

Code No. 8232 (PGD)
Unit 1-9



Allama Iqbal Open University Islamabad

CURRICULUM PLANNING AND EVALUATION-II

Units: 1-9



**Department of Educational Planning,
Policies Studies and Leadership
Allama Iqbal Open University Islamabad**

Disclaimer

The material for the content development of this course were initially collected and prepared from several sources. A substantial amount of effort has been made to review and edit the materials and convert them into this courseware. References and acknowledgements are given as required. Care has been taken to avoid errors, but errors are possible. Please let us know of errors or filed links you discover.

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FORWARD

The course of Curriculum Planning and Evaluation -II(6564) is second one of the two courses offered in the program of study of MA/PGD EPM. The students of Educational Planning and Management are supposed to study these courses for the major purpose of developing an insight in the field of curriculum planning, implementation, review, evaluation and revision. The recent history tells us very clearly how curriculum planning has played a vital role in national development of various countries.

This course focuses on curriculum planning in Pakistan, some review of current schemas and some critique is included for students to think beyond the limits of understanding and application only. The units presented in this book include the phenomenon of curriculum change as well as culture and I curriculum. These are two unique features which need to be explored further at the post graduate level of studies.

The units that discuss the comparative perspectives and innovation in Science and Mathematics curriculum are derived from the thought of globalization and international competitiveness. Our curriculum planners must be familiar with the global perspectives and should be able to enhance our curriculum for enabling our students to compete in the global testing and evaluation.

The testing and evaluation is not only a tool for measuring student achievement but it also helps in assessing the curriculum itself, how far the objectives of the curriculum were achieved, how far the contents could serve the purpose and how successful were the teaching learning experiences? These questions are required to be answered through many means and one of them is testing and measurement.

The initial contributors of this course were Dr. Feroza Yasmin; Dr. Zulkaif Ahmed, Dr. Ronnei Carr, Dr. A.R. Saghir, Dr. Aisha Akber; Dr. Muhammad Ilyas,, Dr. M. Athar Khan Koti, M. Hashim Abbasi, and Mr. Abdullah Khadijm Husain. Now Dr. Afshan Huma has put in her best efforts to revise this course for achieving the enhanced goals of learning at post graduate level. I am sure this revised form of the course book will help you develop a strong understanding and you will feel impelled to study further from reference books and web resources available to you.

Prof. Dr. Nasir Mehmood
(Dean Faculty of Education)

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INTRODUCTION OF THE COURSE

This course is designed for the students of MA-EPM at Allama Iqbal Open University. It is expected that the educators of twenty first century should be able to not only be able to plan the curriculum for specific subjects at various levels but should also be able to evaluate the current schemes of study and program plans. This course will introduce the students to history of curriculum development in Pakistan as well as contemporary trends of curriculum planning in comparative perspectives. The course also includes major initiatives of curriculum reforms specifically in science and mathematics. I am sure that this course will help the students in developing and evaluating different types of curriculum at various levels of education.

Dr. Afshan Huma
Course Coordinator

COURSE OBJECTIVES

After completing this course you will be able to:

1. describe the historical and contemporary trends of curriculum development.
2. determine the importance of testing and evaluation in curriculum development.
3. design, develop and evaluate different types of curriculum.

UNIT-1

**HISTORY OF CURRICULUM
DEVELOPMENT IN PAKISTAN**

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**Reviewed By:
Dr. Afshan Huma**

INTRODUCTION

The history of the curriculum in Pakistan, today, may be traced back to the period when the Prophet of Islam, Muhammad (peace be upon him) started teaching the principles of Islam to the people. In order to appreciate the meaningful development of curricula at various stages in Muslim history, we have started from the development of curriculum in the early Muslim period and traced it through different stages finally upto the present times in Pakistan.

OBJECTIVES

After reading this unit, you should be able to:

1. list curricula offering during the period of the Holy Prophet (peace be upon him), the Omayyads and the Abbassides with special reference to Ghazali and Ibn-e-Khuldun.
2. trace and describe some representative forms of the evolutionary process of curriculum development in the sub-continent of Indo-Pak during the Muslim rule followed by detailed description of subsequent developments down to the present day with emphasis on primary and secondary education.
3. analyse the causes which led the colonial British Government to frame a curriculum that produced white collared personnel in the sub-continent.
4. discuss the guidelines given by the Quaid-i-Azam Muhammad Ali Jinnah for the future development of education in Pakistan in general and curriculum in particular.
5. describe the process of change in curriculum development with special reference to Pakistan.
6. list and appreciate the efforts made by different governments in promoting the cause of education and curriculum through education policies.
7. assess the role of prominent educationists in reshaping curriculum at different stages in Pakistan.
8. discuss the circumstance which led to the formulation of the present national aims and objectives of education and of curriculum in Pakistan, and
9. appreciate the importance of educational planning in the implementation of curriculum in Pakistan.

1. DEVELOPMENT OF CURRICULUM IN ISLAM

1.1 Brief Review of Curriculum Development During the Period of The Holy Prophet (peace be upon him), The Omayyads and Abbasides

It was through education that Islam completely changed the entire fabric of life and living. The Holy Prophet (peace be upon him) started educating people. In his period, instruction was imparted in the following-subjects:

- a) Reading and writing (Arabic)
- b) Quranic education
- c) Learning the Quran by heart
- d) The Fiqha
- e) Mathematical calculations, in respect of distribution of property
- f) Basic medicine: Geneology
- g) Learning foreign languages
- h) Art of sewing masonary and arrow-shooting
- i) Horse riding

Activity-I

Listen the Audios

"The Revolution of Al- Quran & Education during prophet's time and the Era of Khulafa Rashidun."

<https://quizlet.com/84878545/therevolution-of-a1-fluran-education-during-prophets-timeand-the-era-of-khulafa-rashidun-flash-cards/>

During the period of Hazart Umar, the second Caliph of Islam, curriculum also included horse-riding and preparation of armaments besides other subjects

During the- period of Qmayyads & notable progress was made in various fields of education. During this period, curriculum included Arabic Grammar, Rhetorics, Fiqh, Hadith, Mathematics, and Medicine besides the subjects already introduced.

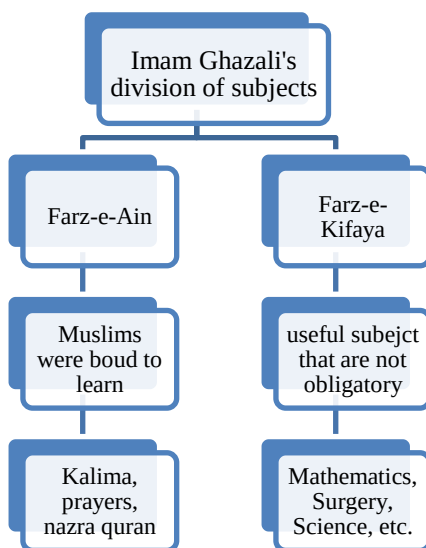
During the period of Abbasside (Banu Abbas), Muslim education visited new lands. Islam had spread to the whole of North Africa, Southern Europe, Middle East, Central Asia and the South East Asian sub-continent. Many new subjects of studies were added. Great progress was made in the field of astronomy and many laboratories were-set up: history and geography' were introduced as new subjects. Many branches of Mathematics, such as Arithmetic, Algebra, Geometry, Trigonometry, were recognised. Philosophy and Ethics gained importance. During the Abbassides period, the curriculum included the-following subjects:

1.	Algebra	2.	Geometry
3.	Ilm-ul-Kalam	4.	Literature
5.	Hadith	6.	Tafsir
7.	Fiqh	8.	Trigonometry
9.	Arithmetic	10.	Plain Geometry
11.	Arabic Grammar	12.	Ilm-ul-Fraiz
13.	Physics	14.	Chemistry
15.	Astronomy	16.	Astrology
17.	Philosophy	18.	History
19.	Geography	20.	Sciences of Medicine and Surgery

Every student was free to take up the subject of his own choice. All the expenditures including expenses on boarding and lodging were borne by the state.

1.2 Contributions of Imam Chazali and Ibn-e-Khuldun

During the 10th and 11th centuries many new subjects of study appeared and there arose a controversy whether to include them in the curriculum or not. Before this, the distinction between important and unimportant, useful and not useful subjects for the students was little cared for. The result was that sometimes unimportant subjects received more emphasis and important subjects were relegated to secondary position. Imam Ghazali realized this confusion and introduced reforms in the curriculum.



He divided the subjects into Farz-e-Ain and Farz-e-Kifaya. Every Muslim was bound to learn about Farze-Ain, subjects which included Kahima, prayers, fasting, Nazra Quran, Fiqh, Hadith, Ilm-ul-Kalam and other essentials relating to fundamentals of Islam. Under Farz-e-Kifaya, he included- useful subjects which were necessary for better living but not

obligatory for all. A few Muslims should suffice on behalf of the Muslim Community by studying subjects under Farz-e-Kifaya.

For the students, Ghazali divided the subjects into three categories: compulsory subjects embraced Arabic grammar and vocabulary, Nazra Quran, Tafsir, Fiqh, Kalam, Ethics and Philosophy. Elective subjects included the Science of Medicine and Suregery, Mathematics, Politics, Literature, History, Geography, all vocational subjects like tailoring, hair-cutting, gardening etc. Subjects not worthy of learning by the students were jugglery, mesmerism, etc.

Activity-II

Substitute some current educational term for the term Farz-e-Ain. Under present circumstances, do you think that some modern subjects can be included under Farz-e-Ain category for the Muslim Ummah? If so mention a few of them.

The curriculum, designed by Allama Ibn-e-Khuldun in his memorable 'Muqaddama', included the following subjects to be taught in schools

1.	Arabic language	2.	Arabic grammar
3.	Tafsir	4.	Fiqh
5.	Hadith	6.	Literature
7.	Ilm-ul-Kalam	8.	Rhetoric
9.	Tasawwuf	10.	Ilm-ul-Fraiz
11.	Mathematics	12.	Algebra
13.	Geometry	14.	Trigonometry
15.	Astronomy	16.	Ethics
17.	Philosophy	18.	Botany
19.	Medicine	20.	History
21.	Geography		

Further Readings

Ibn Khaldun's Concept of Education in the 'Muqaddima' <http://www.muslimheritage.com/article/ibn-khalduns-concept-education%E2%80%98muqaddima%E2%80%99>

Imam A1-Ghazali's views on children's education <http://www.themodernreligion.com/misc/edulghazali-edu.html>

2. DEVELOPMENT OF CURRICULUM IN THE SUB-CONTINENT

Under the Muslim rule, changes in curriculum were introduced from time to time to frame curricula according to Islamic principles. Some of these significant changes are listed below:

- (a) Curriculum which was introduced during the 13th century included Arabic language, Arabic grammar, literature and elementary arithmetic. Besides these

subjects, students were given practical skills in various arts and crafts that were popular in those days.

- (b) In the 17th century, institutions offering Dars-e-Nizamia were established which taught Arabic grammar, Rhetoric, Fiqh, Principles of Fiqh, Ethics, Islamic Philosophy, Ilim-ul-Kalam, Mathematics and Astronomy.
- (c) Akbar, the Great Mughal introduced a curriculum which included morality, arithmetic, algebra, geometry, trigonometry, physics, astrology, Arabic grammar, agriculture, history, geography, political administration, ethics, philosophy and theology. Akbar's curriculum was more of a worldly nature and it included the subjects which were useful in everyday life.
- (d) After the decline of the Mughal empire, the Muslims of India lost their prestige and their condition deteriorated in all walks of life. The British who had succeeded the Mughals tried to destroy the Muslim identity by closing their Madrasses. Shah Wali Ullah was the first Muslim thinker of the sub-continent who tried to reinstate the Muslims once again through education. He worked in a Madrassah known as Madrassah-i-Raheerniyya established by his father. He laid great stress on the moral education of the Muslims. He tried to reform their un-Islamic habits and customs. His curriculum included the Quran, Hadith, Fiqh, Arabic language, Persian language and moral education.
- (e) Encouraged by the success of Shah Wali Ullah, Darul-Uloom Deoband, Nadvatul Ulama Lucknow, Madrassah Jamia Millia, Delhi, were established with stress on religious education and other subjects of everyday use. (But each of these has a typical curriculum model of its own based on its own unique philosophy.) Sir Syed Ahmad Khan was the pioneer of Aligarh movement. He advocated modern education laying greater stress on European sciences. English language and literature with proper scope for religious knowledge.

2.1 Legacy of the British Rule

With the decline of the Mughal empire, East India company had established itself in the year 1600 as purely a trade concern and as such it undertook no educational activity during the first hundred years of its existence. The charter Act of 169, however, required that schools should be established for the Company's Indian employees. As a result of this Act, the company established a few schools, which were called 'Charity Schools', in principal towns such as Bombay, Madras and Calcutta. A few Anglo-Indians were admitted in these schools. The curriculum of these schools was limited to imparting instruction in three "Rs" and the principles of Christian religion.

The activities of the company in the field of education actually began in the decade 1781-91. The first institution, the 'Calcutta Madrassah' was established in 1781. It was a higher institution established for the benefit of Muslim students. The curriculum of the 'Calcutta Madrassah' comprised arithmetic, geometry, Quranic theology, law, logic, grammar and

national philosophy. As such the curriculum was much inferior to the curriculum of higher institutions in the days of Muslim Kings. For example, in Madrasahs built by Akbar, the curriculum included advanced studies in ethics, arithmetic, accountancy, agriculture, geometry, astronomy, economics, physics, logic, natural philosophy- and history. The - curriculum for Muslim students included learning of the Quran, Fiqh, Hadith and Ilum-ul-Kalam while the Hindu students learnt Vedanta and Patan-jili's commentary on "Yoga".

It may be pointed out that during the British period, the word Primary Education and Primary Schools had a connotation different from that of the primary schools of today. The curriculum of the Primary Schools included the study of 3Rs, History of England and of the sub-continent, Geography, Euclidan Geometry and Trigonometry. The number of classes in these schools varied from six to ten.

With Macaulay's Minutes, which he wrote in 1853, education took new turn, and the Minutes gave a new direction to educational activities In the sub-continent. The minutes proposed a new system of education, in which English would be used as the only medium of instruction and all the money earmarked for education would be spent on English education only The Board of Directors in the Despatch of February 1834, doubted the utility of teaching oriental literature but the Committee of Public Instruction did not share these views and favoured retention of oriental subjects of study . This stand of the Committee brought into open the brewing controversy of the Orientalists and Anglicists. The former were in favour of adopting the classical languages, viz., Persian, Arabic and San skit as te medium of instruction, while the latter stuck to English as the only medium of instruction. Arguments countered arguments until in 1835, Macaulay's measures 1radopitig English as the only medium of instruction. According to Resolution of March 7, 1 835, all the funds at the disposal of the Committee were channelised to the cultivation of a knowledge of English literature and science through the medium of English.

In 1837, the government decided to abolish Persian and substitute English as he language of administration. This change made English important for earning of livelihood, and thus contributed substantially to the growth of English Education in the sub-continent.

During the period 1835-54, the missionaries became the pioneers of English education in the Punjab. These schools were established at Lahore. Towards the end of 1954, there were eight Zillah schools (government schools situated at headquarter of districts) in addition to Mission Schools. The subjects of study in these schools included English, geometry and geography. Besides this, by 1854, there were 24 Tehsil Schools (Elementary Schools) in which arrangements for the teaching of 'Three R's, English and Persian were made.

In the Punjab two types of high schools were established. In one of these types no English was taught up to the end of the Matriculation stages. While in the other, teaching of English started in Class IV. In classes VI to VIII, in addition to its being taught as a subject, English became the medium of instruction for several subjects and at the high school stage it was the medium of instruction for all the subjects apart from its being start as a language. The number of high schools, teaching through the mother tongue

eventually faded in almost all parts of the sub-continent. For classes I to III the course of study comprised the three 'R.s' and geography in both the types of schools. In classes IV and V the common course comprised the three Rs and Geography. However, English was taught as a compulsory subject in classes IV and V of the English High Schools, while the students of the corresponding classes in the non- English schools were taught an additional course in Mathematics. In the middle classes i.e classes VI to VIII. the common courses In the two types of high schools comprised Urdu, Mathematics (Arithmetic and Experimental Geometry) History and Geography. English was taught as a compulsory subject in the English High Schools while the students of non English schools III- classes VI to VIII had to study an additional course in Mathematics comprising Euclidean Geometry and Algebra.

The 'Hunter Commission' of 1882 recommended the introduction of vocational courses at the upper secondary stage (two top-classes of a high school). The curriculum of the commercial classes included Mathematics, Modern English, History and Geography. Drawing and Practical Geometry and a Modern Language of the sub-continent. The Punjab University instituted an Entrance Examination in science. Physical education was a required subject for all students who appeared in this examination. Later, Drawing, Agriculture and Physiology were added as additional optional out of which a student had to offer one subject on the lines parallel to the Matriculation examination. It also organized a clerical and commercial examination. The curriculum leading to this examination comprised two sections, compulsory and elective. The compulsory part included English dictation and calligraphy, Precise Writing and Correspondence, General and Commercial Geography, and Book-keeping and commercial Arithmetic. In addition to the compulsory subjects, a candidate had to select one more subject, out of the subjects of Urdu, native system of accounts, and shorthand.

In the Punjab, the first School Leaving Certificate (SLC) examination was not held until 1921. The syllabus comprised two compulsory subjects, viz, English and Arithmetic. (including Commercial Mathematics) and three elective subjects to be chosen either from Group-A or from Group B as given below:

Group-A

- i. Shorthand and Typewriting
- ii. Book-keeping and Commercial Correspondence
- iii. One subject from:
 - a. Language of the sub-continent
 - b. A classical language
 - c. History and Geography.

Group-B

- i. Agriculture
- ii. Physics and Chemistry
- iii. Drawing
- iv. History and Geography

- v. a. A language of the sub-continent or a modern language
- b. A classical language
- vi. Physiology and Hygiene.

The university of Punjab later amalgamated SLC examination and Matriculation Examination in Arts and Science into one known as Matriculation and School Leaving Certificate Examination.

Activity-III

Study the above two groups of subjects and briefly explain the purpose behind these offerings.

2.2 The Hartog Committee

The Hartog Committee, in 1929, emphasized the need of introducing vocational courses including some courses for girls schools as the enrolment in girls schools was increasing day-by-day. In this respect, progress was low. In the Punjab, manual training centres were attached to the secondary schools and instruction was arranged at the time when it was convenient to students and the administration. Vocational form of training had become very popular and therefore soap-making, basket-making, chick-making, rope-Misting, poultry farming and sericulture were introduced in a number of vernacular schools. Now you can well imagine the economic concern of educationists in those days.

2.3 The Punjab University Enquiry Committee

The Punjab University Enquiry Committee in 1932-33 suggested the establishment of Higher Secondary Schools imparting education for 3 years after class IX. It suggested in it apart from schools providing literary education of a purely college preparatory nature, there should be a good proportion of higher secondary schools which should give specialized training in agriculture and military and commercial subjects for adopting them as careers. In 1934, the Sapru Committee recommended the introduction of vocational subjects. As a result, a number of vocational subjects were introduced along with four compulsory subject, i.e English, one language of the sub-continent, History and Geography and Arithmetic.

2.4 Kamal Yar Jang Committee

Kamal Yar Jang Committee was set up by the Muslim Educational Conference to study the educational problems of the Muslims. The Committee recommended diversification of curricula during the last four years of the high school. It recommended the institution of a course in humanities and languages, a course in science, a course in agriculture, a course in commerce and so on.

2.5 Sargent Scheme

The Sargent Scheme recommended that a system of compulsory and free education be introduced for all children upto the age of 14 years, primary school for five years up to the age of 11 and middle stage for 3 years up to the age of 14 and further three years for brighter students who would be sent to High Schools.

2.6 Central Advisory Board

The Central Advisory Board of Education recommended that the high schools should be of two main types, viz.

- i) Academic High Schools, to impart instruction in arts and pure sciences and
- ii) Technical High Schools, to impart instruction in applied sciences and industrial and commercial subjects.

It was, further recommended that the medium of instruction in all high schools should be the mother tongue of the pupils. English should be taught as compulsory second language. All pupils should acquire more knowledge of mathematics and science. Physical training should be obligatory. Rigid distinction between compulsory and optional subjects was discarded. It was considered that the range available should be as wide as circumstances permit and the individual pupil should be allowed to choose according to his interests, and also according to the requirements of his probable future carrier. For girls high schools, domestic science for all at the appropriate stage was included in the curriculum.

In the year 1937 an Educational Conference was held and Mr. Zakir Hussain Jamia Millia Delhi was asked to submit a scheme of educational improvement. This is known as Wardha Scheme. It prepared the syllabi for different subjects for classes I to VII. Another Committee suggested that six types of subjects should be offered at secondary stage. They were recommended as under:

- a) Language, literature and Social Studies
- b) Natural Sciences and Mathematics
- c) Arts
- d) Commerce
- e) Technical and Professional subjects
- f) Domestic Science

The Committee also recommended that there should be a common compulsory core curriculum the subjects. This core curriculum should consist of:

- 1. English
- 2. Urdu (or Hindi)
- 3. Physical Culture and General Knowledge.

Beside compulsory core subjects, students were required to take up three subjects in Humanities and Science.

During the Period 1930-47:

During the period 1930-47, various committees set up to reorganize educational system in the sub continent, forcefully expressed that the educational system needed a drastic reorientation. A shift from pure academic course to technical and professional courses was the keynote of all recommendations. In spite of all these recommendations and

attempts, no substantial change was seen when Pakistan emerged as an independent Muslim stage.

Further Reading

“Study of Curricula Development”

http://shodhganga.inflibnet.ac.in/bitstream/10603/15747/8/08_chapter%204.pdf

2.7 Self-assessment Questions Exercise No. 1

1. State how the curriculum introduced by Imam Ghazli was different from the one introduced during the period of Banu Abbas.
2. What kind of reforms were introduced by Shah Wali Ullah in the curriculum during Muslim rule in the sub-continent, and what were their results?
3. Macaulay's Minutes (1853) are considered to be an important document in the history of education in the sub-continent. Discuss why?
4. How and when did the vocational subjects find their way in the curriculum? Which reports recommended their introduction?
5. Fill in the Blanks:
 - i. Kamal Yar Jang Committee recommended _____

 - ii. Institutions offering Dars -e- Nizami taught the subjects of _____

 - iii. In 1837 the British Government made a decision that compelled the people in the sub-continent to learn English. What was the decision?

 - iv. What provision was made particularly for Muslim students in curriculum of 'Calcutta Madrassah'?

 - v. Horse-riding formed a part of curriculum during the period of _____

6. Tick True or False against each of the statements given below:

- | | |
|---|-----|
| i. History and Geography were introduced as subjects of study during the period of Banu Abbas. | T/F |
| ii. Imam Ghazali divided the subjects into five categories. | T/F |
| iii. IIm-ul-Kalam was included as a subject of study in the Daras-e-Namazi in India in the Mughal period. | T/F |
| iv. Persian was abolished as a language of administration in 1837. | T/F |
| v. Vocational subjects were introduced in the sub-continent in 1934. | T/F |

3. CURRICULUM DEVELOPMENT SINCE 1947

Pakistan, as you know, came into being as an independent country in 1947. At this time, the University of Punjab was the main body governing the preparation of curricula of the secondary stage and higher education in West Pakistan. However, primary education was the responsibility of the provincial governments. The Punjab University conducted two examinations, at the end of the high school stage, viz., the Matriculation Examination and the School Leaving Certificate Examination (SLC).

Following were the main groups of subjects offered.

Group A: Compulsory Subjects

1. English
2. Mathematics or in the case of girls, Arithmetic and Domestic Arithmetic and Household Account
3. History and Geography.

Group B: Elective Subjects

1. Pakistani languages such as Urdu, Punjabi, Pushto, or a foreign language, say, French or German.
2. A classical language Arabic, Persian, Hebrew, Latin, or Greek
3. Physics and Chemistry
4. Drawing
5. Agriculture
6. Physiology and Hygiene or Civics and Hygiene or Domestic Economy for girls only.

For School Leaving Certificate Examination, compulsory subjects were:

1. English
2. Arithmetic including Commercial Arithmetic for those taking up Group A Compulsory. or Algebra for those taking up Group B - Elective.

Group A: Elective

- a) Shorthand and Typewriting
- b) Bookkeeping and Commercial Correspondence
- c) One subject out of the following:

- i. A classical language (as for Matriculation)
- ii. A Pakistani language (as for Matriculation)
- iii. History and Geography
- iv. Civics and Hygiene.

Group B

- a) Agriculture
- b) Civics and Hygiene
- c) Physics and Chemistry and (d) One more elective from
 - i. Languages
 - ii. Drawing
 - iii. History and Geography
 - iv. Civics.

Gradually, School Leaving Certificate Examination became so unpopular that nobody took this examination in the year 1950 and 1951. From here we switch over to the first education conference in Pakistan.

3.1 Educational Conference, 1947

The Quaid-i-Azam Muhammad Ali Jinnah had a great faith in education as a potent factor in realizing his aim of making Pakistan a truly Muslim state. He lost no time and directed that an Education Conference be called as early as November, 1947. In his message to the Pakistan Education Conference, 1947, he laid down the future education policy by saying:

"You know that the importance of education and the right type of education cannot be over-emphasized. Under foreign rule for over a century, sufficient attention has not been paid to the education of our people, and if we are to make real, speedy and substantial progress we must earnestly tackle this question and bring our educational policy and programme on the lines suited to the genius of our people, consonant with our history and culture, the modern conditions and vast developments that have taken place all over the world." (10:p.8)

Activity-IV

Derive principles of curriculum-making from the above policy statement of the Quaid-i-Azam.

On another occasion the Quaid-i-Azam remarked:

"The future of our state will and must greatly depend upon the type of education we give to our children and the way we bring them up as future citizens of Pakistan. Education does not merely mean academic education.' There is an urgent need for giving scientific and technical education to our people in order to build up our future economic life and to see that our people take up science, commerce, trade and industry. At the same time, we have to build up the character of future generation. We should try by sound education, to

instil into them, the highest sense, of honour, integrity responsibility and selfless service to the nation."

Activity-V

Indicate the character traits emphasized by the Quaid-i-Azam and express your - personal opinion.

The first Education on Conference of November/December, 1947, gained importance because of-the guidelines offered by the participants of the future plans and educational programmes. Mr. Fazalur Rehman, the first Education Minister of Pakistan, while supporting the views expressed by the Father of the Nation in his message, remarked:

"Our existing educational system, as originally conceived by Macaulay, was intended to serve a narrow utilitarian purpose and its growth, has been largely a matter of artificial improvization. It has rightly been condemned for task for task of realism and inability to adjust itself to the needs of a rapidly changing society, for its own literary bias and for its soul-less character. It is inspired by no lofty idealism. It has no common faith nor it is governed by sound ethical principles or high intellectual standard. It has, therefore, conspicuously failed to inculcate and maintain the stern moral and intellectual discipline which is the hall-mark of our true culture. The growing realization of these great deficiencies and their paralysing effect on national life inevitably bread acute dissatisfaction in the minds of all thinking people, and has in the recent years led to a considerable concentration of energies in a complete overhaul of or entire educational structure." (10: p.12)

Consequently in the Conference it was emphasised that Pakistani & have now before them the opportunity for reorientating their entire educational policy to correspond closely with times and to reflect the ideals for which Pakistan as an independent state stands.

Since curriculum is the nerve system of education, continuous efforts have been made to modify it and to improve it. Commissions and Committees undertook review of curricula as an exercise. Significant efforts made in this direction are summarized below:

3.2 Punjab University Commission 1950-52

The Commission observed that the school curricula did not provide for enough diversification to suit the ranging tests and aptitudes of the students. The Commission recommend that courses in the middle schools should consist of certain basic subjects such as Religious Education, Physical Instruction, Urdu, Mathematics, History and Geography, Practical Arts and one language from amongst Urdu, English, Persian, Arabic, Bengali, French, Latin, etc. it was considered that this would give the students of the age 11-13 a sound general education. For secondary stage, there should be a few compulsory subjects and a few electives to be chosen from the various groups (one from each group) such as:

1. *Languages:* Urdu, Persian, Arabic, Bengali, trench, German, Latin, etc.
2. *Social Sciences:* History, Geography, Elementary Civics, etc.
3. *Natural Sciences:* Physics, Chemistry, Biology, Domestic Science, etc.

4. *Mathematics:* Algebra, Geometry, Drawing, etc.
5. *Arts and Music:* Drawing, Painting, Designing, Modeling, Eastern Music, Western Music.

The Committee emphasized that each stage should be treated as complete and the courses of studies should be designed on the basis of continuous process for the whole unit.

3.3 Six Year National Plan of Educational Development

It was on 18th and 19th July, 1951, that Mr. Fazalur Rehman, the Central Education Minister, invited Provincial Education Ministers, Secretaries, Vice-Chancellors and other high ranking officers in a Conference at Karachi, to determine the basis for the preparation of the Six year National Plan of Education Development of Pakistan.

As regards the secondary school curriculum in general the Conference made certain suggestions. It was observed that generally for the students of the age range 13 plus to 16 plus differentiation in the interests and abilities of the pupils had long been considered to have been taken care of by following two main lines, viz. Humanities and Science and Mathematics. However, educational experience and psychological research justify greater differentiation with less broad divisions into groups of subjects. The different nation of curriculum should not take form of exclusive compartmentalization, but courses of study should be organized by laying more emphasis on those subjects for which the pupil shows greater inclination. For instance, a pupil may study two or three modern languages in addition to the core subject; another may study physics, chemistry or biology; yet another may study the outline of World History including Islamic History, Elementary Economics and Elementary Civics.

Another positive shift was towards the ideological basis of education. It discussed in detail the “ideological rationale of Pakistan” which would need an educational system corresponding more or less to the ideological rationale of the country. With this basic philosophy in view, the principal objectives of the new plan were enumerated as:

1. To organize education on the basis of the objectives resolution to be embodied in the Constitution of Pakistan.
2. To achieve as comprehensively as possible during the period of six years an integrated and balanced development of education.
3. To provide health and physical education.
4. To eradicate illiteracy from the country.
5. To provide equal opportunity to all.

It also recommended 5 years Primary, 3 years Middle and 3 years Secondary education pattern. The new structure was to provide in total, eleven years schooling upto secondary level and three years instruction at the under-graduate level. When this proposal was referred to the Inter-University Board, it was accepted readily.

When recommendations for reforms were being made, Pakistan did not have uniform pattern of education. The duration of secondary education in Karachi, Sindh, as seven

years of schooling at the Primary level. In the Punjab, Khyber Pakhtunkhwa and Baluchistan, the duration was five years, beyond five years of Primary education. The President, Karachi Board of Secondary, 'Education, suggested the following pattern:

1.	Pre-primary	2 years	age level	3+ to 5+
2.	Primary	5 years	age level	5+ to 10+
3.	Secondary			
	a. Lower level	3 years	age level	10+ to 13+
	b. Secondary	3 years	age level	13+ to 16+
	c. Higher secondary.	2 years	age level	16+ to 18+

Karachi proposal, in essence, as we see, corresponded to the educational practices in Great Britain under the Education Act, 1944. Rejecting the Karachi Scheme for structural and curricular reorganization and leaving it to the mental exercises of its experts, the authors of the plan decided to stay within their limited scope. The Central Government had no constitutional control over education in the provinces and, therefore, no worth mentioning development could take place. However, diversification of courses was accepted by all.

Activity-VI

Compare the structure design of the Six Year National Plan with that of the Karachi Proposal. Find out the major differences between the two, if any.

3.4 Board of Secondary Education, Lahore (1957)

First five-year plan (1955-60) favoured the creation of Board of Secondary Education to take over the change of conducting the public examination at the Secondary Education level. The Board proposed in its meeting that there should be two public examinations, one at the end of class X and the other at the end of class XII. The Board in their sitting on the 15th of March, 1956, approved the following scheme regarding the courses of study for the two stages of Secondary Education:

(a) High School Stage

- i. Religious Education shall be the qualifying compulsory subject. Where Religious Education could not be provided, ethical or Moral Education was temporarily approved.
- ii. **Compulsory Subjects**
 - a. Urdu one paper (to be taken by those not offering Urdu elective)
 - b. English two papers (not to be taken by those offering English group)
 - c. Social Studies two-papers (paper A, History and Geography, and paper, Civics, Health Education and Vocational Guidance).
- iii. Candidates were required to offer one of the following groups in addition to the compulsory subjects:

Group-I (Humanities)

Any three of the following subjects:

- | | | | |
|------------|----------------|---------------------|--------------------|
| 1. History | 2. Geography | 3. One language | 4. Art and Drawing |
| 5. Music | 6. Mathematics | 7. General Science. | |

Group-II (Science)

- | | |
|--------------------------|--------------|
| 1. Physics and Chemistry | 2. Geography |
|--------------------------|--------------|
3. Biology or any subject from 1 to 3 listed under the Humanities Group.

Group-III (Oriental)

- | | | | |
|----|-----------------------|----------------------|----------------------|
| a. | 1. Arabic two papers | 2. Persian one paper | 3. Urdu one paper or |
| | 1. Persian two papers | 2. Arabic one paper | 3. Urdu one par or |
| | 1. Urdu two papers | 2. Arabic one paper | 3. Persian one paper |
- b. Any one subject excepting a language from Humanities Group.

Group-IV (Technical)

One of the following courses with cognate subjects (the entire group was equal to three subjects or six papers):

- | | |
|---------------------|----------------|
| 1. Industrial Arts | 2. Commerce |
| 3. Home Science | 4. Agriculture |
| 5. Military Studies | |

Group- V (English)

- | |
|---------------------------------------|
| 1. English advanced level, two papers |
| 2. Any other group. |

(b) Higher Secondary Stage (1)

As for the higher secondary stage, the decisions taken by the Board were as under:

The following were the qualifying compulsory Subjects:

- i. Physical and Health Education.
- ii. Urdu (one paper) for those who had not passed the Secondary School Certificate Examination of the Board of Secondary Education, Lahore..

The following were compulsory subjects:

- i. Social Studies three papers (paper-A Pakistan, its constitution, resources and problems in the context of World Affairs and paper-B and C, Foundation Studies two papers.
- ii. English two papers.

Candidates were required to offer one of the following groups in addition to the compulsory subjects:

Group-I (Humanities)

Any three of the following subjects:

History, Economics, Geography, Psychology, Civics, Statistics, Mathematics, Religions of the World with Special Emphasis on Islam, Music, Fine Arts, one Language.

Group-II (Medical)

- | | | |
|-------------|------------|--------------|
| 1. Biology, | 2. Physics | 3. Chemistry |
|-------------|------------|--------------|

Group-III (Engineering)

- | | | |
|----------------|------------|--------------|
| 1. Mathematics | 2. Physics | 3. Chemistry |
|----------------|------------|--------------|

Group-IV (Oriental)

The same subjects as for Secondary School Examination.

Group- V (Technical)

One of the following courses with cognate subjects. The entire group was equal to three subjects or six papers:

- | | | |
|----------------------------|---------------------|-----------------|
| 1. Industrial Trade Course | 2. Commerce | 3. Home Science |
| 4. Nursing | 5. Military Studies | 6. Agriculture |

All papers carried 100 marks each. A Subject consisting of two papers for instance carried 200 marks.

3.5 Karachi Board of Secondary Education, Karachi.

Karachi board of secondary education was established in 1950. The Karachi Board recommended two types of public examinations at the end of class X:

- i. Secondary School Leaving Examination (General).
- ii. Secondary School Leaving Examination (Technical).

The course of study leading to the SSLE (General comprised of two sections compulsory and elective. The compulsory subject included):

1. Physical Education
2. Religious Education (both non-examination subjects)
3. English (mother tongue and non-mother tongue)
4. Urdu (mother tongue and non-mother tongue)
5. Mathematics (Arithmetic, Geometry, Algebra)
6. General Science or Domestic Science for girls only).

Elective Subjects

Two elective subjects from any one of the groups. listed under:

Group-I

- | | | |
|--------------|------------------------|-----------|
| 1. History | 2. Geography | 3. Civics |
| 4. Economics | 5. Elementary Commerce | |

Group-II

1. Physics and Chemistry
2. Domestic Science (not for those who take domestic science in lieu of general science).
3. Physiology and Hygiene

Group-III

1. Commercial mathematics
2. Algebra, Geometry, Trigonometry.

Group-IV

1. Biology
2. Geography and Geology
3. Engineering Science

Group-V

Arts and Practical Arts

Group- VI (Language)

- | | |
|------------|-------------|
| 1. Arabic | 2. Persian |
| 3. Latin | 4. Sanskrit |
| 5. Gujrati | 6. Bengali |
| 7. Urdu | 8. Sindhi |
| 9. French | 10. Hindi |

For the School Leaving Examination (Technical)

Compulsory Subjects

1. Urdu
2. Practical English
3. Mathematics (practical Arithmetic and algebra)
4. Mathematics I and- II (Plain Geometry, Trigonometry, Mensuration and Solid Geometry, and
5. Physics and Chemistry

In addition to the compulsory subjects, a candidate was required to offer Engineering Drawing or Engineering Science (Applied Mechanics and Applied Electricity).

The first-five year plan proposed without any reservation, a school system that would include both academic and vocational disciplines in an integrated scheme of work.

3.6 The Commission on National Education (1959)

Now you enter upon a big educational development in the history of Pakistan since 1947 The Commission, as you know, was appointed by the Pakistan Government In December, 1958 and its report was submitted on August 26, 1959. The Preamble of the Commission Report states:

"Whereas the educational system of Pakistan is not adequate to meet the needs and requirements of the nation, it has become necessary to set up a 'competent body to review, in consonance with the aspiration of the people of the country, the educational system and to recommend appropriate measures for its reorientation for the purpose of ensuring an integrated and balanced development of the education at various stages.

In order to bring about full development of the child as (a) an individual (b) a citizen (c) a worker, and (d) a patriot, schools offering, besides a basic core of subjects, should include a range of optional subjects suited to a student's talent and related to our social and cultural needs.

3.7 Curriculum Committee for Secondary Education

In July, 1960, the Government of Pakistan appointed the Curriculum Committee for Secondary Education for implementing the recommendations of the Commission on National Education. The Committee was headed by the late Professor Taj Muhammad Khayal. The Committee had the following objectives in view:

- (i) To formulate the curriculum and syllabi for secondary education in conformity with the recommendations of the Commission to ensure the realization of national objectives which may be summarized as under:
 - a) Projection of trained manpower, educated citizenry and competent leadership for the country.
 - b) Training of students to lead productive public lives and full personal lives according to their talent and interests,
 - c) Maintenance of the freedom, integrity and strength of Pakistan.
 - d) Preservation of the moral and spiritual values of Islam, which emanate from the concept of a universe governed by the principles of truth, justice, benevolence, equality and universal brotherhood.
- (ii) To maintain uniform academic standard throughout the country.
- (iii) To draw up a general scheme of studies for secondary education by integrating into its scheme for studies the three parts of secondary education (a) classes VI to VIII (b) classes IX to X and (c) classes XI to XII.
- (iv) To lay down the broad principles for the guidance of Committee of courses for framing detailed syllabi in individual subjects.
- (v) To 'examine' and coordinate the syllabi prepared by the Committee of course and to ensure that they constituted an integrated and harmonious whole.

The Committee consists of 47 members drawn from institutions and other members concerned with education. The Curriculum Committee on Secondary Education recom-

mended a comprehensive programme of wide variety for adoption in all types of secondary schools from middle stage to higher secondary stage. The Committee was conscious of the sporadic efforts made in the past which lacked cooperation; therefore, it made a sincere effort to coordinate and integrate the work done in middle, secondary and higher secondary schools.

The general scheme of education for middle stage classes Vito VIII was as under:
Required courses, with number of periods allotted:

Subject	Periods allotted per week
1. Urdu	8
2. English	8
3. General Mathematics	7
4. Social Studies	5
5. General Science	5
6. Religious Education	8
7. Physical Education	2
8. One each from both the groups of subjects	3

(a) Arts and Crafts

Clay-modelling, Toy-making, Basketry, Pottery, Fabric Printing, Leather Work, Puppetry, Book-binding, Weaving, Cane and Bamboo Work and such other crafts as may be prescribed.

(b) Art and Practical Art

Wood Work, Metal Work, Applied Electricity, Agriculture and Gardening, Fish-culture, Home Economics and other Practical Arts as may be prescribed.

Electives

One of the subjects: Arabic, Art, Bengali, Dancing, Gujrati, Music, Paki, Pushto, Punjabi, Persian, Sanskrit, Sindhi, Urdu and such other subjects as may be prescribed.

Variety of activities were offered at middle stage, through which the special aptitudes and interests of the children may be discovered to enable them to choose appropriate careers or subsequent courses of study at the higher stage of learning.

Secondary Stage (Classes IX-X)

Required Courses

Urdu 200 marks; English 200, Social Studies 100, General Mathematics 100, General Science 100. Physical Education 100, Manual work 72 hours of work during the year.

Elective

Any of the following groups:

1. Humanities Group

Subjects carrying 100 marks so as to make a total of 300 marks.

- a. Mathematics or Household Accounts (for girls only)
- b. History

- c. Geography
 - d. Islamic Studies
 - e. Art
 - f. Geometrical and Technical Drawing
 - g. Classical languages: Arabic, Persian, Greek, Sanskrit etc.
 - h. Modern languages of the world
 - i. Physiology and Hygiene
 - j. Health and Physical Education-
 - k. Civics
 - l. Elementary Economics
 - m. Music
 - n. Outline of Home Economics
 - o. Such other subjects, as may be prescribed
 - p. One paper of 100 marks from any other group not included in the list.
- 2. Science Group**
- a. Mathematics
 - b. Physics
 - c. Chemistry
 - d. One subject out of Biology, Physiology and Hygiene. Geometrical and Technical Drawing, Geography, one pair carrying 100 marks on a subject not included above.
- 3. Commerce Group**
- a. Business Methods and Correspondence
 - b. Commercial Geography
 - c. Arithmetic and Book-keeping
 - d. Type working
- 4. Industrial Arts Group**
- a. Mathematics
 - b. Physics
 - c. Chemistry
 - d. Any two subjects out of Metal Work, Wood Work, Applied Electricity. Pottery and ceramics, Leather Work. Ornamental Arts and Crafts. Weaving, Geometrical and Technical Drawing, Building Construction, Cane Work. Tailoring. Confectionary and Bakery, such other subjects as may be prescribed.
- 5. Home Economics Group**
- a. Chemistry, Physics and Biology
 - b. Food and Nutrition. Social Science
 - c. Elementary Botany. Horticulture and Gardening
 - d. Elementary Zoology, Animal Husbandry and Fisheries
 - e. Mathematics or a paper carrying 100 marks from any other group.

Total Marks

700 for required subjects and 300 or 400 marks from the six groups of the subjects, so as to keep the total of maximum marks between 1000 and 1100.

Activity VII

Discuss the term “Humanities” and “Home Economics” and indicate their most significant contribution for our Social welfare.

Higher Secondary Education (classes XI and XII)

Required Courses

1. Urdu
2. English
3. Physical Education (non examining subject)
4. Manual work (non-examining)

Elective Courses

1. *Humanities Group*
 - a. General History or Islamic History
 - b. Economics
 - c. Geography
 - d. Military Science
 - e. Logic
 - f. Psychology
 - g. Civics
 - h. Statistics
 - i. Islamic Studies
 - j. Outline of Home Economics
 - k. Music
 - l. Fine Arts
 - m. One of the Modern Languages of the world
 - n. Commercial Practice
 - o. Health and Physical Education
 - p. Such other subjects as may be prescribed.
2. **Science Group**
 - a. Mathematics
 - b. Physic.
 - c. Chemistry
 - d. One subject out of Biology. Physiology and Hygiene, Geometrical and Technical Drawing, Geography. One paper carrying 100 marks on a subject not included above.
3. **Commerce Group**
 - a. Book-keeping
 - b. Principles of Commerce
 - c. Economics and Commercial Geography.

- 4. Technical Group**
 - a. Applied Mathematics
 - b. Applied Science
 - c. Engineering Drawing
 - d. Workshop Practice and Survey
- 5. Home Economics Group**
 - a. General Science, Food and Nutrition
 - b. Clothing and Textile and Applied Art
 - c. Family Life and Home Management.
- 6. Nursing Group**
 - a. Nursing and First Aid - Anatomy, Physiology and Hygiene practical and oral.
 - b. Anatomy and Physiology, Health of mother and child and dietetics practical and oral
 - c. Two or more subjects from other groups.
- 7. Islamic Studies Group**
 - a. Arabic
 - b. Quran and Hadith, Fiqh and Usool-e-Fiqh
 - c. Islamic History and Culture.
- 8. Military Science Group**
 - a. War
 - b. Military History
 - c. Economics of War'
 - d. Military Geography
 - e. Defense of Pakistan
 - f. Special Military Studies.
- 9. Agriculture Group**
 - a. Agriculture part I and II
 - b. Two or more subjects carrying 400 marks from any other group.

At the higher secondary stage, the commission prescribed five subjects in all: two required and three elective. Required areas of study were English. Urdu or Bengali carrying 200 marks each, while three electives were to be selected from 10 groups carrying 200 marks each, so as to make the total of 1100 marks.

The Commission also recommended two public examinations for 9th and 10th classes separately for Secondary School Certificate Examination.

In the manner explained above, the Commission on National Education, 1959, recommended a diversified curriculum in secondary schools. The proposed curriculum was, to be both terminal and college preparatory.

3.8 The Curriculum Development Process Since 1970

Reform

It may be noted that the process of curriculum reform in Pakistan has been introduced as part of the successive series of national education policies (Table 1).

Table 1. Education policy and curriculum reform cycle

National Education Policy	Curriculum reform cycle
1972	1st Cycle, 1973-76
1979	2nd Cycle, 1982-85
1992	3rd Cycle, 1992-95
1998	4th Cycle, 1998-01

The following six-phase strategy has been adopted for implementing curriculum change:

1. Evolution of curriculum objectives (by level);
2. Development of scheme of studies (by level);
3. Development of syllabus of each subjects;
4. Development of textbooks/instructional materials;
5. Review/approval of textual material;
6. Teacher training.

Developing objectives

Curriculum objectives are basically derived from the recommendations of National Education Policy, national level seminars and other forums (e.g. forums of the Inter-Board Committee of Chairmen (IBCC) and research studies conducted at provincial curriculum centres). The NBCT prepares the draft of objectives; which are widely circulated among the provincial institutions responsible for curriculum development, teacher training and examination. Based on their views/comments, these objectives are finalized. They are subsequently translated into the specific teaching objectives for various subjects. Several factors are considered in finalizing curriculum objectives; including the requirements that objectives should: (a) be precise; (b) assist in the selection of teaching strategy; (c) produce (or contribute to) a designated behaviour pattern; (d) enable the teachers to measure or evaluate the quality and effectiveness of learning.

The studies scheme

The scheme of studies is based on three key factors: (1) the national education policy; (2) market demand; (3) global issues that relate to new or contemporary education dimensions. Task work in this area is undertaken with active participation of the provincial government, research organizations and experts; as well as feedback from the 1B-CC.

Development of syllabi

Based on the objectives and scheme of studies, subject specific syllabi are prepared in consultation with: provincial curriculum centres; subject experts; and psychologists and serving teachers. Collectively, they ensure that the syllabi, in all respects, satisfy the following conditions:

1. They are based on the needs of the learner/child;
2. They take into account the existing knowledge and environmental experience of the learner;
3. The developmental level of the learner is considered in the cognitive, effectiveness and psycho-motor domains;
4. The contents should be focused on attaining the objective(s).

Textbook development

Provincial Textbook Boards (PTBB) are responsible for development of text-books according to the approved syllabi. Established lists of textbook writers in various subjects are kept. From these lists, invitations are issued to writers to submit draft materials within the prescribed syllabus parameters. Selections are made on the basis of the quality and relevance of materials submitted to local situations. Finally, the selected materials are transformed into textbooks; the final versions of which are sent to the NBCT for approval.

Review and approval

A National Review Committee, comprising five or six members includes: at least one expert from the Syllabus Formulation Committee; two subject experts; two school teachers (one teaching the relevant material and one from a teacher-training institute). On receipt of textual materials from PTBB, this committee conducts textbook reviews based on the following parameters: (a) the book truly reflects the curriculum; (b) it meets the objectives stated in the curriculum; (c) the book does not contain any material repugnant to Islamic and Pakistani ideology.

In the case of approval, the textbook is sent back for publishing and distribution. In case of objection, the specific complaints are relayed along with revision recommendations.

3.9 Curriculum Planning Before 18th Amendment

	Curriculum Wing Ministry of Education	Regional/Provincial level • Local Authorities • Inspectors • Teacher's Choice	School level • Heads • Teachers • Communities
Aims and objectives	National aims, as reflected in the National Educational Policy	Evaluation/study reports of curriculum centers provide change direction	Some aims of effective domains are suggested by teachers
Curriculum plan	National framework: syllabus and Weightage	Introduce unique cultural/regional aspects, including mother tongue	Scheme of work., adjustment of time-table, provision for co-curricular activities, exams
Methods and approaches to learning	Teacher-training courses are designed, also in-service teacher	Teachers' colleges implement training programmes (pre-service)	Practice different methodology
Materials	Provincial textbooks are reviewed/approved by Federal Ministry through National Review Committee	Provincial Textbooks Boards commission writers and select material on merit basis	Representation of teachers. in the National Review Committee
Evaluation and examination	Inter-Board Committee of Chairmen, co-ordinate activities of the Exams board.	Board of Education holds exams	Trained teachers set the papers and evaluate the script

3.10 Current Practice

In Pakistan four distinct systems of education and examinations are being followed i.e. public school system, private school system, Deeni Madaris system and non-formal education system. Each one follows different curricula and assessment systems resulting in wide range of inequalities and disparities. Uniformity in curricula and standards has, therefore, become a matter of great concern. The abolition of Concurrent Legislative List under 18th Constitutional Amendment which fully devolved education to the provinces has added yet another dimension of uniformity in standards amongst various provinces/areas. This has raised national and global concerns for uniformity in curricula and standards. All the federating units realized the need for creation of national forum to address these concerns constituted a national coordinating body called National Curriculum Council (NCC) consisting of three members from each Province/Area, one each from Curriculum Bureaus, Textbook Book Boards, and Education Department. NCC has been constituted to function under the Ministry of Federal Education and Professional Training. NCC is mandated to serve as a professional, advisory and consultative national body to steer and guide the development of curriculum in close collaboration and consultation with all the federating units to ensure minimum quality standards from Early Childhood Education to Grade XII. Following are the main functions of NCC:

Functions of NCC National Curriculum Council

- Develop Minimum National Standards in all subjects and for all grades (pre-primary to XII)
- Development of National Curriculum Framework in consultation with all stakeholders.
- Conduct research in Curriculum, teachers' training and assessment.
- Develop Linkages and networking amongst all concerned institutions at both the national and international levels.
- Coordination, development and revision of uniform minimum quality standards in curriculum.

National Curriculum Council, Secretariat

National Curriculum Council, Secretariat has been established in Curriculum Wing, Islamabad to facilitate and assist NCC in undertaking various activities relating to curriculum development across the country. The Secretariat is providing technical support to NCC for development of minimum national standards and National Curriculum Framework (NCF). The Secretariat is headed by Joint Educational Advisor. He is assisted by Deputy Educational Advisers, Assistant Educational Advisers and Education Officers. Three sections i.e. 1) NCC framework Standards, 2) Quality Assurance in Learning and Assessment and 3) Research and Evaluation have been created in the NCC, Secretariat. Each Section is headed by Deputy Educational Adviser.

Progress Until April 2017

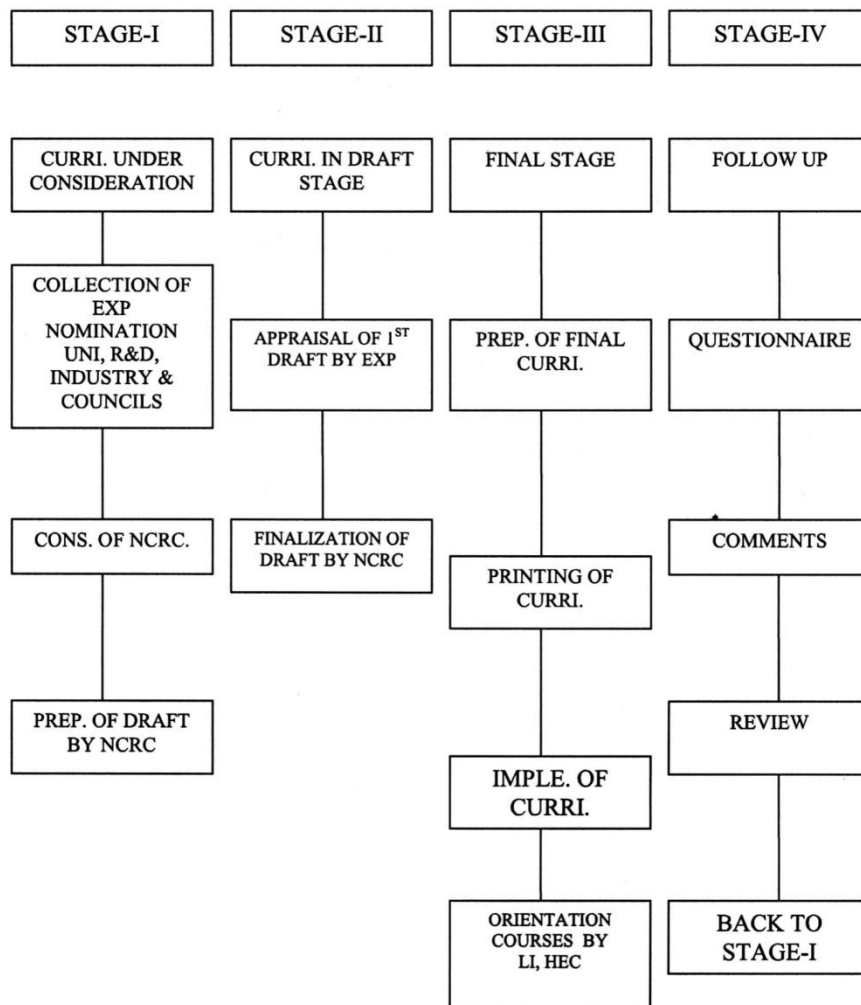
The minimum Standards for Quality Education in Pakistan have been developed in consultation with all federating units which was approved by Inter Provincial Education Ministers Conference (IPEMC). This document contains standard in respect of learners,

curriculum, textbooks and learning materials, teachers, assessment, early learning and development and school environment. These standards ensures uniformity and compatibility in school curriculum across various federating units. The report has been printed and disseminated to all provinces/ areas to guide them in revision of school curricula and development of teaching and learning materials. These standards have been followed for revision of curricula and development of teaching and learning materials by various federating units.

Draft National Curriculum Framework has been developed in consultation with all provinces areas. The draft report of the NCF has been circulated to all provinces/ areas, private sector, universities and other stakeholders. The NCF has focused on the objectives of education in view of the goals contained in various national policies. The NCF contains the broader guidelines for revision and development of curricula and provides guidelines on different aspects of curriculum such as teacher training, teaching and learning materials development, teaching and learning environment, assessment, evaluation and research, information sharing and harmonization. Three consultative workshops had been held in which representatives from all federating units participated. The representatives from federating units reviewed the draft NCF and gave their recommendations/ views which are being incorporated. After incorporating the recommendations of all the stakeholder, the NCF will be submitted to NCC for approval.

Up till now seven meetings of National Curriculum Council have been held. In these meetings various issues pertaining to curriculum development, and quality standards have been discussed. Curriculum on Accelerated Learning Program has been developed in collaboration with JICA. National Curriculum Council (NCC)

3.11 Process of Curriculum Development at Higher Education



Abbreviations Used:

NCRC	National Curriculum Revision Committee
VCC	Vice Chancellor's Committee
EXP	Experts
COL	Colleges
UNI	Universities
PREP	Preparation
REC	Recommendations
LI	Learning Innovation
R&D	Research & Development Organization
HEC	Higher Education Commission

4. CURRICULUM DEVELOPMENT UNDER VARIOUS EDUCATION POLICIES

From 1970 onwards various governments formulated Education Policies and took steps to implement them effectively. In these policies there were clear directions for Curriculum. The following Education Policies were announced under which curriculum were also reformulated.

4.1 New Education Policy, 1970

New Education Policy was formulated in March 1970, with the following basic concepts inspiring the goals/and guidelines of education development

- a) Preservation and inclusion of islamic values**
The role of education in the preservation and inclusion of Islamic values as an instrument of national unity and progress.
- b) Reorientation of islamic values**
Reorientation of educational programmes laying more emphasis, on scientific, technical and vocational education.
- c) Education as an instrument of change**
Role of education as a instrument o social change and development and as a factor in the creation of opportunities of education.
- d) Quality in education**
The paramount importance of quality in education and the crucial role of teachers in the improvement of educational quality.
- e) Decentralization of education administrations**
Decentralization of educational administration to ensure academic freedom and administrative and financial autonomy required for healthy and efficient growth of educational institutions particularly at the higher stage.

a) Curriculum

It was recommended to set up curriculum committees at appropriate levels to design curricula suited to the needs of each stage of education, Curriculum development, however should be viewed as an integrated and continuous process. It as therefore, recommended that each province should have a permanent Bureau of Curriculum Development for supporting activities of the various agencies concerned with curriculum development, e.g. Teacher Training Institutions, Textbook Boards and the Secondary Education Boards. The Ministry of Education was expected to continue to coordinate the formulation of national policies in curriculum development and preparation of text books and other learning materials. The policy laid down some principles for the development of curriculum for elementary and secondary schools.

b) Elementary Curriculum

The curriculum should be inspired by Pakistan's national objectives. The curriculum of elementary schools should be redesigned around basic linguistic and numerical skills and

manual and production work to suit the practical needs of everyday life. The aversion to manual work should be countered by relating the curriculum to the physical and social environments of the children which will make elementary education more responsive to the needs of society. With view to developing the children's analytical and problem – solving skills, teaching of science should be introduced at the elementary stage in the form of the study of nature and the environment.

c) Secondary School Curriculum

The policy, recommended that the curriculum at the secondary stage should be redesigned with particular emphasis on science and technical subjects and manual arts. A large number of students should be diverted to technical. agriculture and industrial streams designed to prepare them for absorption in the economic life of the country.

As the regime which floated the ideas of New Education Policy was short lived, the recommendations could not be carried out but they prepared the ground for the next Education Policy.

4.2 Education Policy 1972-80

1. Building up national cohesion
3. Maturing total personality
4. Providing a comprehensive programme of studies

Education Policy 1972-80 was introduced with the objectives of:

1. **Preservation ,Promotion and Practice of basic ideology of Pakistan**
Ensuring the preservation promotion and practice of the basic ideology of Pakistan and making it a code .of individual life.
2. **Building up national cohesion**
Building tip national cohesion by promoting social and cultural harmony compatible with our basic ideology through the conscious use of the educational process.
3. **Maturing total personality**
Building up and maturing the total personality of the individual dynamic creative and capable of facing the truth as it emerges from the objective study of reality: an individual who should be able to comprehend fully the nature of technical and social change and having deep concern for the improvement of society.
4. **Providing a comprehensive programme of studies**
Providing a comprehensive programme of studies through the integration of general and technical education and. by keeping option open to transfer from One course of study to another. (3:1)

(i) Curriculum Development

The relevant decisions in the Education Policy relating to curriculum development and revision were as follows:

- a) Designing curriculum relevant to the nation's changing social and economic needs compatible with our basic ideology and providing a massive shift from general education to more purposeful agro-technical education.
- b) Curricula, syllabi and textbooks will be revised to eliminate overloading, to emphasize learning of concepts and skills and to encourage observation, exploration, experimentation, practical work and creative expression.
- c) The system of elementary education will be so designed that the knowledge and skills imparted, attitudes formed and the learning methods employed will ensure that those proceeding to secondary education can be usefully absorbed into the economy of the local community. For those leaving school after class VIII, special course of training in the skills of their vocational interests will be provided in the school workshop. It is essential that children who drop out after class VIII should carry with them enough skills to return to their local or ancestral vocation as better farmers or craftsmen.
- d) The integration of general and technical education will equip secondary and college students for gainful employment.
- e) Education will be introduced as an elective subject for matriculation, intermediate and degree levels.
- f) An integrated science course, including mathematics, biology and physical sciences will be introduced at the high school and intermediate stage.

The Ministry of Education, Curriculum Wing, Islamabad, asked the provisional Bureau of Curriculum to frame curricula in all subjects at primary stage.

The first initiative for formulation of curriculum was taken by Bureau of Curriculum Research and Development, Lahore, in 1973. A meeting of curriculum framers and educationists was convened at the Education Extension Centre, Lahore where approaches to curriculum designing were discussed and prominent educationists addressed the participants. A sample curriculum of all the subjects at primary stage was presented by the Punjab which served as the guideline for the curriculum framers of other provinces.

A National Committee of Curriculum in each subject was formed which discussed the provincial draft curricula in each subject and the final draft was prepared and approved by the Ministry of Education in each subject in 1974. The curriculum for classes I to III was introduced in 1974. Textbooks were prepared under the guidance of curriculum framers.

Micro testing of the curriculum in the subjects of Urdu, Social Studies, mathematics and Science as done before introducing the curricula in all the schools. After micro testing Some of the concepts were deleted, others modified and some added.

After the introduction of primary school curriculum, similar steps were taken to prepare and Implement the curricula for the middle and high stages.

Revised curriculum up to class X was introduced by 1976 Curriculum of teacher education courses was also revised. Semester system was introduced in teacher training colleges in B Ed, CT, and PTC classes. One year course for these classes was introduced.

Recommendations for three years elementary teacher training and three years B Ed after FA/F.Sc were made. Three years scheme has not been introduced in Elementary Colleges. but three years B Ed course was adopted by some training institutions.

Activity-VIII

How do you view the idea of three years BA/B.Sc, B.Ed course after Intermediate?
Think over it for five minutes and record your opinion point-wise.

4.3 National Education Policy 1978

You will recall the an educational conference was convened in 1977 to review the slate of education in the country, and to suggest ways and means to bring it in line with our faith and ideology. The government directed that this conference should be a major step in the search of an indigenous education policy. It was attended by eminent scholars, educationists, journalists, lawyers, vice-chancellors etc. The conference examined and redefined the aims the nation should attempt to realize through education. National aims of education in conformity with the lofty principles of Islam, our rich cultural heritage and our socio economic needs and requirements were incorporated in the Education Policy. Some of these objectives were:

a) Foster in the hearts and minds of the people

To foster in the hearts and minds of the people of Pakistan in general and the students in particular a deep and abiding loyalty to Islam and Pakistan and a living consciousness of their spiritual and ideological identity thereby strengthening unity of the outlook of the people of Pakistan on the basis of justice and fair play.

b) Create awareness

To create aware these in every student that he, as a member of Pakistani nation, is also a part of the universal Muslim Ummah and that it is expected of him to make a contribution towards the welfare of fellow Muslims inhabiting the globe on the one hand and to help spread the message of Islam throughout the world on the other.

c) Produce citizen fully conversant with Pakistan movement

To produce citizens who are fully conversant with the Pakistan Movement, its ideological foundations, history and culture so that they feel proud of their heritage and display firm faith in the future of the country as an Islamic State.

d) Development of a true Muslim

To develop and inculcate in accordance with the Quran and Sunnah, the character, conduct and motivation expected of a true Muslim.

e) Promote and strengthen scientific, vocational and technological education

To promote and strengthen scientific, vocational and technological education, training and research in the country and to use this knowledge for socioeconomic growth and development thereby ensuring a self-reliant and secure future for the nation.

Evidently, these aims formed the basis for determining the content of education at all levels.

The most important criterion of relevance and adequacy of curricula is the ideological basis of Pakistan and the needs and aspirations of the nation. It had, therefore, got to be ensured that knowledge, attitudes, and skills to be imparted at all levels, were in line with the teachings of the Quran and Sunnah.

i. Recommendations of the conference, however, could not be implemented because of a number of reasons. In the National Education Policy clear decisions and programme for the revision of curricula and textbooks had been included.

Recommendations regarding curriculum were as under:

- i. The entire curricula and textbooks will be reviewed to ensure that adequate content on Islam and Islamic ideology is included; that due coverage is given to instructional materials aimed at the promotion of national cohesion and integration. Textbooks of all levels will also be revised to ensure that Islamic ideology is protected and high academic standards are maintained.
- ii. In order to avoid overloading and overlapping, integrated curricula and textbooks will be introduced. At the primary level more weightage will be given to practical work and creative activities so that children could gain desired attitudes and skills.
- iii. The Textbooks Boards will be reorganised to improve their efficiency. Effective liaison will be established between the National Book Foundation and the Textbook Boards.

(ii) Programme

The programme outlined for the implementation of the recommendations of the policy regarding curriculum was, as given below:

- ◆ The entire curricula and textbooks will be reviewed to ensure inclusion of adequate content on Islam, ideology of Pakistan, and promotion of national cohesion and integration.
- ◆ University Grants Commission will undertake review of curricula and textbooks for higher education programmes to bring them in consonance with the ideology of Pakistan and principles of Islam. The new curricula will duly emphasize latest knowledge and developments in scientific disciplines in particular.

- ◆ Evaluation studies of the existing curricula will be undertaken to identify strengths and weaknesses of the existing curricula.
- ◆ Integrated curricula and textbooks will be introduced in class I and II from the year 1979-80.
- ◆ At the primary stage more weightage will be given to the practical work and creative activities so that children could gain desired attitudes and skills.
- ◆ The component of agro-technical education, already introduced at middle and secondary stages, will be evaluated and the programmes will be made production oriented.
- ◆ The process of curriculum development will be improved by proper emphasis on research studies. Field testing will be given due importance.
- ◆ The revised curricula will be implemented in a phased manner.
- ◆ National/Provincial curriculum development agencies will work in close collaboration and involve adequate number of students and teachers.
- ◆ Supplementary reading materials for children and teachers guided/manuals for teachers will be prepared for the enrichment of experiences of students and teachers.
- ◆ In order to make the teacher-learning process more effective, laboratory equipment and instructional aids/kits will be provided.
- ◆ A standing committee of the National Education Council on Curriculum and Textbooks will be constituted to review the existing curricula and textbooks for improvement and to identify textbooks which can be prescribed throughout the country.
- ◆ The Ministry of Education will undertake a review of all the textbooks prescribed by the English medium schools. These textbooks and auxiliary materials will require approval by the Ministry of Education.
- ◆ Possibilities of introduction of common textbooks in selected subjects at different levels will be examined.
- ◆ Textbook Boards will be reorganized to improve quality of textbooks and to ensure their in time availability. Professional staff will be recruited by the Boards for editing, printing, production, research and development. The existing staff will be provided inservice training for effective performance of their functions.

- ◆ Supply of quality paper at cheaper rates will be arranged for the Textbook Boards. The Boards will be allowed to import paper duty free. Import of other machinery required by the Boards will also be made duty free. Adequate facilities for printing, storage and distribution will be developed.
- ◆ The textbooks will be supplied to all the students at the primary level. As envisaged in the Fifth five year plan, the teachers will be made responsible for distribution and maintenance of these books. The books will be retrieved for subsequent use.
- ◆ The Provincial Governments and Textbook Boards will provide sufficient subsidy to keep the prices of textbooks within the reach of common man.

(iii) Implementation of the Recommendations of Education Policy 1978

Steps were taken to implement the recommendations of the Education Policy concerning curriculum such as:

- a) As a first step towards the implementation of Education Policy a National Text book Review Committee was setup in which a number of educationists participated. The Committee reviewed the textbooks of all levels and deleted all the material, which in any way was not in line with the 'Quran' or 'Sunnah'. The text books, the revised were reprinted by the Textbook Boards.
- b) The research institutions such as Curriculum Centres/Bureaux undertook research and curriculum issues, including their evaluation and revision.
- c) An intensive evaluation of curricula of agro-technical subjects was undertaken.
- d) The curricula of Deeni Madrassahs were reviewed to make them in line with the Quran and Sunnah on one side, and with the demands of the modern age on the other. The work was undertaken by a national committee set up for the purpose.
- e) A project for preparation of integrated curricula and text books for classes I and II was undertaken by the Ministry of Education in collaboration with The Curriculum.
- f) Programmes of inservice of education of teachers at Primary and Secondary level were undertaken by various organizations such as the Ministry of Education and Provincial Education Extension Centres. Allama Iqbal Open University has also undertaken the training of primary school teachers through correspondence course implemented by radio television lessons and workshop.
- g) The scheme of studies for intermediate level (classes XI and XII) was revised so as to lay more emphasis on Mathematics and integrated science course. General Mathematics was made compulsory for all groups.

- h) School teachers were trained for practical work and research.

(iv) Second World Conference on Muslim Education

One of the recent landmarks in the history of curriculum development was the Second World Conference in Muslim Education, “Islamic Concepts and Curricula” which was held in Islamabad in 1980. This Conference classified the subjects into two categories: subjects containing ‘Perennial’ knowledge, and subjects containing ‘Acquired’ knowledge, but recommended the integration of both as under.

A - Group-I, Perennial

- (i) Al-Quran
- a) Recitation (Qirah), Memorization (Hafz) and Interpretation (Tafsir)
 - b) Sunnah
 - c) Sirah of the Prophet peace be upon him), his companions and their followers (which covers the early history & Islam)
 - d) Tauhid
 - e) Usool-i-Fiqh
 - f) Qureanic Arabic

(ii) Ancillary Subjects

Islamic Metaphysics, Comparative Religion, Islamic Culture.

B - Group- II Acquired

To be divided into the following sub-categories:

- a) Imagination (Arts) Islamic Arts and Architecture, Languages, Literature.
- b) Intellectual Science: Social Studies (Theoretical). Philosophy, Education, Economics, Political Science, History, Islamic Civilization, Geography, Sociology, Linguistics, Psychology, Anthropology.
- c) Natural Sciences (Theoretical): Philosophy of Science, Mathematics, Statistics, Physics, Chemistry, Life Sciences, Astronomy and Space Science, etc.
- d) Applied Sciences: Engineering and Technology, Medicine, Agriculture and Forestry.
- e) Practical: Commerce, Administrative Sciences (Business Administration, Public Administration).
- f) Library Science, home Sciences, Communication Sciences (Mass communication, etc.).

It was recommended that the above branches of acquired sciences should be taught from the Islamic point of view. Islamic schools of thought should be established in all branches of social studies.

4.4 Curricular Development in the Light of National Educational Policies Gulam Haider 2016*

After the independence of Pakistan, the first educational conference was concerned in Karachi in 1947 to restructure and reshape the whole process of education including the process of curriculum in order to make curriculum effective and responsive to the needs of the country. But, the fruitful results could not be achieved. Therefore, in 1959 the on education was set up to review the whole education system of the country. Although, it was time consuming task, it produced an explicit framework for promoting education in Pakistan aiming at restructuring the education system. The objectives of education were elaborated and emphasis was laid on the overall development of an individual through education process so that he/she could become effective member of the society. But due to several reasons, our education system was not to fully achieve the desired objective.

In late 1960s, it was realized that there was and to formulate new education policy in order to bring about changes in the education as a whole. This policy also focused on the quality education and character building of the young generation that appeared to be marvelous on paper other than putting these ideas into practice through the curriculum. After a few years a new government took over and announced another educational policy in 1972 for a period of 8 years which provided a comprehensive list of objectives of education including the promotion of ideology of Pakistan, building national cohesion by promoting social and cultural harmony among people, nurturing the total personality of the individual, mobilizing the youth for leadership roles. It was proposed that these objectives can be achieved through the translation of curriculum, to classroom practice. For example; the Educational Policy (1972-80) mentioned that 'relevant curricula will be prepared in line with the nation's changing social and economic needs compatible with its basic ideology and to provide a. massive shift from general education to more agro technical education' (Government of Pakistan 1972). In the light of the above policy objectives, the curricula at the primary, secondary and tertiary levels were revised and implemented in the educational institutions but the policy could not fully achieve its targets. However, another educational policy was introduced in 1979. This policy also retained more or less the same objectives of the past policies. However, this

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policy laid an emphasis on the individual as a good Muslim and making him/her effective member of Muslim Ummah. Education Policy emphasised the need for creating awareness in every student that he/she as a member of Pakistani nation was also a part of the universal Muslim Ummah and that it was expected of him/her to contribute towards the welfare of fellow Muslims. In line with the National Education Policy 1979, a gigantic task of restructuring or renovating curriculum was done to ensure that adequate content on Islam and Islamic ideology was included and due coverage was given to instructional materials aimed at promotion of national cohesion and integration. Textbooks of all levels were revised to ensure that Islamic ideology was protected and high academic standards were maintained. The concept of an integrated curricula and textbooks was also reinforced. At the primary level, more emphasis was given to practical work and creative activities so that children could gain desired attitudes and skills. However, Education Policy 1979 clearly stated that before revising the existing curriculum, the evaluative studies will be undertaken to identify strengths and weaknesses of the existing curriculum which seemed an encouraging trend to develop curriculum in line with findings of evaluative research. In the past, looking at the curriculum and text-books it appears that no systematic research/evaluation were conducted to develop bases for the revision and restructure of the curriculum. Therefore, our process of curriculum development was more relied on their intuitive knowledge and arm chair research approach of curriculum planners who failed to consider the reality of instructional and learning milieu. However, there vision of curriculum and textbooks has become a regular feature without much improvement. Our school curriculum has to be based on research so that the balanced and coherent curriculum and textbooks could be developed. This can only be possible by developing expert personnel responsible for the preparation and production of books. After a period of about years a new National Education Policy was announced called the National Education 1992-200 which emphasised the importance of an Islamic order enabling the students to understand the message of the Holy Quran, imbibe the spirit of Islam, and appreciating its world view in the context of scientific and technological advancements. This policy endorsed some of the factors such as limited financial resources, poor appreciation of educational priorities inadequate delivery system, population pressure, low participation of education, poor quality of teaching, overloaded textbooks, lack of self-learning etc. The National

Education Policy 1992-2002 further revealed that our education system has not been able to build the capacity of human capital which could provide high rates of return to society. In order to develop institutional capacity building, policy envisaged the improved quality of public instruction, textbooks, evaluation techniques, and teachers training, the most important thing was that it highlighted the importance of redefining the 'role of teachers. The Educational Policy further provided the seventeen principles as a conceptual framework to restructure the education system in the country. However, some measures were taken to renovate curriculum in line with the above conceptual framework. It would have been better 'if these measures were based on research outcomes. Like other educational policies, this policy also seemed to be based on rhetoric rather than reality.

Following the National Education of 1992-2002, the Government of Pakistan announced the current National Education Policy in 1998 which also emphasised the importance of the 'curriculum as a central covenant of educational development' which needed major reforms. It suggested the starting of a new cycle of curriculum development at all levels of education by professionals. who are trained in the science of curriculum development; bringing about cognitive compatibility between-one level of curriculum and the next eliminating unnecessary overcrowding objects in the curricula and allowing the production of competitive textbooks in the private sector 'with the possibility of different books to be prescribed by different institutions. This issue had also been highlighted in the Eighth Five Year Plan (1993-98) that the education would be improved through "Qualitative improvements of physical infrastructure, curricula (by making the courses demand-oriented), textbooks, teacher training programmes, and examination system at all levels of education" (Government of Pakistan 1994, p.300). However, research has not been considered as an integral part of curriculum development and evaluation process.

4.5 Self-assessment Questions -Exercise No. 2

1. In what way does the present curriculum for classes Vito X differ from that of pre-independence period?
2. Analyse the general trend in curriculum reforms since 1959
3. How would you inculcate the spirit of unity and integrity among the students through general curriculum at the secondary stage.
4. Compare the recommendations regarding curriculum reforms contained in the two education policies of 1972 and 1978 and highlight the main differences.
5. Fill in the blanks:
 - i. Education Policy 1960 could not be implemented because _____

 - ii. Micro-testing of the curricula was carried out to _____

 - iii. The chief criterion of relevance and adequacy of curricula is _____

 - iv. List three main problems which in your opinion, have caused slow implementation of education policy, 1978 _____

 - v. A National Textbook Review Committee reviewed the text books in 1979 for the purpose of _____

6. Tick True or False against each of the statements given below:
 - i. The First Education Conference was held in Karachi in November, 1947. T/F
 - ii. The Curriculum Committee for Secondary Education was appointed in 1960 for implementing some of the recommendations of the Committee on Education. T/F
 - iii. The Education Commission, 1959 recommended one public examination for class X. T/F

- iv. The 1972-80 Education Policy recommended the introduction of Education as a subject at Intermediate and Degree levels. T/F
- v. The Second World Conference on Muslim Education held in Islamabad in 1980 generally classified the subjects into two categories viz. 'Perennial' and 'Acquired'. T/F

4.6 Answers to Self-assessment Questions - Exercises No. 1 & 2

Exercise No.1

Q 1 to 5: For answers to questions No. 1-5 see the relevant portions of the unit

Q 6: (i) True (ii) False (iii) True
(iv) True (iv) True

Exercise No. 2

Q 1 to 5: For answers to questions No. 1-5 see the relevant portions of the unit.

Q 6: (i) True (ii) True (iii) False
(iv) False (v) False

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UNIT-2

**ROLE OF TESTING AND
MEASUREMENT IN
CURRICULUM**

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INTRODUCTION

We are all familiar with the terms "testing and measurement" There are other ways of student assessment but testing and measurement play a vital role in academic planning. It has always had a powerful influence on decision making about how and what teachers teach and is thus an important source of feedback on the appropriateness of curriculum content. Fulfilling the diverse objectives of diagnosis, certification and accountability requires different kinds of instruments and strategies selected to achieve specific purposes. Testing and measurement could be done in summative or formative evaluation, and there are various types of tests to address different needs such as standardized tests, performance-based tests, ability tests, aptitude tests and intelligence tests.

Specifically for the curriculum developers, reviewers and evaluators it is most important to keep getting the data driven information. This data provided through testing and measurement gives the planners and curriculum developers an evidentiary warrant to improve not only the selected content and methodologies but even the objectives.

All curricula, no matter what their particular design, are composed of certain elements. A curriculum usually contains a statement of aims and of specific objectives; it indicates some selection and organization of content; it either implies or manifests certain patterns of learning and teaching, whether because the objectives demand them or because the content organization requires them. Finally, it includes a programme of evaluation of the outcomes.

This unit deals with the last and final element of the curriculum "a programme of evaluation office outcomes". The outcomes of the curriculum are conceived in terms of what the pupil has achieved in the school or class or subject.

For a moment, let us get back to your school days with particular reference to examinations. Your teacher or someone else asked you one or more questions orally or gave you a printed question paper. What you said or wrote in response to the questions indicated the level of your achievement in a particular subject or in your school subjects in general. Your position in the class and whether or not you were promoted to the next higher class, or awarded a pass certificate, was determined by your answers to the examination questions.

Activity-I

Think for while and try to verbalise the definitions of testing, measurement and pupil evaluation. While down your definition of these terms in the spaces provided below:

i. Testing

--

ii. Measurement

iii. Pupil Evaluation.

Read the following in the context of your own experience as a school student:

Testing: A question or a set of questions asked orally or given to you in a printed form: your answers to these questions were assessed in order to determine what you had achieved during the course of your education in the school. This is **Testing**.

Evaluation: Your measured achievement in the examination was one thing. In the process of your examination, your teachers generally got together to ascertain or judge the level of your achievement or performance. Evaluation. Procedures used to determine whether the subject (i.e. student) meets preset criteria, such as qualifying for special education services. This uses assessment remember that an assessment may be a test) to make a determination of qualification in accordance with a predetermined criteria.

Measurement, beyond its general definition, refers to the set of procedures and the principles for how to use the procedures in educational tests and assessments. Some of the basic principles of measurement in educational evaluations would be raw scores, percentile ranks, derived scores, standard scores, etc.

Reference: Assessing Learners with Special Needs: 6TH ED. By Terry Overton

C. V. Good's Dictionary of Education (3e ed., 1973, defines these components as below:

Testing: "use of tests, usually some specific instrument or set of instructions, to determine a certain quality or trait or a series of traits."

Educational Measurement: "a broad term for the general study and practice of testing, scaling, and appraisal of aspects for which measures are available and of the individuals undergoing the educational process: includes the theory-of test and scale construction, validation and standardization, interpretation of test results, objective and subjective evaluations, and the application of statistical techniques of the interpretation of obtained measures"

Evaluation: "the process of ascertaining of-judging the value or amount of something by rise of a standard of appraisal; includes judgment in terms of internal evidence and external criteria".

Activity-II

In the space provided alongside each of the following terms, write down the meaning of each term as you now understand it

Testing:	
Measure- ment	
Pupil Evaluation	

OBJECTIVES

Having gone through this unit intensively, you are expected to:

1. Differentiate amongst terms like testing, measurement, evaluation etc.
2. Identify different components of curriculum.
3. Review the role of testing and measurement in curriculum with reference to the following:
 - i. instruction,
 - ii. pupil evaluation,
 - iii. curriculum development.
4. Identify and explain the different fundamentals of testing.

1. WHAT CONSTITUTES THE CURRICULUM?

Now for a moment let us turn back to the beginning of this unit. Read the definition of the term 'curriculum' again. You would note that a curriculum has four basic components which are: (1) a statement of aims and specific objectives, (2) contents, (3) patterns of learning and teaching, and finally (4) an evaluation of the outcomes. In the following sections we would discuss each one of these components of curriculum and also explain the role of testing and measurement along with that.

1.1 Statement of Aims and Specific Objectives

In the context of a curriculum, the aims usually connote broader goals of education. They are stated in terms which are not easily measurable. For example, the aims of teaching Urdu in classes IX and X, as formulated by the National Bureau of, Curriculum and Textbooks, Ministry of Education (1975) include the development (in the student) of the sentiments of love, sacrifice, and sincerity for Islam and Pakistan; development of respect for the national flag and awareness of its rules, etc.

By objectives, we mean not the broad aims of the teaching/education, or what form it will take, or even what subject matter it will include, but simply, what will the student be able to do, as a result Of the teaching that he/she was unable to do before'. The specific objectives of teaching Urdu in classes IX and X, for example, are to enable the students to read Urdu as a living and developing national language; to gain knowledge through reading and listening; to express themselves through speech and writing, and so on. You can see' that all these objectives have been formulated in behavioral terms and are measureable in terms of achievements of the students.

1.2 Contents

The selection of the contents of a course is determined by the objectives of a curriculum. It includes the textbooks, lectures and lecture notes, assignments and such other materials and activities which the teacher or the school considers necessary for the achievement of the objectives of the curriculum.

1.3 The Pattern of Learning And Teaching

The pattern of learning and teaching includes all the activities of students and teachers, classroom practices, schedules and the conditions under which the teaching and learning of the contents of a course take place.

1.4 Evaluation of Outcomes

Evaluation of outcomes of the curriculum provides feedback on the nature and attainability of the objectives of the curriculum, the relevance and teach ability of the course contents and their meaningfulness to the teachers and the students; and the effectiveness of the patterns of learning and teaching.

The formulation of the objectives, we know, is fundamental to the process of curriculum

planning. So much so that the selection of contents of a course and patterns of teaching and learning are dependent upon it.

If the objectives occupy such an important place in the curriculum, there must be some criteria to judge whether or not these objectives are realistic and attainable, and whether the contents of the course and the way they are taught and learnt, make the achievement of these objectives possible. Since the specific objectives of the curriculum are formulated in terms of behavioral changes in the students, the test results of students are the best measure of the degree of the achievement of these objectives and the value of the contents and the pattern of learning and teaching.

In Pakistan, testing and measurement have had only a limited application at different levels and in various branches of education. A review of the situation relating to the practices of internal and external examinations in this country indicates that at all times, the attention of educationists, educational planners and administrators and teachers has been focused mainly on the evaluation function of testing and measurement. Tests have, therefore, been used for promoting students to a higher class, for grouping them for the purposes of distribution, identification, and professional education, and for qualifying them for a job or training. The educational and developmental functions of testing and measurement have generally been ignored. This situation, besides creating other problem, has also contributed to deterioration in the standards of education, and has led to curricula which have failed to fully achieve the national goals of education.

The recent controversy over the continuation or discontinuation of the semester system in our educational institutions is also based on the problems caused by the policies and practices of the examination system relevant in our schools, colleges and the universities.

An objective analysis of the situation would reveal that the role of testing and measurement in the curriculum has not been properly conceived by the educational policy makers, planners, administrators and the institutions in this country. There is a dire need to do extensive research work and explore the role of testing and measurement in the context of curriculum and instruction.

Activity-III

Pick up a copy of the curriculum of any class and course. Visit a school and discuss it with the course teacher with special reference to the following:

- a) the objectives of the curriculum
- b) the contents of the course
- c) teaching/learning experience
- d) the role of testing and measurement in teaching and learning.

Take a note of your finding on this space.

2. ROLE OF TESTING AND MEASUREMENT IN CURRICULUM

Decisions concerning student placement in courses often have strong implications for the success of implementation efforts and the distribution of effects across various student groups. Evaluations must carefully document and monitor the range of student preparation levels that teachers must serve, the advice and guidance provided to students and parents as to what curricular choices are offered, and the levels of attrition or growth of student learning experienced over a curricular evaluation study period by students or student subpopulations. Another important aspect to consider here is that not all curricula materials are implemented in the same way. In some schools, the full curricula are covered, while in others units may be skipped or time limitations at the end of the year may necessitate abandoning the last ones in the sequence. Even within units, topics can be dropped at teachers' discretion. Thus, it is important for evaluations to document what teachers teach. Opportunity to learn is a particularly important component of implementation because it is critically involved in examining differential student performance on particular outcomes. It can be evaluated directly using classroom observation or indirectly through teacher and student logs, or by surveying teachers and students on which items on an end-of-year test were covered.

The evaluation of the outcomes of the curriculum through the process of testing and measuring student achievement has the following rules:

- i. Instructional
- ii. Pupil evaluation
- iii. Curriculum development

2.1 The Instructional Role of Testing and Measurement

According to Thorndike and Hagen, when properly used, testing and measurement serve the following purposes in the teaching learning process:

i. Motivation

Tests that are well constructed and effectively used can motivate pupils to develop good study habits, to correct errors, and to direct their efforts to the achievement of instructional goals.

ii. Diagnosis and Instruction

Testing serves to diagnose weaknesses and provide practice for available knowledge and skills. The items on which an individual fails or on which many members of a class or group fail can serve to identify points which necessitate further study whenever the test task is sufficiently precise for the nature of the failure to be identified. The function of a test as a rehearsal of knowledge and as a guide for further study has long been recognized.

iii. Defining Testing Objectives

What a teacher would like to emphasize in his evaluation of pupils, and particularly

in the more formal evaluation represented by tests. he must define the same as teaching objectives and provide instruction to his pupils? We may know a teacher by the tests he makes. They tell what he is truly valuing in his pupils even though he himself does not know it and they influence profoundly what his pupils will learn.

iv. Differentiation and Certification of Pupils

The teacher appraises individual differences among his pupils, determines his suitability for the next higher class or for a particular course or subject and reports to parents or other teachers the progress of the student on the basis of what they value the student to be. The 'value' of student's performance serves as the basis for differentiation and certification.

2.2 Pupil Evaluation

Formative or embedded assessment refers to the system of classroom assessment that occurs during the course of normal classroom teaching and is designed in part to inform subsequent instruction. Often assessments are included in instructional materials, and attention must be paid to how these are used and what evidence they provide on curricular effectiveness. It is particularly helpful when teachers use multiple forms of assessment, so that one can gauge student progress across the year on tests, quizzes, and projects, including conceptual development, procedural fluency, and applications. It is also important that such testing provides evidence on the variation among students in learning and creates a longitudinal progression on individual student learning. More and more, schools and school districts are working to coordinate formative assessment with high-stakes testing programs, and when this is done, one can gain an important window on the relationship between curricula and one standardized form of student outcomes. Because it is in schools with large numbers of students performing below expected achievement levels that the high-stakes testing and accountability models exert the most pressure, it is incumbent upon curriculum evaluators to pay special attention to these settings.

The pupil evaluation according to B. W. Tuckman, has the following uses in the process of learning and teaching.

i. To Give Objectivity to the Observations of a Teacher

In the process of teaching and learning a teacher has to be constantly observant of student's behavioural changes and his performance. The tests serve as tools for observing student behaviour as objectively as possible. If a teacher depends upon his ordinary observation of student, the former may or may not be objective.

ii. To Elicit Behaviour Under Relatively Controlled Conditions

The tests are generally administered under controlled conditions. The effects of the variables which might influence the students performance are as far as possible, therefore, eliminated in testing.

- iii. **To Sample the Performance of Which a Student is Capable**
The tests measure a sample performance of the student, which makes it possible to cover a larger area of a student's behaviour or performance,. The test-results so obtained can be used for better evaluation.
- iv. **To Determine Performance and Measure Gains Relevant to Goals or Standards**
The tests provide a measure of student performance against the predetermined goals or standards.
- v. **To Apprehend the Unseen or Unseeable:**
The tests, if properly used, give the teacher insight into the student behaviour which is not possible otherwise.
- vi. **To Detect the Characteristics and Components of Behaviour**
The tests provide an opportunity for the observation of student behaviour in small units, which are not easily distinguishable.
- vii. **To Predict Future Behaviour:**
The test-results offer data which can be used for predititing student's performance in future tasks in other areas of education.
- viii. **To Make Data Available/or Continuous Feedback and Decision Making:**
The test-results are used for informing tke students about the quality of their performance and for helping the teacher in making decisions about his patterns of instruction.

Self-assessment Questions - Exercise No.1

1. Differentiate between the following terms:
 - i. Measurement
 - ii. Evaluation
2. How are measurement and evaluation related to curriculum? Explain.
3. How fans pupil evaluation important in the process of teaching and learning? Explain with examples.
4. Tick True or False given against the following statements of aims and objectives:

a. Curriculum usually contains a statement of aims and objective.	T/F
b. Measurement is the quantitative aspect of evaluation process.	T/F
c. According to C. V. Good, there are four components of pupil evaluation.	T/F
d. Tests can be used for motivating students in the diection of achieving instructional goals.	T/F

2.3 Role of Testing and Measurement in Curriculum Development

In examining the effectiveness of curricula, student outcome measures are of critical importance. One must keep in mind that the outcomes of curricular use should be the documentation of the growth of mathematical thinking and knowledge over time. We sought to identify the primary factors that would influence the perceived effectiveness of curricula based on those measures.

Most curricula evaluators use tests as the primary tool for measuring curricular effectiveness. Commonly used tests are large-scale assessments from state accountability systems; national standardized tests such as the SAT, Iowa Test of Basic Skills (ITBS), or AP exams or the National Assessment of Educational Progress (NAEP); or international tests such as items from the Third International Mathematics and Science Study (TIMSS). Among these tests, there are different choices in terms of selecting norm-referenced measures that produce national percentile rankings or criteria-referenced measures that are also subject to scaling influences. At a more specific level, assessments are used that measure particular cognitive skills such as problem solving or computational fluency or are designed to elicit likely errors or misconceptions. At other times, evaluators report outcomes using the tests and assessments included with the curriculum's materials, or develop their own tests to measure program components.

For evaluation studies, there can be significant problems associated with the selection and use of outcome measures. We use the term "curricular validity of measures" to refer to the use of outcome measures sensitive to the curriculum's stated goals and objectives. We believe that effectiveness must be judged relative to curricular validity of measures as a standard of scientific rigor. In contrast, local decision makers may wish to gauge how well a curricular program supports positive outcomes on measures that facilitate student progress in the system, such as state tests, college entrance exams, and future course taking. We refer to this as "curricular alignment with systemic factors."

One should not conflate curricular validity of measures with curricular alignment with systemic factors in evaluation studies. Additionally, whereas the use of measures demonstrating curricular validity is obligatory to determine effectiveness, curricular alignment with systemic factors may also be advised.

In the preceding pages you have learnt about the educational and evaluative roles of testing and measurement in the context of curriculum. The tests and measurement also have the following roles in the development of the curriculum.

2.4 Testing the Objectives of Curriculum

The process of test construction and the results of students performance on the tests provide criteria to evaluate the nature and attainability of the objectives of curriculum. While preparing the test blue-print and outlining the objectives of the test, a teacher can immediately detect if there is any ambiguity in the objectives of the curriculum, and whether or not it has relevance to the particular course work of the student. Similarly, if the test result shows a high rate of student-failure in achieving certain objectives of the curriculum, it might well be concluded that either the objectives have been formulated

unrealistically or something is wrong with the process of selection of the content, or patterns of learning and teaching. In any case, attention is first drawn to the objectives of the curriculum and if everything else is alright, it points to reformulation and revision of the objectives, thereby making it more realistic and attainable.

2.5 Testing the Contents

The test results of the students also reflect on the quality of the contents of a course and provide answers to the following questions:

- a) Are the contents of the course too difficult, too easy, or just about right? Student's performance on a test and their behavior during the test tell the teacher how well the students have followed the contents of the course. Course content which is above the children's mental age level might result in answer which would be indicative of immaturity of response. Similarly the answer of the students to the test questions may also show their over-maturity and their knowledge of something more than what he prescribed course content presents. A teacher might well evaluate the contents of a course objectively on the basis of the performance of students on a test, and suggest improvements and revision in the contents.
- b) Do the course contents have relevance to 'the objectives of the curriculum? While preparing the test blue-print, and selecting contents for constructing test questions or test items, one may become aware of the degree of relevance or Irrelevance of the contents which have been selected for achieving the objectives.
- c) Is the amount of content proportionate to the time available for teaching? Although a teacher and his students become aware of the amount of content of a course during their teaching and learning sessions, student performance on a test (or at least the sample of test items selected from the course) provides objective feedback on the length of the course.

2.6 Testing and Patterns of Learning and Teaching.

Beside their other functions, outlined above, the tests are also a dependable criterion for judging the effectiveness of the methods of teaching, the facilities available for teaching and learning a course, and the schedule of teaching etc. The test results of students are not only the measures of the students' ability to learn and to benefit from the facilities provided by the school; they also tell us a lot about the effectiveness or otherwise of the methods of teaching, a teacher's ability to teach, the facilities provided for teaching of a course, the schedule for teaching it, the students habits of learning.

By now you should have acquired an understanding of the place and role of testing and measurement. in the process of curriculum planning and organization. You must be wondering about the role of testing and measurement in relation to the curriculum of different levels of education in Pakistan.

The internal and external examinations prevalent in our schools, colleges, and our system

of education in general have been utilized to only a very limited degree in curriculum planning and evaluation. One important factor responsible for this situation is people's lack of awareness of the significance of testing, measurements, and evaluation

3. FUNDAMENTALS OF TESTING

In this part of the unit, we have outlined some fundamental aspects of testing and measurement with which you should acquaint yourself.

Following are the fundamentals of testing

i. Planning the Test:

The primary function of any evaluation procedure is to determine as to what extent students have achieved the objectives of instruction. If a test is to serve this function effectively it must be planned with that end in view. A test which has been developed just in an adhoc fashion is unlikely to correspond very well to the teacher's stated objectives.

ii. Defining Objectives:

The next and most important step is to define the objectives to be appraised.

iii. Outlining Content:

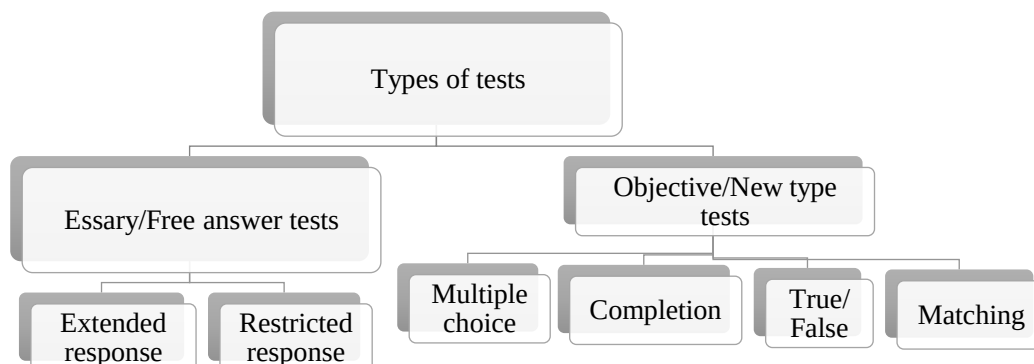
The outline of the content is important because the content is the actual vehicle through which the process objectives are to be achieved.

iv. Preparing the Test Blue-print:

The content outline and the statement of objectives represent two dimensions into which a test should be fitted. These two dimensions need to be put together to give a complete framework and to see which objective is related to which segment of the content.

3.1 Types of Tests

The tests used in our educational instructions are divided into two broad categories (i) essay or free-answer tests and (ii) objective or "new type tests". Objective type tests are further divided into multiple choice, True - False, matching items. Each of these has its advantages and limitations and each has its place in the measurement of student achievement.



The Essay or Free Answer Tests

The essential characteristics of the task set by an essay test are that each student (i) organizes his own answers with a minimum of constraint, (ii) uses his own words, (iii) answers one (or, a small number) of questions, and (iv) produces answers having varying degrees of completeness and accuracy.

In part because of the ease with which they can be prepared and, in part, because of their advantages in evaluating the ability to organize an answer to a question, to recalling the ability to organize an answer to a question to recall and select relevant information and present it logically, essay examinations will continue to be used. The teacher should have weaknesses found partly in the format of question and partly in the answers written by the students.

Types of essay

There are two types that are defined as follows.

Extended Response Test

Extended Response Essay Questions Extended response question allows student to select information that they think is pertinent, to organize the answer in accordance with their best judgment and to integrate and evaluate ideas as they think suitable. They do not set limits on the length or exact content to be discussed.

Restricted Response Test

Restricted Response Essay Questions Restricted response usually limits both the content and the response by restricting the scope of the topic to be discussed. Useful for measuring learning outcomes requiring Interpretation and application of data in a specific area.

When to Use Essay Examinations

The factors that make it appropriate to use an essay examination are in part very immediate practical ones, in part more fundamental theoretical considerations.

An essay examination is a practical compromise when the class group is small or when time to prepare the examination is limited. A consideration that may be compelling in some cases is lack of reproduction facilities for running off copies of the test. A third point that is sometimes made is that essay questions make less demands on the skills of the teacher and therefore, most of the teachers usually go for essay type examinations

More Basic Theoretical Issues

The functions that can be appraised better by an essay question are the abilities to select relate and organize and to create essentially new patterns (using one's own language and to use language to express one's own ideas)

3.2 Preparing Essay Questions

One of the common weaknesses of essay questions is that, if not prepared skilfully, they are too vague and general. This has a number of disadvantages. So much time is required to answer a single question that very few questions can be asked in a given time. The student may feel pressed for time and be handicapped by his limited speed of writing. In his selection, from among all things he might write about, it may be in good part a matter of luck whether, he picks out the aspects of the topic that a particular instructor considers important. In view of this criticism, it would seem appropriate to replace the one long general question with one or more of a series of shorter and more specific questions. When an essay examination is being used to assess the achievement of the objectives of a common programme of the study, each examinee should be required to answer the same questions. Giving a choice of questions reduces the common base on which different individuals may be compared. It adds one further source of variability to the subjectivity and unreliability that already exist. A choice of questions may have public relations value with the examinee but it has no justification from the point of view of effective measurement.

Scoring Essay Examinations

A number of steps may be taken to mitigate the subjectivity and to reduce some of the biases in evaluating the answers to an essay examination. These are mostly attempts to break up the process of evaluation into a series of more specific judgments made upon a common base and applied to an anonymous product. Specific suggestions are outlined below:

1. Decide in advance what factors are to be measured. If more than one distinct quality is to be appraised, make a separate evaluation of each.
2. Prepare a model answer in advance, showing what points are desired and the credit to be allowed for
3. Read all answers to one question before going on to the next.
4. Grade the papers as nearly anonymously as possible.
5. Average independent ratings of more than one raters for greater reliability.

Objectives Tests

Objective tests require a user to choose or provide a response to a question whose correct answer is predetermined.

(<http://caacentre.lboro.ac.uk/resources/objective-tests/index.shtml>)

Types of objective tests

The following are the common forms of objective test items:

1. Multiple-choice
2. Completion
3. True/False
4. Matching

1. True-False Items

A true-false question is a specialized form of the multiple-choice format in which there are only two possible alternatives. These questions can be used when the test-

designer wishes to measure a student's ability to identify whether statements of fact are accurate or not.

2. Matching Test

A matching question is two lists of related words, phrases, pictures, or symbols. Each item in one list is paired with at least one item in the other list. Matching may be considered to be a variant of multiple-choice in which more than one choice is correct.

Matching Questions - TLT Home

[archive.tlt.psu.edu/learning design/quiz questions/matching/matching.html](http://archive.tlt.psu.edu/learning%20design/quiz%20questions/matching/matching.html)

3. Multiple Choice Items

A traditional multiple choice question (or item) is one in which a student chooses one answer from a number of choices supplied. A multiple choice question consists of a:

Stem - the text of the question

Options - the choices provided after the stem

The key - the correct answer in the list of options

Distracters - the incorrect answers in the list of options

4. Completion Test Items

An intelligence test requiring that the test taker complete a whole (as a sentence or picture) from which certain parts have been omitted.

Essential Features

The essential features of a test made up of objective items as distinct from an essay test are that the examinee:

1. Operates within an almost completely structured task.
2. Selects one of the limited numbers of alternatives.
3. Responds to each of a large-sample of items.
4. Receives a score for each answer according to a predetermined scoring key.

3.3 Preparing Objective Tests

General Maxims for Items Writing

1. Keep the reading difficulty of test items low in relation to the group.
2. Do not lift a statement verbatim from the textbook.
3. If an item is based on opinion or an authority, indicate whose opinion or authority it is.
4. In planning a set of items for a test take care that one item does not provide clues to the answer of another item or items.
5. Avoid the use of interlocking or, interdependent items.
6. In a set of items let the occurrence of correct responses follow essentially a random pattern.
7. Avoid trick question.
8. Try to avoid ambiguity of statement and meaning.
9. Beware of items dealing with trivia. Do not emphasize items just because they may

be easily testable.

10. Beware of "specific determiners" _____ words that, give cues to the probable answer such as all, never, usually, etc. Statements that contain "all", "always", "no", and such all-inclusive terms are likely to be false.
11. Beware of ambiguous and indefinite terms of degree or amount such as "frequently" greatly", "to a considerable degree" and "in most cases".
12. Beware of items that include more than one idea in the statement specially if one is true and the other is false.
13. Beware of negative statements and particularly of double negatives.
14. Beware of giving cues to the correct answer by the length of the item. There is a general tendency for true statements to be longer than false ones.

Maxims Concerning Completion Items

1. Beware of indefinite or open completion items.
2. Do not leave too many blanks in a statement; omit only key words.
3. Blanks are better put near the end of a statement, rather than at the beginning.
4. If the problem requires a numerical answer, indicate the units in which it is to be expressed.

Maxims for Multiple-choice Items

1. The stem of a multiple-choice item should clearly formulate the problem.
2. Include as much of the item as possible in the stem.
3. Do not load the stem with irrelevant material.
4. Be sure that there is one and only one correct or clearly best answer.
5. Items designed to measure under standings, insights, or the ability to apply principles should not be presented, in novel terms.
6. Beware of clang associations (if the stem and the keyed answer should be alike the examinee may get the question right just by using these superficial cues).
7. Beware of irrelevant grammatical cues (cues from the form of word like "a" versus "an", number of tenses or verbs etc. should be excluded).
8. Beware of cues from the length of the options (there is a tendency for the correct answer to be longer than incorrect answers).

Maxims for matching Items

1. When writing matching items, the items in a set should be homogeneous.
2. The number of item choices should be greater than the number of problems presented.
3. The set of items should be relatively short.
4. Response options should be arranged in a logical order, if one exists.
5. The directions should specify the basis for matching and should indicate whether an answer choice may be used more than once.

4. MEASUREMENT

The test results of student provide the data about the performance in a certain course or a number of course and display it to him, and express the results in quantitative terms. The measurement gives meaning to it by translating it into "a quality or attribute in which the teacher is interested". For example, a student's result on a test in mathematics could be used for determining his ability in the course or subject; it could also tell the teacher about the student's weak and strong areas of performance and describe in quantitative terms the level of the student's performance on the test.

Since education has to be fitted to the individual and collective needs and capabilities of the students, the test results of the students and their interpretation made through the techniques of measurement, suggest something about the objectives of the curriculum, course content and the patterns of learning and teaching. Measurement, as such, becomes means of evaluating the curriculum and effecting desirable changes in it for development.

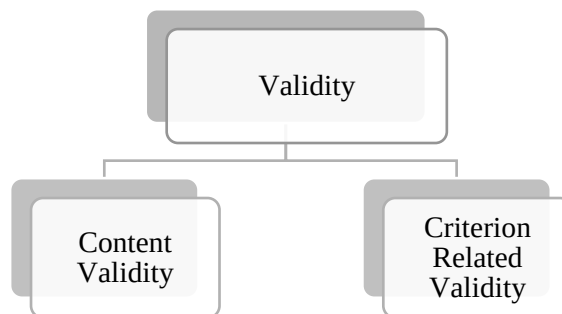
Your knowledge of the role of testing and measurement in curriculum will remain incomplete until you learn to distinguish between a good test and a bad one. In the following few lines let us examine the two major characteristics of a good test validity and reliability.

4.1 Validity

In educational measurement, the validity of a test refers to the degree to which it measures what it is intended to measure. For example, a test which has been prepared for determining a student's achievement in his mother tongue should be based on the contents sampled from the text or prescribed course on the mother tongue. A test which is based on the contents taken from a social studies course cannot appropriately test a student's achievement in the cause for which it is being used. Again, you know a student who is excellent in Mathematics, but on a test he scores surprisingly low. It is just possible that the test does not measure his achievement in the prescribed course of Mathematics; it might be a measure of some other ability characteristic of the student.

4.2 Types of Validity

There are several types of validity but for our present purposes we are concerned mainly with two of them which are:



1) Content Validity

The content validity is determined by the degree to which the contents of the test reflect the contents of the subject or the course in which a student's achievement is maintained free measured

2) Criterion Related Validity

The criterion validity of a test can be judged by comparing the performance of two students one of whom has been taught the subject or the course or one who has learnt the subject through other means and another who has not been taught it or has learnt it otherwise. The former student must score higher on the test than does the latter student. A test with no or low criterion validity would not distinguish between the two students.

4.3 Reliability

One major criterism made on our present essay-type tests is that the same answer assessed by different examiners or by the same examiner on different occasions, yields results which vary greatly, for the same answer a student might get 70 percent marks on one occasion and 45 per cent or-even less on the other This phenomenon of error of measurement reflects the reliability of a test. The reliability of a test-refers to consistency of the source of a student on a test assessed by different person or by the same person on different occasions; or a student's own scope on the same test taken on two different occasions.

For a test to be valid, it is essential that it is reliable. But reliability of a test does not guarantee validity. However, like validity, reliability is a fundamental characteristic of a good test.

Activity-IV

List the fundamentals of testing:

- 1) _____
- 2) _____
- 3) _____
- 4) _____

4.4 Self-Assessment Questions Exercise No. 2

1. Describe briefly the essentials of good measurement.
2. What are the major questions answered by the process of content testing? Explain.
3. What are the different types of tests? Explain with examines.
4. Give a brief analysis of the examination system of our country; how can it be used for evaluation, of the curriculum? (Use a practical example to illustrate your answer.)
5. Match the item given in the following columns A and B

Column-A		Column-B	
i.	Pupil evaluation	i.	Defining objective to be. api raised
ii.	Multiple-choice items	ii.	Valid instrument
iii.	Right test to measure the intended ability	iii.	Prediction of future performance
iv.	One of the fundamentals of testing.	iv.	One of the forms of objective test.

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UNIT: 3

CURRICULUM CHANGE

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INTRODUCTION

Change is a constant law of nature. It always brings improvement. It always occurs continuously. Technological advancement and explosion of knowledge is the basic reason of varying style of change. Change is an ongoing, almost unconscious process that involves reworking familiar element into new relationship. Consequently, we have to seek correspondingly different types of solutions to rectify the situation. The essence of life is continuous evolution. This change is sometimes, brought about consciously, sometimes unconsciously, It may be drastic or imperceptible, but change is invariably there.

The effects of the phenomenon of change are not restricted to a particular aspect of the universe; rather they are all embracing and comprehensive. As society in general is prone to gradual change, its various agencies cannot resist the same. As they have been set up to serve the needs of individual members as well as the society as a whole, these agencies must change their roles in accordance with the ever-changing individual as well as social needs as well as social needs. Under changing circumstances, it becomes incumbent upon such agencies to modify and update their programmes so as to respond to the individual as well as collective needs and interests of society. School is undoubtedly one of these agencies of society created for the realization of certain predetermined goals by educating individuals. It is a sub-system within the bigger social system. Consequently, it cannot keep itself aloof from and remain unaffected by developments taking place in the social milieu. In order to sustain and survive in the face of an ever-changing society, school is bound to revise its offerings from time to time so as to make them more meaningful and useful to the society.

The idea of revising the school offerings introduces us to the concept of curriculum change. It has rightly been observed in the Report of the Education's Reforms Implementation Unit that the children for whom a particular curriculum is framed are to lead their lives and prosper in the society of future. Societal needs have to be visualized by those who are responsible for the preparation of the curriculum. This makes the process of curriculum change highly imperative to cope with the ever-changing circumstances by preparing pupils for the times to come.

Features of change

- It's a PROCESS not an EVENT:-
It Requires
Time-energy- resources
- It is achieved incrementally and entails development in feeling and skills in using new programs.
- It should lead to improvement
- To work, it must be supported by individuals first.
- (Institutions cannot change until the individuals within them support the innovations)
- It is a learning process in itself.

The Nature of the Curriculum

Before taking up the detailed analysis of the concept of curriculum change and the process involved, it seems pertinent to have just a brief look at the nature of the curriculum. According to Bent and Unruh, the concept of the curriculum has evolved over the years. Constructing and reorganizing the curriculum has always been a major concern for educators. The Process involves many continuing problems, which are complicated by the fact that there have been many concepts of the curriculum which have caused disagreement as to its functions. For example, what should be included in the curriculum and how should the content be organized?

Various definitions of the curriculum have already been discussed in unit-1 and unit 2. However, for the sake of reference, some more definitions are given below.

According to Barman, in the traditional sense, the curriculum means a list of subjects determined by higher authorities. This concept of the curriculum is, however, no longer general accepted. More up-to- date definitions of curriculum include the following:

- i) "the sum total of the experience provided for learners for which school takes responsible (Barman)
- ii) "All of the planned experience provided by the school to assist the pupils in attaining the designated learning outcomes to the best of their abilities." (L. Stenhouse)
- iii) "The sum total of the school's efforts to influence learning whether in the classroom on the playground or out of school" (Alcorn& Linely)
- iv) "All the learning experience, a student can have at school." (Bent& Unruh)

Out of all the definition of curriculum given above, the last one includes all the course of study, student activities and learning experiences connected with the entire school environment, but does not hint at the types of activities to be included, though Bent and Unruh themselves point out that definition which do suggest the types of activates to be provided are preferable. According to Stenhouse, curriculums defined in these terms consist of the learning activities and experience which have been selected to achieve educational goals.

A close analysis of the foregoing definitions of the curriculum reveals that basically it consist of certain activates planned by the school with the school with the intention of achieving certain to-school under varying circumstance.

Activity-I

Please write down some educational goals and then list some of the activities which in your opinion can be adopted to achieve these educational goals.

OBJECTIVES

After reading this unit, you should be able to:

1. Describe the essence of the process of curriculum change.
2. Describe and analyze the multi-dimensional forces rendering change in curriculum imperative.
3. Describing the background to process of curriculum change.
4. Describe and explain the need for curriculum change.
5. Explain the role of the teacher in curriculum change in some other countries of the world and compare the same with the situation in Pakistan.
6. Suggest some activities for bringing about effective change in curriculum in Pakistan.
7. Identify and describe different preliminary factors to be taken into consideration before embarking upon the task of curriculum change.
8. Identify the various setting involving curriculum framers working individually, as well as collectively, in curriculum change.
9. Identify the various and explain the consideration to be kept in view while selecting and organizing the content of curriculum.
10. Make a selection of and provision for the most appropriate learning experience for the students compatible with the content of curriculum.
11. State the nature and importance of evaluation of curriculum.

1. CURRICULUM CHANGE

1.1 The Nature of Curriculum Change

The existence of such a diversity of concepts regarding the curriculum as discussed in the foregoing section, has led to a lot of criticism and to many suggestion for its change and improvement. These effort s will continue as long as educator continue to study and reorganize the curriculum and the attempt t bring it into better alignment with the changes which occur in society. The term ‘curriculum change, or ‘curriculum development’, although used with increasing frequency in education, is a fairly new one in Pakistan. According to Ronald Cave, it is concerned with “revalidating and reshaping our educational aims and objectives and the ways in which these can best be achieved.” Nicholas and Nicholas assert that “the planning learning opportunities intended to bring about certain changes in pupils and the assessment of the extent to which these changes have taken place is what is meant by curriculum development.”

Every activity of the school, aimed at planning, implementing, evaluating and eventually modifying any instructional task in order to achieve the desired goals of education, has obviously to be carried on with reference to the multifarious needs and interests of the learners. These learners, as members of the society, have to cope with the current and future problems of the society in which they live; which in turn, necessitates change and improvement in the curriculum so that it is responsive to their needs.

The process of curriculum change is long and arduous. The programme must be progressive and practical, ensuring the full development of the individual and, at the same time the maximum advancement of the society, in the light of existing conditions and within the means available for its enforcement.

The foregoing discussion about `curriculum change leads to the corollary that is an ongoing phenomena and a dynamic process. Its cyclical nature suggests that is has no rigid beginning or end. The changing nature of the society, the schools and the pupils supports to view that curriculum development and change is a never-ending activity. That Is not to say, necessarily, that every member of the Curriculum Committee, if any, must be engaged in curriculum change all the time, however, it does mean that some aspect of curriculum work is like to be going on in a school most the time. A school which is standing still in terms of its curriculum is in fact moving backwards. Nor is it implied that change should be undertaken for its own sake. In some years, change is a particular school or class may be quite small; but change there should surely be because the pupils, the focal point of any curriculum, are not the same as in the previous year. The point can be best be exemplified with the help of the story of a man who was running very fast. When asked about the reason for that, he said that since the world is moving too fast, he was running in order to remain where he was Similarly, the school must be quite vigilant to take notice of such changes taking place around in the society and plan for curriculum change accordingly.

Curriculum Changes

- Process of Curriculum change may be assisted by permissiveness and Support in accordance of with a helpful improvement in Curriculum. Changing Curriculum changes individuals.
- At the time of Curriculum Change it must be necessary in Consideration that Resources of implementation of Curriculum are available or not.

Definition

- Curriculum change mean making the curriculum different in some give way, to give it new position or direction. This often means alteration to its philosophy by way of its aims and objectives, reviewing the content included, revising its methods and re-thinking its evaluator procedures
- Curriculum change or innovation is defined as deliberate actions to improve a learning environment by adapting a method of presenting material to students that involves human interaction, hands-on activities and student feedback, according to the Annual Review of Applied Linguistics.

Reference

<https://www.refernce .come/education/curriculum-innovation-change->

1.2 The Strategy and Prerequisites of curriculum Change

Curriculum change is one of the most challenging tasks in which education are engaged. It requires a systematic equence of work on the part of all concerned dealing with all aspects the curriculum ranging from goals to means. A piecemeal approach, no matter how effective it may appear does not produce sufficient change either in thinking about the curriculum or in actual practice. A planned strategy, thus, according to Hilda Taba must establish a sequence of steps or tasks in effecting curriculum change. Constructing this strategy involves the following kinds of questions:

- i) In initiating curriculum change, where does one begin?
- ii) What is the order of the steps or tasks that must be followed by a given group working either on a segment of the curriculum or in developing a total plan?

A strategy for curriculum change assumes the creation of an atmosphere conducive to work. Furthermore, mastery of new skills and a large amount of training are also necessary for effecting curriculum change in the desired direction. New cognitive perspectives, new modes of thinking and new theoretical insights are other pre-requisites for bringing about a healthy change in the curriculum.

Curriculum change, being an extereely complex enterprise also requires many different types of competency. And people with such competencies require to be organized info effective working teams so that all resources are made available for achieving the target.

As discussed above, the process of curriculum change makes heavy demands on all concerned. They must be skilful enough to visualize the process as a whole, as well as the sub-processes involved in different stages; and to appreciate the possible problems, as

well as their tentative solutions. They must gather necessary and reliable data from different quarters before embarking upon the task. The nature of the role different members of the team can play in this regards make is imperative for them to develop in themselves a critical understanding and a broad outlook enabling them to do full justice to their jobs assigned to them by the committee.

1.3 Forces Necessitating Change in the Curriculum

Now please stop for while and try to think of some of the forces necessitating change in the curriculum. Jot down the points in the space below and then compare your thinking with view expressed in the following section:

The curriculum offered in a school must not remain static. It should be adapted to be manifold changes taking place in the world at large. As a matter of fact, there are numerous forces which are constantly acting upon it, thereby necessitating certain modifications in the dependent upon such forces, is the ultimate net result of their interaction. A brief analysis if these forces and their impact upon the curriculum is given below

i) Cultural Changes

Cultural patterns, through relatively constant in certain ages and regions, have always been undergoing change. Since the curriculum, through the school, is interwoven with the whole cultural fabric, it follows that as the culture undergoes certain changes, be they major or minor, so also should the curriculum. The adequacy of the old curriculum for meeting the new cultural circumstances must be seriously questioned and relevant changes in it proposed. Although it is itself a potential agency for change, the school must review and improve its curriculum to keep it abreast of the development taking place outside the school, and thus make it compatible with the socio-cultural requirement so as the ever changing needs of the day.

ii) The Explosion of Knowledge

The modern era can rightly be called an era of `Knowledge explosion. The amount of knowledge in different fields is increasing at a tremendous rate. Scientific Knowledge alone doubles every 10 to 15 years and this period is shrinking every moment. The amount of knowledge in other areas which are being discovered through experimentation and research or being develop through observation, discussion and thought, are equality large. It is evident from the every-growing quantity of knowledge that everybody cannot

learn each and everything. In view of the phenomenon, therefore, the curriculum planner, through a selective approach, has to pick out the most essential and the most appropriate knowledge, skills and information for imparting to the learner from amongst this huge resource. To achieve this end, the curriculum has to be altered from time to time in order to include the necessary and exclude the unnecessary knowledge and skills.

iii) Technological Advancements

Technology refers to the replacement of manpower with machinery. Advance in technology have influence all aspects of society and have caused more curricular changes than any other cultural change. The development and use of machinery has increased the demand for working with relevant knowledge and skill. This must bring changes in vocational education and hence necessitate changes in the school curriculum. For example, when Pakistan shifted to mechanized farming during the 1960s and 1970s, changes in content had to be introduced under the Agro technical Scheme. The introduction of remote control color television and the video cassette recorder etc. has led to a corresponding change in the curriculum and vocational institutions. Similar is true about computer technology.

iv) Meeting Diversified Human Needs

Another major factor affective curriculum change is the need and concerns of pupils, teacher, administration, parent and other groups who work together to provide the best possible education for the children. To dedicated educators, this is the most satisfying and meaningful force with which they deal. The real needs and concerns of people always have part of their foundation in the societal, sub-cultural and community milieu. It, therefore, becomes essential that experiences in school are revised off and on through curricular change and thus made compatible with the life styles of the youngster coming from different socio-economic strata of the society.

v) Studies in Human Development and Learning Processes

The finding of studies on human development and learning processes also exercise a great and far-reaching influence on the curriculum and necessitate its change from time to accordingly. With the passage of time, more startling and encouraging of physical, social and cognitive development of individual has important implications for curriculum-making Curriculum-makers are striving to develop pupil experience adapted to their learning styles to stimulate learners intellectually, to offer them new opportunities for success and to encourage their reasoning and critical thinking. The curriculum, to be meaningful and practicable, must keep pace with recent discoveries and developments in the field of psychology as well as other social sciences.

vi) School Drop-outs

School drop-outs pose a serious problem to educational planners. This phenomenon also necessitates periodic revision of the curriculum. Education provision has to be made for those who, for one reason or the other, are unable to continue their education. This demands the identification of potential drop-outs long before they leave, and the planning of programme for increased guidance services and academic activities in which they have

chance of success. In Pakistan, where the drop-out rate is alarmingly high, special consideration must be given to these factors while framing and changing the curriculum at almost all levels of education.

vii) Pressure Groups

Group of parents and socio-cultural organizations are always active in curriculum revision. Civic groups, veterans, and newspaper editors usually lay stress on the inclusion of social science and other ancillary disciplines, whereas religious emphasize the inclusion of religious education and ethical concepts in the curriculum. In Pakistan, the curriculum for Islamic Studies, for example, has been frequently revised to be pressure of religious organizations. Organized groups of individuals in local communities make their curricular wishes known to the authorities through releasing the minutes of their meeting and making statements in newspaper and other media of propaganda which can exercise a far-reaching influence on curricular changes.

Types of Curriculum Change

According to John McNeil the different types of changes are:

1. Substitution
2. Alternation
3. Perturbation
4. Restricting
5. Value Oriented

1. Substitution

In this type of change one element is substituted by other, i.e. one course paper/one unit is replaced with another. Mostly, this kind of change is easily implemented.

2. Alternation

If some material, content, item or procedure is introduced into the existing material and is adopted, it is considered alteration.

3. Perturbation

Some changes when introduced disturb the programme for some time then later on they get adjusted or adopted into the programme.

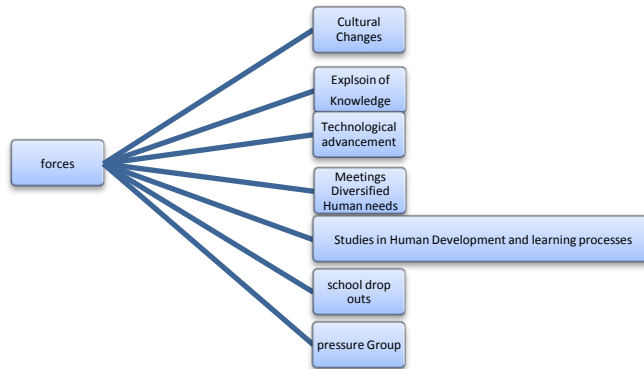
4. Restricting

These changes lead to modification of the system itself. For instance, team teaching, project method or competency-based teaching and evolution.

5. Value-oriented change

This change basically brings a shift from one philosophy or basic ideology towards a particular curricular prescription or orientation. Most of them who resist should adjust with the changes and accept the same. The teachers who cannot adjust their values to such changes may not be retired for long.

Necessitating Change in the Curriculum



1.4 Self-assessment Questions-Exercise No.1

Part-I

Fill in the blanks with suitable words or phrases.

1. The cyclical nature of _____ suggests that it has no rigid beginning or end.
2. _____ pattern, though relatively constant in certain ages and regions, have always been undergoing changes. Thereby necessitating a corresponding change in curriculum.
3. Changes in vocational education in schools are the result of _____ advancement.
4. _____ human needs make it imperative to have diversified curricula.
5. Potential _____ need to be identified long before they leave and programmes planned for their increased guidance while they are at school.

Part-II

Circle the most appropriate answer

1. Category does this definition of `curriculum fall?
a) traditional
b) modern
c) none of the above
2. The phrase revalidating and reshaping our educational aims and objectives and the ways in which these can best be achieved refers to
a) A definition of the curriculum
b) curriculum change
c) selection the best textbooks
d) lesson planning.

Part-III

1. How would define curriculum? Discuss its traditional as well as modern concepts in the light of authorize definition.

2. Elaborate on the concepts of curriculum change. How far is it inevitable?
3. Enumerate and discuss the forces necessitating curricular change with special reference to the situation obtaining in Pakistan.

2. The NATURE AND IMPORTANCE OF THE TEACHER'S ROLE IN CURRICULUM CHANGE

2.1 The Nature of the Teacher's Role

In the traditional system of education, the curriculum was usually framed by a few persons at the top of the organization and superimposed on the teacher who was in turn simply required to present the same to the learners without questioning its contribution which he could practice paid little attention to the classroom teacher's potential contribution which he could make in the light of his experience and his immediate contact and dealing with the learners. With the advent of the modern democratic era, however, this practice of super imposition is gradually waning. The hierarchical structure involved in curriculum change is gradually losing its time-honored importance. It is now being increasingly accepted that no matter how good the Director of Education, supervisor or the headmaster may be, the school cannot function effectively on his ideals alone. Today the head and senior members of staff are acting more as coordinators and facilitators. Every teacher can now play a part in curriculum development and should accept this as a part of their professional responsibilities. They should not be willing to leave so much of the thinking and planning of the curriculum to the head or others outside the school.

The result of this significant change is that dependence upon the individual and cooperative efforts of teachers to decide when, how and what to teach –to select content, to plan experience, to produce aids to teaching and to revise course offerings – has become a much more common practice in advanced countries of the world. In Pakistan, though the teacher has not come to play that effective role in curriculum change, yet various circles have started appreciating this potential role of the teacher. Krug has aptly remarked that the precise definition of the role of the teacher in curriculum change has not yet been achieved; but there are developments which promise much for an eventual to this problem. For one thing, it is being increasingly recognized that the teacher's most significant participation in curriculum change and development is what he does in his own teaching. Furthermore, the process of curriculum change cannot in any way, be restricted to the formal decisions taken by the concerned persons in the form of committees or conferences etc. *As matter of fact, every teacher does participate in the process of curriculum change whether he ever serves on a committee, he is always directly involved in the curriculum instruction of the pupils who are undoubtedly the focal point in every process of curriculum change.* Understood in this sense, the classroom teacher is a director or coordinator of the efforts aiming at curriculum change in his own classroom as he works and plans with the learners; for it is in the teaching-learning situation that educational change is evaluated, directed and shaped.

While the process curriculum change is usually affected by a committee of representative of all those who are indirectly concerned with the task, the of the team, he is now gradually being recognized as an important, on rather the most important, figure around whom the whole process of curriculum change should revolve.

2.2 The Importance of the Teacher`s Role

The teacher occupies the central position in the whole process of curriculum change. The nature of the process of curriculum formulation and the task the teacher is involved in, make it highly imperative that there should be close coordination between the apparently two distinct jobs of curriculum formulation and classroom instruction. They are the two aspects of just the same role. According to Manning Duane, the teacher's personal judgment about selective use of material. He or she may refine, distil, delay, distil, delay, delete, or add to what the author has produced; it is entirely proper that he or she does so. In fact, it is improper if he or she does not.

Any plan for modifying educational processes must be implemented by teachers in their own classes. Any programme of education must be implemented by teachers in their own classes. Any programme of education must be tailored to the local situation, the school situation. In this task the classroom teacher enjoys the privilege of directly observing and studying his students, who are, after all, the ones most directly affected by the curriculum. He can discuss their problems with them; he can visit their homes and see where and how they live. He can study developments in the field of child and adolescent psychology and learn more of youth's growth and development patterns, ways of learning, social ties, group relations, motivations, and interests. All this makes the teacher emerge as the most appropriate figure to develop, on his own, a list of essential items to include in the curriculum or the ones to be deleted from it or improved and updated.

Furthermore, the classroom teacher's direct involvement in the process of curriculum change assumes immense importance from the importance from another also. Where the task of curriculum development is carried out on a group basis, it can provide a means of continuing teacher education. As a matter of fact, few teachers would assert that when they finish their training they know all that they will even need to know; or that what they are offering their pupils this year will necessarily be appropriate the following year as well. The teacher's participation in the work of curriculum change offers a partial solution to both of these problems. In understanding curriculum development, teachers become involved in a reappraisal of their own work and in so doing further their professional knowledge. Thus they gain new insights and expertise. This increase in knowledge, insight, and expertise, in turn, can give teachers a feeling for further change. In this way, teacher's involvement in curriculum development work proves beneficial to them and facilitates the advancement of their professional knowledge and competencies, which should help in the maximum realization of educational objective.

2.3 The Teacher's Role in Curriculum Change in World Perspective

As the classroom teacher is in direct contact with the pupils, it implies that he should have the greatest say in framing the curriculum for them. That is why most of the

countries of the world, in their respective educational systems, have conferred or are on their way to conferring this position on him.

Though the concept of curriculum change is a new one in developing countries various studies reveal that it has a long history in the advanced countries of the world. For example, in 1940, in the Virginia Programme section of his curriculum development study, Saylor showed that in countries where participation was more inclusive and where more teachers were engaged in deliberative meetings and in production of materials, there was more genuine adaptation in the programme and significant changes took place in the classroom and in the teaching process. The findings of the study obviously support the proposition that involvement of the classroom teacher in curriculum change facilitates the task of achieving educational goals. Krug concluded that teachers' participation in curriculum planning today is to be regarded ``not as a pleasant gesture to them, but rather as an indispensable part of the process`` consequently, there is growing a general trend in the world to recognize the potential contribution of the classroom teacher in affecting curriculum change.

For example, in Denmark, classroom teachers enjoy considerable academic freedom in planning and implementing the courses of study. For the purpose of facilitating the design of local teaching plans (school curricula); the Ministry of Education prepares a guideline for each subject containing both general considerations and concrete proposals as to subject-matter, content, and possible teaching methods; as well as an indication of how teaching may be organized. But all these instructions from the top are not binding and obligatory upon the schools. They are rather of a suggestive nature and may or may not be accepted by the school. This leaves great room for the contribution of the teacher in the field of curriculum formulation in the sense that he enjoys great academic freedom. In this way, the teacher determines what will be included in or excluded from the curriculum proposed by the Ministry of Education.

In England also, the nature of the curriculum depends largely upon the nature of the teacher's contribution. Because official requirements are not confined to any particular area of study, there is a natural temptation to assume that the teacher's own choice of what to teach and how to teach it is all-important in the sphere of curriculum change and development.

Similarly, the situation in the Netherlands is highly conducive to teacher contributing to development of curriculum with much of the work in connection with curriculum development at elementary and secondary school level being carried out by heads and teachers. The contribution of study courses and other activities in different subjects, and the methods serve to provide a means for ordering events in the schools.

In Pakistan, the Curriculum Wing of the federal Ministry of Education, in collaboration with Provincial Curriculum Development Centers and the Textbook Boards, is responsible for formulating curricula and undertaking other ancillary activities in connection with the same Curriculum Committees at the federal level consist of experts

in education and other related areas but these Committees at the federal level consist of experts in education and the teaching community at large. Selected individuals, appointed to work on subject committees, control and direct curriculum development activities. However, the number of working teachers represented on these committees is always limited. Whenever any decision is taken regarding curriculum, some teachers are provided with a certain amount of training through refresher courses, usually conduct under the auspices of provincial education extension centers, or other teacher education institution and thus prepared to implement the curriculum framed by the upper circles. This situation cannot be described as satisfactory. There is a dire necessity to introduce drastic changes for decentralizing the whole system of education by recognizing the full potential of working teachers who directly deal with the pupils i.e. the ultimate concern of the curricula. The implementation of such a big change is not, however, as easy as it might appear to be. It demands long-range planning on the part of those who are at the helm of affairs – e.g. envisaging necessary administrative changes at different levels, the provision for the requisite type and amount of professional training for the teachers in curriculum formulation; and the making of arrangements in educational institutions for successful implementation of the plan. Further discussion on the topic appears in the last section of this unit.

2.4 Settings for Teachers' Activities

The process of curriculum change is a highly systematic one requiring a scientific approach, and hence a continuously planned sequence of activities on the part of the teacher. The activities may be undertaken in a variety of situations. Depending upon the nature and scope of the task in progress, as well as the capabilities of the teacher, one may work individually or in a group situation, or even adopt a combined approach or sometimes working alone and sometimes referring the matter back and forth for coordination to group to arrive at relatively more sound decisions about curriculum content. These situations in which the teacher carries on his activities may be called the “settings”. A brief description of these types of settings follows:

a) Individual Teacher's Work

The activities of curriculum development may be undertaken by an individual teacher depending upon the magnitude of the work involved in it. He can undertake the task for his own class in a primary school or for a subject for one or more classes in a secondary school.

Pre-requisites for Individual

The individual teacher's work makes heavy demands on him as under:

- i) As he alone has to design, prepare, implement and subsequently evaluate every bit off activity related to the process of curriculum change, it becomes imperative for him to develop an understanding of the rationale of the whole enterprise.
- ii) He should also be equipped with the necessary skills and techniques required at different stages of the task so that he can gain the maximum benefit from it.
- iii) He should be shrewd enough to appreciate the importance and implications of these techniques in relation to the process he is engaged in.

- iv) He must get a sufficient number of the latest relevant books and journals for ready reference and
- v) He is required to visualize the requirements of the job and also be quick enough to refer the work to the most appropriate person or organization for an expert opinion on any issue.

b) Group Work

In comparison with the efforts of the individual teacher, obvious advantages flow from either the whole staff in fairly small schools, or groups of teachers in larger schools, working together. There is the benefit of their sharing their joint knowledge and experience; the advantage of their using complementary skills and expertise; the benefit of their shared ideas that are developed through the application of the results of their work. Perhaps the greatest advantage of a whole group of teachers working in their own school is that they can undertake their development work with detail knowledge of all the relevant factors about their pupils, themselves, the school and the whole situation. There will be consistency in the curriculum they plan.

Group work by teachers and other experts in curriculum development does not, in any way, imply that there exists a formal hierarchical set-up of initiative or control. The cooperative effort of each interest group needs to be involved in equal partnership, and all parties should be ready to give and seek support. What is necessarily required of them is that the local group of curriculum experts involved in the task should be effective with close collaboration between teachers and all those who are able to offer cooperation.

c) The Mixed Approach

In addition to the individual change should involve an organized and systematic effort on the part of those who engaged in it. It, therefore, requires that the coordinator of the in Curriculum Committee maintains a formal record of all that is conceived, planning and done this connection. The actual writing of reports and the keeping of up-to-date and unambiguous records of developments have distinct advantages. They provide a record against which memories of agreements as well as differences can be checked. Putting on paper the ideas, reviewed and revised-when change can be agreed upon. It also gives some evidence of accomplishment. Finally, regular and carefully maintained up-to- date records of all that has gone on directly or indirectly related to the process of curriculum change serves as reliable raw material out of which the teacher can construct a superstructure of a far better curriculum commensurate with the circumstances.

2.5 Notes and Observations

The process of curriculum change should involve an organized and systematic effort on the part of those who are engaged in it. It, therefore, requires that the coordinator of the in Curriculum Committee maintains a formal record of all that is conceived, planned and done this connection. The actual writing of reports and the keeping of up-to-date and unambiguous records of developments have distinct advantages. They provide a

record against which memories of agreements as well as differences can be checked. Putting on paper the ideas, agreements and arguments provides something concrete and specific to be examined, reviewed and revised – when changes can be agreed upon. It also gives some evidence of accomplishment. Finally, regular and carefully maintained up-to-date records of all that has gone on directly or indirectly related to the process of curriculum change serves as reliable raw material out of which the teacher can construct a subsequent superstructure of a far better curriculum commensurate with the circumstances.

2.6 Self-assessment Question –Exercise No.2

Part-I

Circle the most appropriate answer.

1. A teacher cannot play any significant role in curriculum formulation unless he
 - a) works on the committee of curriculum formulation
 - b) Is formally requested to suggest something
 - c) himself prepare suggestions for curriculum change and submits them to his head.
 - d) none of the above.
2. Any plan for modifying educational processes must preferably be:
 - a) approved by the competent committee
 - b) implemented by teachers in their classes
 - c) finalized under the guidance of the administrator
 - d) all of the above
3. Once the work of curriculum framing is distributed among the individual members of the curriculum formulation team, each one of the may carry on the assigned task himself and refer to the group as and when necessary. This strategy falls under which of the following settings?
 - a) Individual work
 - b) group work
 - c) mixed approach
 - d) all of the above.
4. One of the advantages of teacher's direct involvement in curriculum change is:
 - a) continuous teacher education
 - b) that teacher receive recognition at different levels
 - c) improvement of school management
 - d) one of the above.
5. The system of curriculum formulation is comparatively centralized in:
 - a) England
 - b) Denmark
 - c) the Netherlands
 - d) Pakistan

Part-II

Fill in the blanks with suitable word/phrases:

1. _____ is the focal point in every process of curriculum change.

2. The assumption that ‘‘the teacher’s own choice of what to teach and how to teach it is all important in curriculum change ‘is prevalent in_____
3. The specification of the objectives of instruction, usually in the form of examination requirements provides a means for ordering events in schools, is a practice followed in_____
4. The situation in which the teacher carries out his curriculum formulation activities is known as the_____

Part-III

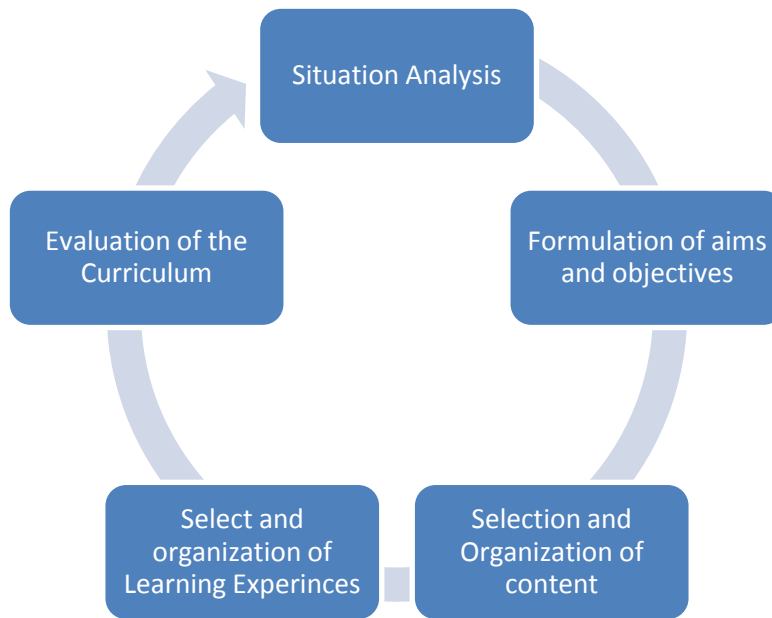
1. Trace the evolution of the role of the teacher in curriculum change. Also discuss possible future development in this context.
2. Evaluate the significance of the role of the teacher in curriculum change.
3. What role can a teacher play in curriculum change in Pakistan under the existing system?
4. List and elaborate on suggestions for enhancing the role teacher in curriculum change in Pakistan.
5. What setting for activities would you suggest for the teacher as a member of curriculum committee? Give reasons in support of your answer.

3. DIFFERENT OF STAGES OF CURRIUCLUM CHANGE

The process of curriculum change consists of a series of activities undertaken at different levels. Particular sets of such activities forming compact, separate and distinct portions within the whole set of activities in the entire process may be termed as ‘‘stages of curriculum change’’. These stages may be listed as follows:

- a) Situation analysis
- b) Selection of aims and objectives
- c) Selection and organization of contents
- d) Selection and organization of learning experience
- e) Evaluation of the curriculum

The stages in curriculum change must follow the logical sequence in the above mentioned order. The teacher in particular and other members of the team in general have specific roles to play at each of these stages. A brief discussion of them is given in this section.



3.1 Situational Analysis

Before the team actually embark upon the task of determining the curriculum content, it is essential for member to have a preliminary analysis of the situation in respect of the relevant phenomena existing at present, the background against which the process have to be undertaken. This will give them the necessary Knowledge of the conditions which may affect their future undertakings. These data must be scrutinized for indication of new approaches of neglected needs to supply a picture of the characteristics of the children and the resources available. The results may well indicate the need for a new approach to the curriculum, changed attitudes on the part of the teacher, or a new orientation to the teaching learning situation. The extent of the diagnosis is directly related to the breadth of the scope of the objectives and to the deviation of the contemplated programme from traditional organization and methods.

Among the most crucial elements pertaining to which situational analysis may be undertaken are the following:

- i) The teacher
- ii) The pupils
- iii) The physical plant and facilities
- iv) The psycho-social climate

i) The Teacher

The teacher is the pivot around which the whole system of education revolves. The success or failure of any change or innovation in the field of educational depends upon the degree of involvement of the teacher in its implementation. It is, therefore, of the utmost importance that before undertaking the actual task of curriculum formulation, the team must for analyse teacher's attitudes, skills, etc, in relation to the conceived changes

or modifications. As he is the central figure concerned with putting into practice the proposed changes, it is incumbent upon him to evaluate his professional insights and competencies. The deletion of old content and the addition of new material in the curriculum must have a direct bearing upon the educational practice and methodology of the teacher. He should plan to bearing upon the educational practice and methodology of the teacher. He should plan to reinforce his strengths and eliminate his weaknesses and should see whether he would be in a position to meet the heavy demands made by the introduction of new Knowledge, concepts and skills in curriculum. If necessary, he should acquire new knowledge and skills for successfully introducing the proposed changes in the curriculum. The examination of teacher's procedures, values, approaches to learning and personal resources is absolutely necessary if progress is to be made in this connection.

ii) The Pupils

Everything in education exists for the ultimate benefits of the pupils. The educational administrators and planners and the physical facilities are all indented to facilitate the learning of the pupils. The team in general made the teacher in particular should, therefore, thoroughly analyse the pupil's needs. Any change introduced in the curriculum without taking into consideration the attitudes, values, potentialities and weakness of the students is doomed to fail. The team should, therefore, familiarize itself with the multi-dimensional needs as well as through patterns, interests and beliefs of prospective students. For example, it should acquire a thorough knowledge of their developmental stages as well as developmental task and activities and should assess their abilities and aptitudes from time to time. They should be skilful enough to appreciate their abilities and aptitudes from time to time. They should be skilful enough to appreciate their levels of mental growth and also their ethic as well as socio-economic group differences. Moreover, they also need to study the patterns of their social relations and interaction and then capitalize upon them in order to achieve the educational objectives.

iii) The physical Plan and Facilities

The availability of physical facilities is undoubtedly a pre-requisite for the successful implementation of any educational programme. The team should, therefore, thoroughly analyse the school building faculties before introducing any major change in the curriculum. If they provide for certain skills in the curriculum which the physical plant is insufficient to accommodate, the whole input will be wasted leaving an adverse effect upon the functioning of the system. It is, therefore, advisable to conduct a detailed survey of the existing facilities and also visualize any future extensions. They should also understand the relationship between different component units of the building and see how far they are likely to hinder or promote the implementation of the new programme.

iv) The psycho-social Climate

Analysis of the psycho-social climate is of no less importance as pre-requisite of any new educational offering. No amount of physical facilities can ever further the achievement of educational objectives without a favorable psycho-social environment. The team must, therefore, know and understand the social set-up of the locality. Its structure, problems,

beliefs attitudes, values and other relevant aspects. As one of many social institutions, the school cannot implement its policies and programmes by remaining indifferent to the society it intends to serve. Therefore, before launching any new program, the team must try to discover the possible reaction of the people at large. They need to conduct comprehensive periodic surveys in order to apprise themselves of new developments and trends emerging in the society; and should analyse and understand in the different psycho-social forces at work and their impact upon the conceived changes in the curriculum.

3.2 Formulation of Aims and Objectives

The process of education has to be a goal-oriented activity. So after situational analysis, the next stage in curriculum change is that of the formulation of the aims and objectives to be achieved. Though there is important distinction between them, the terms are often used as synonyms. The importance of framing aims and objectives cannot be over emphasized in an educational system. They serve as the reference points for judging the effectiveness of any programme, and are valuable in guiding the activities of the programme and in its final evaluation. The formulation of objectives, however, makes, makes a heavy demand on the teacher, because it is imperative for them to have a profound Knowledge of the social, philosophical and psychological bases from which he can derive the objectives to be realized. Defiled discussion of this stage of curriculum formulation also appears in unit-4 Goal, Aims and Objectives of Education by Dr. Mushtaq Ahmad Goraha.

3.3 Selection and Organization of Contents

Activity-II

Think of some of the principle to taken into account in the process of selecting and organizing the content. Note down your points in the space below and compare them with the ones mentioned in the lines given hereafter.

The next stage in curriculum development relates to content selection and organization in the light of certain guiding principles.

The principles and criteria of content selection and organization are many. A brief description of some of them is given in this section.

In the light of the aims and objectives the team has to select and organize the most suitable content to achieve them. However, good the selection of objectives may be, defects in content-selection and organization can undermine the whole enterprise. The situation, therefore, demands that the team must exercise extreme care in this regard. The following, among others, guiding principles should not be lost sight of while carrying out the task:

i) Validity

The team, while selecting the contents, must ensure that they are valid. To test the validity of the contents, check whether the predetermined objectives seem likely to be achieved with the help of the contents. For example, if the objective is to develop understanding of the concept of “Two-Nation Theory” as put forth by the Quid-Azam, but the events selected do not help understanding of this concept, the content cannot be called valid.

ii) Significance

The content selected should have significance for the learners in particular and for the society in general. It should aim at developing meaning and useful ideas, concepts and skills, the importance of which should be quite evident from the very beginning. Even from the content selected according to this principle, the team must further decide whether its breadth or depth should be given greater emphasis; again this depends upon the whole set of circumstances in which the learner will be required to serve as a member of community. The curriculum formulation committee, therefore, must conceive contents, keeping in view their significance.

iii) Difficulty

Other things equal, it would seem appropriate for the team to select content focusing upon matters that are too difficult to be learnt at home. There may be certain concepts and skills which are essential for the learners’ growth and development, but which at the same time are difficult to acquire in informal situations. Here the team must be vigilant enough to spot the relevant content which facilitates the acquisition of such skills at school.

iv) Pupil Needs and Interests

Pupil needs and interests occupy an important place in the process of content selection. If the team ignores this important factor, there is every possibility of losing a strong motivational force and running the risk of little or no learning taking place at all. But this is not the sole criterion. As a matter of fact, the interests of learners at different developmental stages should influence the selection of content after other criteria have been satisfied. This is not so much a general principle for the selection of content as a supplementary criterion intended to facilitate the choice between alternatives which can be considered equivalent.

v) Universality

The phenomenon of universality places special emphasis on the curriculum having a wider application, not simply a local application in a particular geographical region or at a particular time. This principle must also be kept in view when selecting curriculum content. The content so selected should facilitate the inculcation of such skills and attitudes as have comparatively as have comparatively universal application. It does not, however negate the value of learning of skills which are important from a local or regional point of view.

Members of the curriculum formulation committee must note that this is not an exhaustive list of principles guiding the selection of content for the curriculum. As society evolves, new problems and difficulties arise which must determine new priorities in this regard. The team must take serious notice of such recent development in the social milieu for example; Pakistan is very rapidly shifting to mechanized farming. In this case, they must understand the future needs of the expanding agrarian economy of the country and determine the most appropriate curricula for the years to come. Moreover, they must attempt to satisfy the different aspects of the criteria, as too great an emphasis on one aspect alone may result in neglecting others. In this way, process of curriculum change makes heavy demands on the team who must consider all factors, and then come up with the most suitable curriculum for the particular set of circumstances.

Selection of content by team further requires that they must have studied thoroughly the whole set of information from amongst which they have to choose the most desirable content for the curriculum. Consequently, they must keep themselves abreast of the latest developments in different fields. However, to be realistic we cannot expect a science teacher working in a far-flung and remote rural secondary school in Pakistan to be fully aware of the latest developments in the field of science and technology. Here he must get the cooperation of other members of the team in the field. At primary level. It may be feasible for a teacher to select the curricula of all the disciplines of knowledge, whereas at the advanced stage it poses a serious problem for teacher to make a selection for different areas of knowledge this naturally implies that there must be a close cooperation and coordination among the members of the team in determining curricula for different subjects.

3.4 Selection and Organization of Learning Experiences

The selection and organization of learning experience is another important stage of curriculum change. The objectives are of no use if they are not reinforced using the member compatible learning experiences. Wheeler has very aptly remarked that “appropriate learning expertise and activities are mea which may be used for bringing the deterring behavioral changes in the learns.

The selected learning experience must serve some definite purpose. There should not be activity just for the sake of activity. Learning experience which do not help to achieve specific purposes are a waste of time. In considering the functions of learning experiences. It is important to keep mind the total range of objectives so that there are

some assurances of implementing them all. The possibility of developing learning activities which serve multiple objectives also need to be considered. This is essential in order to acquire certain behavioral competencies. Care must also be taken to include a variety of ways of learning: reading, writing, observing, doing research, analyzing, discussing, tabulating, parting, constructing and dramatization and experience involving both intake and those requiring synthesis, reformulation and expression should be properly presented. It is also essential to maintain a proper sequence of learning experiences. This sequence should be arranged so as to reinforce and advance the learning; and should be based on the previous learning activity and be commensurate with following one.

Learning experience should be so organized that they facilities the development of attitudes of analysis and generalization. They should enable the learners t put their ideas together and reformulate them in their own terms, to compare and contrast, to formulate conclusions and to arrive at interrelationships among different ideas.

Learning activities and experiences, organized with reference to the curricula, may also be designated as 'methods'. Thus learning experiences or methods serve as something in between the curriculum and the achievement of objectives. They represent the means through which the teacher strives to achieve educational objectives. Understood in this sense, learning experience or methods cannot be separated from the contents of the curriculum; though it is possible that some particular content may be presented to the students through a variety of experiences, whereas other content may be presented through just one activity.

In a developing country like Pakistan, where have economic constrains limiting the provision of expensive teaching aids, the teacher must try to visualize the types of experiences which can be helpful in achieving more than one objective, i.e. to get the output optimum from minimum input.

Once the learning experience have been finally identified, the role of the teacher as facilitator of learning becomes more crucial in organizing the same.

The selected learning experiences may involve the class as a whole, group situations or even individual learners. It is up to the teacher to decide what the best setting for a particular learning experience is in order to get the maximum benefit put of it. In order to provide for differences in terms of learner interests, aptitudes, abilities, motivation, and future aspirations etc. he can divide the class into suitable groups and may get better results than it would have been possible, working on a class basis. Or he can focus individual learners and suggest the most suitable learning experiences for each of them. On the other hand the teacher can involve the entire class in any experiences. It is also possible that a specific portion of an activity may be performed by each individual; and the students may join others for its completion. For example, a teacher of Pakistan Studies may give indivual assignments on different phases of the Pakistan Movement which are then to be presented, discussed and defended in the class as a whole.

The above discussion on the selection and organization of learning activities and experience can be summed with the remarks that they are very closely related to and dependent upon the contents of the curriculum and the objectives to be achieved. This makes heavy demands on the curriculum framers who must take the decisions keeping in view educational objectives, the curriculum content and the feasibility of the learning experiences.

Activity-III

List some of the possible learning experiences and activities which can be adopted in teaching different subjects and discuss them with your friends in the field.

3.5 Evaluation of the Curriculum

After the selected curriculum has been translated into classroom of field practices through relevant learning experiences, the next stage in curriculum change is its evaluation. Cronback regards curriculum evolution as the collection and use of information as a basis for decision about an educational programme.

According to Wheeler, the aim of the evaluation phase is to produce evidence about the nature and extent of behavioral changes which arise from educational endeavors, and to use this evidence as a guide for modification in any phase of the curriculum process. The only evidence that is acceptable in this connection relates to pupil change. In some cases, it may be possible to measure this quantitatively and objectively; in others, some sort of qualitative assessment must suffice. In addition to assessing behavioral changes in individual also or groups, it is necessary to make judgments about the objectives of the learning experiences, the content, the organization and the teaching methods used to attain them.

It may be noted that evolution enables the evaluator to compare the actual outcomes with the expected outcomes or objectives and to arrive at conclusion about this comparison with a view to future action. It is obviously a vital phase, because without some quantities objectives have been realized and if they have been, to what extent. Since without some system of benchmarks it is impossible to tell whether behaviors in the form of attitudes, values, skills, knowledge and so on have been instilled, inhibited, or altered, it is essential to have complete information about the level of knowledge, attitude or skills possessed by student before starting instruction. Since in our system of education teacher is

supposed to implement the curriculum given to him and he usually not given due recognition, the situation needs a critical analysis and improvement.

As for the techniques of evaluation, their nature and types are both determined by the phenomenon which is to be evaluated. In developed countries, there are innumerable tests, questionnaires, etc. designed to evaluate different aspects of the learners' growth and development in relation to the educational input. These techniques may be adapted to the specific situation obtaining in Pakistan. Culture-bound elements in these techniques must be eliminated and necessary changes made in them to suit local circumstances.

Teachers must understand the use of each type of test. For example, they should be well aware of the fact that cognitive tests are used to assess how far students have gained and retained the information and knowledge imparted during the instructional process. Likewise, diagnostic tests are meant to reveal the difficulties that pupils experience in learning. The teacher can use the results of such tests to remove the difficulties to the maximum possible extent. Any change pupil's attitudes may be measured with the help of any inventory. Aptitudes tests may be developed and used in order to determine the aptitudes of learners so that they can be provided with the most appropriate learning experiences. It is further essential for the teacher to be well aware of different forms of objective tests, e.g. multiple choice, true-false and other types, though he should also give due weight to essay-type questions in order to test the power of expression of the learners. Finally, any tests developed by the teacher must be valid and reliable.

The above discussion may be summed up with the observation that provides teacher with necessary information regarding the effectiveness and suitability of different aspects of the educational enterprise. Evaluation can be successfully used by the teacher to make necessary changes and modifications where needed. Unachievable objectives, unsuitable curricula content, and defective learning experiences may be revised in the light of the results of the evaluation of the whole process.

4. SUGGESTIONS TO ENHANCE THE TEACHER'S ROLE IN CURRICULUM CHANGE IN PAKISTAN

In our traditional system of educational administration in Pakistan, teachers are accustomed to implementing in the classroom whatever is superimposed upon them. They are not properly encouraged to make any major contribution to the formulation of the curriculum at any level of education. The role of the teacher as a member of the team constituted for curriculum formulation, as conceived in this unit cannot be assigned to him unless certain other necessary changes are made in the whole set-up.

In the first instance, changes may have to be introduced in the administration of the Education Department. As a corollary, it would be necessary to, revise the functions of the Curriculum Wing of the Ministry of Education and Textbook Boards etc. to more effectively associate the teachers in work as curriculum-makers. This drastic shift of

functions in curriculum-making may entail numerous unforeseen difficulties. It, therefore, seems desirable to proceed towards decentralization in a phased manner. The responsibility for curriculum-making may, in the first instance, be delegated to the newly formed bodies at provincial and regional levels and the Curriculum Wing may be assigned the work of an advisory and coordinating body.

Before our teachers, can play some constructive role in curriculum change, it seems essential to equip them with the necessary theoretical back ground and skills involved in the process of curriculum formulation. To this end, the teacher education institutions at all levels will have to revise the syllabi to make necessary modifications commensurate with changed circumstances. Changes in content must also result in changes in the methods adopted in training teachers. They need not only pre-service but also in service training in .the latest teaching techniques.

Furthermore, teachers will also need to be trained in the techniques of establishing close cooperation with other different types of socio-cultural agencies and industrial enterprises to exchange the necessary information and data for making the most appropriate curriculum in light thereof. The reason for this is that teachers cannot remain aloof from the social and cultural settings and suggest a curriculum while remaining quite indifferent to the immediate and future need and aspirations of the community.

The whole programme of teacher education should be overhauled centering on the persistent problems of our culture with specific reference to the tenets of Islam. It should provide for group as well as individual planning that will help the teachers see and appreciate the problems and make corresponding provisions in the curriculum.

The conceived change in the position and functions of classroom teachers will also necessitate changes in position and functions of the headmaster, the district administrative and supervisory staff and so on. The problem under discussion also has implications for the financing of the programmes flowing from the curricular changes made by local school teachers.

Through the existing centralization system of curriculum formulation in Pakistan leaves little room for teachers contributions, any sudden and unplanned change in the system may have an adverse effect. An overnight shift to unchecked academic freedom for unprepared and ill-equipped classroom teachers may further aggravate the situation. But at the same time, the maximum participation of teachers is essential to further the cause of education, both qualitatively, and quantitatively. An organized attempt must, therefore, be made to consider the implication and potential problem arising from the suggested change; and to find possible solution by conduction a feasibility survey at the national level.

4.1 Self-assessment Question- Exercise No. 3

Part-I

Circle the most appropriate answers to the following questions:

1. A detailed look into the relevant phenomena existing at present and the background against which the process of curriculum formulation has to be taken up is known as:
 - a) formulation of aims and objectives
 - b) situational analysis
 - c) both a. and h.
 - d) none of the above.
2. The border of stages in curriculum formulation is, best represented by:
 - a) situational analysis; formulation of aims and objectives; selection and organization of content; selection and organization of learning experiences; curriculum-evaluation.
 - b) selection and organization of content; selection and organization of learning experiences; formulating of aims and objectives curriculum evaluation.
 - c) Formulation of aims and objectives; selection and organization of learning experiences; selection and organization of content; situational analysis; curriculum evaluation.
3. Ascertaining whether the objectives can be achieved through the selected content refers to which characteristic of the content?
 - a) significance
 - b) difficulty
 - c) universality
 - d) validity
4. With the tentative content outline in hand, the next step is to;
 - a) begin the formulation of aims and objectives to be achieved through it,
 - b) start evaluating the curriculum content,
 - c) began the plan of learning experience,
 - d) none of the above,
5. Learning experience or method service as something as something in between the;
 - a) curriculum formulation and its evaluation;
 - b) formulation of aim and objectives and content selection;
 - c) content selection and situational analysis;
 - d) curriculum and the objectives to be achieved;
6. According to Cronbach, the collection and use of information as a basis for decisions about educational programmes refer to:
 - a) curriculum formulation.
 - b) situational analysis.
 - c) curriculum evaluation.
 - d) teaching methodology.

7. Evaluation of curriculum enables us to:
 - a) compare the actual outcome with the expected outcome.
 - b) revise and improve our instructional strategies.
 - c) both A. and B.
 - d) none of the above.

8. The tests used to assess how far the students have gained and retained the information and knowledge imparted to them are called;
 - a) aptitude tests.
 - b) cognitive tests.
 - c) both A. and B.
 - d) none of the above.

9. In Pakistan, a teacher can play an effective role in curriculum changes even without revising the function of the:
 - a) textbook boards.
 - b) curriculum wing.
 - c) both A. and B.
 - e) none of the above.

10. Which one of the following will not be affected by assigning the new role of curriculum from formulation to teachers:
 - a) the curriculum of teacher training institutions:
 - b) teaching methodologies:
 - c) the educational administrative set-up:
 - d) none of the above:

Part-II

Compare the following statement by using the most appropriate words/phrases.

1. Situational analysis must _____ the formulation of aims and objectives.
2. If the objective is to develop understanding of the spirit of the Pakistan movement but the content selected does not help in the achievement of this objective the content can not be said to _____
3. The phenomenon of _____ placed special emphasis on the curriculum having a wider application as against its local application in a particular geography region or at a particular time.
4. Having translated the curriculum into classroom or field practice with the help of relevant experiences, we now proceed to its _____

Part-III

1. Give a brief account of each one of the stages of curriculum changes

2. What do you understand by term situational analysis in the content of curriculum change?
3. What are the different principles of content selection which a teaching must keep in view?
4. "Learning experiences serve as a means to achieve the predetermined educational objectives through implementing the contents of the curriculum Discuss the statement
5. Discuss the strategy of selection and organization of learning activities and the place of the teacher in this process.
6. Elaborate on the role of the teacher in curriculum change at the stage of evaluation of the curriculum.
7. Discuss the significance of the evaluation of curriculum as a necessary step for its modification?
 - a) What role would you like to assign to teachers in curriculum formulation in Pakistan?
 - b) How far can the present administrative set –up be co????? and helpful in assigning the new role to teachers?
 - c) What changes, structural and procedural, would you suggest to enable the teacher to play the conceived role in an effective manner.

4.2 Answers to Self-assessment Questions – Exercises 1-3

SAQ-1 (Self-assessment Questions)

Part-I

- | | |
|----------------------|----------------|
| 1. curriculum change | 2. cultural |
| 3. technological | 4. diversified |
| 5. dropouts. | |

Part-II

- | | |
|--------|--------|
| 1. (a) | 2. (b) |
|--------|--------|

Part-III

1 3 compare your answer with relevant portions of the unit.

SAQ Exercises-2

Part-I

- | | | | | |
|--------|--------|--------|--------|--------|
| 1. (d) | 2. (b) | 3. (c) | 4. (a) | 5. (d) |
|--------|--------|--------|--------|--------|

Part-II

- | | | | |
|-----------|------------|--------------------|-------------|
| 1. pupils | 2. england | 3. the netherlands | 4. setting. |
|-----------|------------|--------------------|-------------|

Part-III

1 5 Compare your answers with relevant portions of the unit.

SAQ Exercise-3

Part-I

- | | | |
|---------|--------|--------|
| 1. (b) | 2. (a) | 3. (d) |
| 4. (c) | 5. (d) | 6. (c) |
| 7. (c) | 8. (b) | 9. (c) |
| 10. (d) | | |

Part-II

- | | | | |
|------------|----------|---------------|---------------|
| 1. precede | 2. valid | 3. university | 4. evaluation |
|------------|----------|---------------|---------------|

Part-III

For Questions 1 to 8 compare your answer with the relevant portion of the unit.

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UNIT: 4

COMPARATIVE PERSPECTIVE OF CURRICULUM DEVELOPMENT

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INTRODUCTION

Educational planners and administrators as well as students of education in every nation need to know a lot about education, its organization and management in countries other than their own. It is beyond any shadow of doubt that the future of not only a nation, but of the entire mankind and the civilization depends on the purpose, kind and quality of education provided to its members as well as development that will affect education and will be affected by education for the succeeding generations all over the world.

Different nations adopt different methods to meet the educational challenges of today. The study of educational system and curriculum development in other countries provides an important key to the understanding and interpretation of major national and international issues, trends and problems. It can also bring to light the potential strengths and weaknesses in the educational system of the country under study.

This unit provides information on education systems and curriculum developments in countries which represent different stages of development, different philosophies and have different ways of dealing with educational issues.

The unit aims at offering insight into forms of upbringing, schooling and enlightening in countries other than ours. A comparative study of the curriculum is all the more important as curriculum is at the very heart of educational endeavour and deserves careful attention.

In the subsequent sections, educational systems and curricula of the following

- | | |
|-----------------|------------------------------|
| 1. USA | 2. U.K |
| 3. Canada | 4. Russia |
| 5. Japan | 6. Peoples Republic of China |
| 7. Thailand | 8. Malaysia |
| 9. Saudi Arabia | 10. Pakistan |

Having studied the process of curriculum development in the above mentioned countries, you are expected to draw inferences and compare and contrast different features of this activity with reference to Pakistan and other countries. Let us now proceed further to study the practices of curriculum development in these countries one by one.

OBJECTIVES

After studying this unit you should be able to:

1. Describe the process of curriculum development in selected countries of the world
2. Identify the differences as well as similarities in the systems of curriculum of the sample countries
3. Discuss the approaches to curriculum development adopted in the sample countries
4. Compare and contrast the process of curriculum development in Pakistan with some other countries.
5. Recommended suitability of various ideas and processes of curriculum development for adoption in our own situation.

1. CURRICULUM DEVELOPMENT IN THE UNITED STATES OF AMERICA

1.1 Introduction

Rich in Land, population and natural resources and highly developed technologically, the people of USA enjoy a high standard of living and lead the nation of the world according to various conventional indicators. The US territory extends up to 2400 miles from the Atlantic to the Pacific Oceans and 160 miles from Canada in the north to Mexico in the south. The indigenous population consists of Indians and migrants from Britain, Germany Scandiavia, southern and eastern Europe, and central and south America besides the descendants of slaves imported from Africa during colonial and post-colonial years. The combination of geographical and demographic characteristics results in great diversity from one section of the country t the other. Systems and structures of education are also quite diverse in different parts of the country.

1.2 Educational System

Each state provides a system of free public school, covering kindergarten plus 12 year. Though laws vary among the states, schooling is compulsory from the aged of 6 or 7 years to 16. There are several structural patterns in used depending on the location; kindergarten plus elementary grades 1-8 followed by four year of high school; kindergarten plus six grades of elementary school followed by three year junior high school and three year senior high school (sometimes combined into a six year high

school. Or a relatively new development kindergarten plus four or five grades of elementary schools, a four-year middle school and four-year high school. All patterns lead to a high school graduation at the age of 17 to 18 years.

Historically, education has been considered a state and local responsibility but the Federal Government has been involved at all levels since 1972. Federal Government supports school launch programmes, administers education for Indians, finances education for veterans and underwrites college student loans. The federal Department of Education headed by a Secretary of cabinet rank is responsible for executing government policy.

In various states generally a Board of Education comprising elected/and or appointed members forms policy and determines the budget. The state department of education headed by a chief administrative officer is responsible for providing education at all levels, curriculum development, teacher certification and school finances etc.

1.3 Curriculum

As a rule, the practical responsibility for running the schools is in the hands of smaller units such as counties and districts and 18, 200 local districts run the daily administration. The strong tradition of local autonomy and the pluralistic nature of society influence curriculum. There is no official national curriculum. State department of education prescribes curriculum with varying degrees of specificity leaving scope for local and individual variations. Subject specialists, school administrators, and teachers are involved in the process of curriculum development based on research and investigation. The major subjects taught at all levels of the school systems are English language, Mathematics, Social studies, Science, Music, Arts, and physical Education.

The advances in technologies have resulted in the introduction of new teaching methodologies such as team teaching, programmed instruction, language laboratories and computer aided instruction. The current social concerns have made their way into the consumer and environmental education and drug and alcohol abuse instruction. Policies concerning promotion from one grade to the next depend on the state or district decision. A student at secondary level is required to repeat a grade after unsatisfactory performance but promotion at elementary level is automatic. Acquisition of a high school diploma does not always require a formal examination but attendance and a satisfactory school record of achievement are considered sufficient for this purpose. In the absence of any national public examination system, the standard of education varies in different states. Recently there have been moves to set state criteria for high school diploma generally in the form of minimum competency requirements.

Structure of the U.S. Education System
Curriculum and Content Standards

Primary and Secondary Standards

While there is no national curriculum in the United States, states, school districts and national associations do require or recommend that certain standards be used to guide school instruction. In addition, federal law mandates that state standards be developed and improved in order for states to receive federal assistance.

Federally Approved State Accountability Plans is a directory of approved state accountability proposals under the Elementary and Secondary Education Act.

Federal Resources for Education Excellence (FREE) is an extensive linked directory of curricular resources, organized by subject.

MCREL Directory of National Subject Benchmark Standards is a directory of benchmark standards for a variety of subjects developed by national professional associations and compiled by the federally funded Mid-Continent Regional Education Laboratory.

MCREL Benchmark Standards Database is a searchable database of benchmark curricular standards organized by subject and level of school.

ECS Directory of State Curriculum Standards is a linked compendium of reports on state standards in specific subjects provided by the Education commission of the States.

Curriculum Standards Placeholder is a directory linked to both state curriculum standards available online and national standards proposed by various subject organizations.

NCEO Directory of State Secondary Graduation Requirements is linked to official state information on secondary graduation, including state examinations in many cases.

ECS Table of State Graduation and Admission Requirements provides 2006 data for how state secondary graduation requirements – expressed in Carnegie Units – align with state minimum postsecondary admissions requirements for public institutions where these exist.

Tertiary Standards

Postsecondary standards are the primary responsibility of individual institutions of higher education. However, institutions develop and enforce their standards with reference to the policies administered by state agencies, the requirements of accrediting agencies, the expectations of professional associations and employers, and the practices of peer institutions.

EROD State Higher Education Agency Directory provides links to the various state higher education commissions, whose websites have policy information and other resources pertaining to standards and other topics.

National Governors Association Center for Best Practices provides information and links to various policy studies on access and degree completion that relate to standard-setting and accountability.

NCPPE College Level Learning Page provides information and links to policy reports and studies of undergraduate programs and outcomes.

National Forum on College-Level Learning is a national research project to measure comparable standards of learning across states at the bachelor's degree level.

College Learning Assessment (CLA) Consortium is a cooperative project to study the value added by undergraduate education. Over 150 institutions participate in the CLA.

Activity

Have a discussion with your colleagues as to how social concerns and advances in technology have affected curriculum development in USA. Also discuss the applicability of the forces in the context of Pakistan.

2. CURRICULUM DEVELOPMENT IN THE UNITED KINGDOM

2.1 Introductions

The United Kingdom is located on a number of Islands on the western edge of the European continental shelf. Immigrants from all over the world had important consequences for the educational systems prevalent in the U.K. Ethnic minorities are concentrated in certain larger urban areas, especially, London and require from education system in these areas, recognition of their special needs, particularly in respect of language and cultural differences.

2.2 Educational System

Education in the U.K. is said to be national system, locally administered. A large part of the day-to-day running is in the hands of local education authorities (LEA).

Attendance of school is compulsory for children of 5-16 or 18, years divided into two or three tiers. The two tier system comprises primary schools age (5-11) except in Scotland where transfer is usually at 12 instead of 11, sometimes subdivided into infant (5-7) and junior (7-11) school and selective or nonselective secondary school (ages 11-16 or 18). The three tier system consists of first schools (age 5-8 or 9): middle schools (age 8-12 or 9-13) : and upper schools usually nonselective (ages 12 or 13 to 16 or 18). The two tier system is most common: the three-tier-system is to be found only in England catering for 15 per cent of all pupils. Children over the age of compulsory school education (16) may continue in the same school in what is known as sixth form usually for two further years or they may join a separate institution such as a sixth form college, tertiary college, college of further education or technical college.

Education for school learners is divided into two categories: non-advanced further education (NFE) which consists of courses provided up to the standard of the General Certificate of Education (GCE) and Advanced (A) and higher education which consists of courses above this level provided in universities, autonomous institutions and by colleges maintained by LEAs.

2.3 Curriculum

Previously there was no nationally determined curriculum but examination boards which controlled the General Certificate of Education exerted something of a unifying influence on what was taught in schools. Her Majesty's Inspectors of Schools were responsible to the Secretary of State for Education. They investigated and reported on all aspects of education including the curriculum. The government, however, introduced a national curriculum in 1989. The curriculum prescribes a core of three principal subjects Mathematics, Science and Language and children's attainment in these subjects is to be tested at age 7, 11 and 14. Other foundation subjects include History, Geography, Art and Music. In addition, the Education Reforms Act (1988) includes the provision for religious education for all pupils. A modern foreign language is also applicable for secondary schools.

Progress through school depends chiefly on age rather than attainment. There is no grade system and a majority of children move through system with other children of the same age. Teachers nevertheless use a variety of ways to test pupils' progress.

Until 1988, secondary school pupils could attempt examination in various subjects leading to the Certificate in Secondary Education (CSE) or a more demanding General Certificate of Education Ordinary Level (O Level). In 1988, these two systems were abolished and replaced by the General Certificate of Secondary Education (GCSE). The examination is organized by five independent groups in England, and Wales and one in northern Ireland. Scotland has undertaken a separate but similar freeform.

The GCE Advanced level (A level) is normally taken by student in up to three or four subjects, two years after GCE O level and is the standard for entrance to higher education and professional training.

However in connection with the newly introduced national curriculum, the government is proposing to introduce nationwide assessment for all pupils of 7, 11, 14 and 16 years of age.

Curriculum Planning

All schools in England and Wales are required to follow the National Curriculum. This means that teachers have to ensure that they plan thoroughly what they will be teaching, how it will be taught and when it will be taught – this is known as curriculum planning. Although individual schools may have modified models of curriculum planning, all schools will ensure that your child's education is strictly planned in each subject area over the following periods:

- ◆ Key Stage (Years 7–9 or 10–11)
- ◆ Yearly

- ◆ Weekly
- ◆ Daily
- ◆ Individual lessons.

Therefore, when your child enters secondary school in Year 7, teachers in each subject area will have planned not only what your child will be studying in their first lesson and first week at their new school, but also what will be taught in Years 7, 8 and 9. Heads of department will co-ordinate this planning in their individual subject area.

Meeting the students learning needs

Curriculum planning will not only focus on what topics will be taught, but also on the skills that students will require within specific subjects. Teachers will plan to address the needs of all their students, ensuring that preferred learning styles are met – they will introduce tasks that suit individual students’ needs, for example some may like to read, write, record, discuss, or become involved in role play or model-making. Tasks will be set to ensure that all learning styles are catered for.

Each subject area will also ensure that teachers incorporate government initiatives, such as the Every Child Matters agenda or the new Programme of Study at Key Stage 3, within their planning. These may help in such areas as cross-curricular links – helping to ensure that subjects relate to each other and that students see that there are aspects of their History and Religious Studies lessons that link together. There is also a requirement to focus on issues that increase the students’ understanding of cultural, social and economic issues, and to help them become ‘better citizens’ – this is known as Citizenship. The latest initiative requires all subject teachers to incorporate Personal, Learning and Thinking Skills (PLTS) within their teaching. These are intended to develop students’ skills in areas such as independent enquiry, creative and reflective thinking, team-working, self-management and effective participation. These are skills that students will need beyond the individual subject and the classroom, and that will prepare them for the workplace and later life.

Teacher planning

When students enter Year 10 and embark upon their GCSEs, teachers also use examination board specifications to plan their teaching to ensure that students are fully prepared for the end of Key Stage examination. Curriculum planning underpins teaching within schools. Heads of department are directed by senior managers (the head teacher, deputy and assistant head teachers) to produce planning documents that are distributed to all staff to ensure consistency among teachers and quality teaching for your child. Good curriculum planning gives access to the curriculum for all students and the opportunity for every child to achieve their academic potential.

Here are some examples of curriculum planning

- ◆ Yearly planning – a scheme of work
- ◆ Daily planning – a teacher’s planner
- ◆ Individual lesson planning – an individual lesson plan.

Activity

Discuss with your colleagues the salient features of curriculum in GCSE system.

3. CURRICULUM DEVELOPMENT IN CANADA

3.1 Introduction

Public schools are the responsibility of individual provincial departments of education and funded mainly from local and provincial taxes, with some federal funds. Practices and policies regarding education (public and private) vary depending on the province. Provincial departments of education determine education policy on accordance with provincial laws. The minister of education is responsible for setting policy relating to educational affairs, and library services, provision of records and educational statistics, and setting and enforcing the term of compulsory education.

One of the unique aspects of the Canadian public schools system is the amount of decentralization and the degree to which schools are run by local school authorities. Each province is divided at the local level into school districts governed by a superintendant and a locally elected school board (or board of education) that decided instructional policies, hires teachers, purchases equipment and generally oversees the day to day running of schools. Most schools have parents Advisory Councils (PACs) that mainly concern themselves with raising money to be equipment such as computers, video surveillance, emergency lighting, playground equipment and schools buses for children with special needs.

Therefore qualifications and standards vary from province to province. All provinces require teachers to have a license or certificate to teach in public elementary and secondary schools, although the actual requirements for teacher certificate are set by provincial education departments.

Geographically Canada is the second largest country in the world next only to Soviet Union. By population it is among the smallest with its 24 million people of different colours, creeds and languages with tow predominant languages English and French, traced back to its colonial beginning.

3.2 Education System

There is officially, no Canadian educational system and by law education is a provincial responsibility. Thus Canada has twelve education systems. Though systems in different provinces have much in common, yet each has its unique features stemming from tradition and aspirations of the people in each province, and from differences in economy, geography and size of population. Educational systems in English speaking provinces have been influenced by Scottish traditions, while traditions in France are followed in French speaking province of Quebec. One thing, however, is common that Canada is now tow-third urban and new, and constantly improving technologies have brought the country close to being able to offer equality in educational opportunities to all

citizens. There are elementary schools, secondary schools, special schools, private schools, community colleges and universities. The beginning age for school varies across the country. Elementary schools are for children aged 5 or 8 to 11 or 13 with secondary schools providing programmes for 12 or 14 years old. The Elementary school is usually designed to provide basic learning in reading, writing, computation, science, social studies, music and art. Emphasis is also being put on Canadian studies.

Secondary schools are of different types, though most are Composite Schools' and offer a wide range of academic, business and technical courses. Some vocational occupational schools are also available for non-academically oriented students. These schools lead directly to the world of work while graduation from a composite school leads to employment in a community college or university.

3.3 Curriculum

There is no uniform curriculum in Canada and even within provinces there are many differences among school systems. The Ministry of Education is responsible for prescribing course of study. The Ministry declares subjects which are to be compulsory. Usually education department issues guidelines outlining the course content and then it is the responsibility of the supervising officer of a school to see that these guidelines are interpreted and implemented within the philosophy and rationale of the approach outlined therein. School staff are encouraged to take active part in designing the course. A new course is usually introduced in one or a few schools and then school boards seek ministerial approval for its province-wide application.

Discovery method, Team Teaching and new technology are in wide use. Lecture method is also used by some teachers.

Until 1976, a student had to pass a set of departmental exams to graduate from a secondary school. This system was strongly criticized on the basis that less capable students would cram and pass the exams and that teachers would concentrate on the areas important for the exams only. In most cases, it is now the principal and classroom teacher who determine whether or not a student will graduate on the basis of overall school performance and school tests and exams.

Activity

Compare Canadian composite schools with comprehensive schools in Pakistan.

4. CURRICULUM DEVELOPMENT IN RUSSIA

4.1 Introduction

The system of education in Russia dates back to 1920. It has since then been continuously developed and improved to keep pace with the economic and cultural growth of the country. All education is controlled by the state and is characterized by equality and continuity between all types of educational institutions. Education is universal, free, and

secular and is conducted in native tongues with the freedom of choice in language of learning.

Education in Russian is compulsory for children between the ages of 6 and 15. It consists of primary school education for ages 6-10, followed by senior school for ages 10-15. If a pupil of secondary school wishes to go on in higher education, he or she must remain to complete secondary school for 2 more years, from ages 15-17.

Primary and secondary school includes 11 years of study. Every school has a core curriculum of academic subjects. After completing this stage, pupils are awarded the *Attestat to Srendnem (Polnom) Obshchem Obrazovanii* (Certificate of Secondary Complete General Education).

Some subjects are mandatory such as Russian literature, Russian language, Russian history, world history and the maths and sciences. In addition, there are specialized schools that concentrate on specific subjects.

Students are normally graded on a scale from 2 – 5, with 5 being the top grade. Each student has his or her “dairy”; a personal book of academic achievements in which teachers record the given grades.

At 15 years old, children may choose to enter a vocational school or non-university institute. These typically offer programmes of academic subjects and a programme of training in a technical field until students reach 17 or 18. Such institutions used to be called *technikm* but now most of them are known as colleges.

4.2 Educational System and Curriculum

The system of public education in Russian includes pre-school institutions (Kindergartens and nursery schools), schools providing general education, vocational schools, specialized secondary schools and higher educational institutions. Thee pre-school institutions are of two types, nursery schools enrolling children from 2 months to 3 years and kindergartens enrolling children from three to seven years of age. Activities at these institutions include games, study, entertainment, elementary work, and all aspects of physical moral, aesthetic and academic education. The state kindergarten syllabus specifies as to what children have to learn about the environment, arithmetic, drawing, modellin, sewing and dancing. Reading and writing became a part of the syllabus only in 1970. The language used is the respective regional language and the main task of kindergarten is to care for children's health and physical development. This is ensured by an appropriate schedule, a planned diet, child care, physical exercises and medical supervision.

The next stage is eight-year school, primary education which is compulsory for all children is a part of eight-year school. The duration of primary education out of eight is three years. All subjects are taught with more emphasis on native language and Mathematics. Other subjects includes Music, Art and Physical Education. Systematic courses in the native language. Literature, Mathematics, History and foreign language are

introduced in form 4. Biology and Geography are added in form 5, physics in form 6 and Chemistry in form 7.

The next stage after eight-years is secondary education for two years. For this level, there are secondary schools, vocational schools and specialized secondary schools.

Subjects taught in the first year in secondary schools include Literature, History, Mathematics, Physics, Chemistry, Foreign Language and Economic Geography. In form 10, more subjects such as Astronomy, General Biology and Social Sciences are added. Labour education is conducted throughout the whole period of secondary schooling. In form 1 to 3, children acquire work-skills with paper, card board and other materials. They study needle work and grow flowers and plants. Lessons in forms 4 to 8 are conducted in wood-work and metal-work, in domestic science workshop and in the educational/experimental plots belonging to the school. Attention is also paid to vocational training in the senior forms of secondary school.

After form 8, some pupils also work in industry or agriculture but all of them must receive secondary education. For this purpose, evening secondary schools provide course for the continuation of secondary education. Study in these schools lasts for one year more than the day secondary schools.

Vocational schools prepare skilled workers for different sectors of national economy and the system is continuously revised according to the needs of the national economy.

The courses offered in these schools are of 3 to 4 years duration.

Technical schools train specialists with middle level qualifications for different sectors of the economy. The term of study in these schools after eight year school is 3 to 4 years and after secondary school two to two and half years.

There are specialized secondary schools for those who did not complete secondary education to give them sound knowledge and skill. Students in these schools study the interrelated cycles of subjects i.e. General Education, General Technical and Special Cycle Graduates have a right to enter any higher educational institution and are trained for a large variety of jobs in different sectors of economy.

Higher education is provided in universities and other institutes (Pedagogy, Economics, Polytechnic, Agriculture, Theatre, and others) Higher education is accessible to everyone irrespective of sex, race, social origin or status. A specific set of subjects involving a combination of education and practical work, resulting in the acquisition of modern scientific knowledge are chosen. The programme includes obligatory subjects which form the basis of special training and optional subjects to enable students to study special fields in depth in order to learn the latest scientific and technical developments. Optional subjects are available in wide range. In Physics alone there are more than 100 courses.

The main teaching method at this state is lectures, seminars, laboratory work, practical work and course and laboratory projects.

Activity

List the major characteristics of Russia educational system.

5. CURRICULUM DEVELOPMENT IN JAPAN

5.1 Introduction

Japan consists of mainly 4000 large and small islands covering an area of 378000 kilometers out of which only 12 per cent can be inhabited. In 1984, total population was 120 million and those up to 14 years of age formed 22 per cent of the population.

In Japan, local standard curriculums provided by the prefectural boards of education and the municipal boards of educator, are based on “The Course of Study,” which is the standard nationwide curriculum. Each school makes its “yearly guidance plan” as a general plan at the beginning of the year. This guidance plan provides direction for (1) Guidance plans for grades, fields and subjects, (2) Semester guidance plans, (3) Monthly guidance plans, (4) Weekly and unit guidance plans, (5) Daily guidance plans and (6) Current lesson guidance plans. Plans are gradually made from (1) to (6). These plans are evaluated through actual classes and periodically reexamined.

The school also makes its “Course of Study” at the beginning of the year. This plans is made for each subject and extracurricular activity (moral education, special activities, the period of integrated study) at each grade level and for each class.

Curriculum development is an activity that evaluates a school’s curriculum continuously from the perspective of social change, etc. and then improves it. It includes curriculums at various levels. For instance, schools, communities and the national curriculum. In Japan, the implementation of the fundamentals of the course of study and each school’s full involvement in curriculum development commence after CERI (Center for Educational Research and Innovation) of the OECD advanced an idea called SBCD (School-based Curriculum Development).

Curriculum development is a dynamic process of curriculum improvement through “doing (teaching and guidance)” and evaluation of the results of a planned curriculum. “Teaching” is one of the practice models in the curriculum development process. It is important that the unity of “process of teaching improvement” be incorporated into curriculum development.

5.2 Education System

The aim of education in Japan, according to the fundamental law of education, is that it shall aim at the full development of student personality, at rearing a people sound in mind and body, who love truth and justice, esteem individual values, respect labour, have

a deep sense of responsibility and are imbued with an independent spirit as the builders of a peaceful state and society.

Secondary in Japan emphasizes the development of basic abilities in young people rather than set of specified vocational skills on the assumption that shall be prepared to cope flexibly with rapid progress in science and technology and with rapid changes in society.

The education system of Japan consists of the following four states:

i) Kindergarten and Nursery

Kindergarten is an educational institution under the Ministry of Education for children aged three to five years, while nursery schools is regarded as a social welfare institution under the Ministry of Health and Social Welfare for children up to five years of age.

ii) Elementary Education

Children of six years of age attend elementary schools which is compulsory for all and lasts for six years.

iii) Secondary Education

Lower secondary school is compulsory for three years. After compulsory schooling, three to four years upper secondary education is provided. Admission is given on successfully passing the entrance examination.

iv) Higher Education

After upper secondary school, students proceed to Daigaku University or Taiki-Daigaku (Junior Colleges) after passing an entrance examination. University course are of four years duration while junior college is of three years' duration.

5.3 Curriculum

The school curriculum is prescribed by the Ministry of Education but schools are required to prepare their own detailed instructional programmes on the basis of the courses of study and guidelines provided by the Ministry. A course is revised approximately after ten years. Teachers guide books for each grade and subject are prepared by Curriculum Specialists in the Ministry with the assistance of teachers.

Following are the details of curriculum for all levels.

i) Kindergarten and Nursery

Both types of institutions provide the same sort of activities to the children based on the principle of teaching through games.

ii) Elementary

The subjects taught in elementary school include Japanese languages, Social Studies, Arithmetic, General Science, Music, Art, handicraft and physical-education. Moral education is also compulsory. Some private institutions replace

moral education with religious education. Promotion from one grade to the next is automatic.

iii) Lower Secondary

In lower secondary schools, in addition to the subjects taught at the elementary level, pre-vocational education subjects are also taught. A foreign language is one of the elective subjects but almost all schools teach English as a foreign language.

iv) Upper Secondary

In upper secondary schools, in addition to the general education courses, technical and vocational education courses such as business education and industrial education are taught.

At all levels of the school system, tests of various types are used to judge whether a student should be promoted to a higher grade. In elementary schools, the decision about promoting pupils is based on internally administered tests. If students have not attended more than half the number of school days or if their subject matter achievement is unsatisfactory or if they have a record of miserable matter achievement is unsatisfactory or if they have a record of misbehavior, they are required to repeat a grade.

Activity

Discuss the merits of Kindergarten/Nursery and elementary Education in Japan.

6. CURRICULUM DEVELOPMENT IN THE PEOPLES REPUBLIC OF CHINA

6.1 Introduction

China is the most thickly populated country of the world with more than 1311 million people according to the last census. Out of these 200 million live in cities and the rest live in rural areas. China has territory of about 96 million square kilometers including remote mountainous areas, forest zones and pastoral areas. The models of China's current curriculum organization can be divided into two categories; 'the subject plus the activity' and 'the required plus the elective plus the activity' (State Education Commission 1994). The adjusting opinions on the curriculum Programme for full-Time Elementary and Junior High Schools According to the New Work-Time System (Beijing; State Education Commission). For example, in the current national curriculum for elementary schools, there are 12 courses; moral education, Chinese literature, mathematics, social studies, science, physical education, music, arts, labour, morning/evening meeting, team activity, and social practice. The first eight of these courses reflect the 'subject' and the remaining four the 'activity'. In the current national curriculum programme for senior high schools, there are 25 courses; politics, geography, information technology, etc., representing the 'required'; health and physical education, arts, theme studies, etc. the 'elective'; and social service, labour, and social practice, etc., the 'activity'.

The new curriculum organization for basic education will be a combination of the subjective and the integrative. Interrogative courses are given a central place in elementary schools, while the subjective courses are emphasized at senior high schools. In junior high schools, a combination of both the subjective and the interrogative is emphasized (Ministry of Education 2001) Guidelines on Curriculum Reform of Basic Education (for Experiment) (Beijing; Ministry of Education). In this spirit, Shanghai, for example, has planned a comprehensive curriculum re-organization combining 'basic', 'expanding', "inquiring", and 'researching' courses (Sun 2000) On the focus on the second round of curriculum reform in Shanghai City Shanghai Education may 6 10).

There are required courses for all students in that they provide fundamental knowledge for students' further learning; strict assessment is undertaken to ensure that all students meet the requirements of these courses. Basic courses are fundamental for the cultivation of students' abilities in that they present essential contents and represent a general requirement for all students. Which courses are 'basic' will be different at different learning stages, e.g. Chinese, mathematics, and English are 'basic and natural sciences 'expanding' in elementary schools; in high schools, physics, chemistry and biology are 'basic'.

6.2 Education System

Shortly after the founding of People's Republic of china in 1949, it was stipulated that education should serve economic reconstruction and the schools should be accessible to workers and peasants. The policy on education is to enable everyone who receives education to development morally, intellectually and physically and become a worker with both socialist consciousness and culture'. There are various types of schools such as full-time schools, part-study/part-work schools and spare-time schools. In China education begins with pre-school education for children over three years.

Primary schools enroll children at the age of seven years. The length of schooling for most primary schools is five years while schools in large cities have a six-year schooling. A general secondary school is divided into junior stage and senior stage, the former lasting for three years and the later for two to three years. Secondary specialized schools admit junior secondary school graduates and this stage lasts for four years. Vocational schools and polytechnics enroll junior graduatean offer a three year course. Undergraduate programmes in colleges and universities generally require four to five years, while medical college require six years. Short cycle professional training colleges offer two to three year courses. Postgraduate studies may be undertaken at two levels, leading to the award of a master's degree (two to three year programme) or a Doctor's degree (another two to three years programmes after the master's degree). Adult education is provided to workers, peasants and soldier over 15 years of age with the priority given to the young and middle-aged.

6.3 Curriculum

Education is under the general guidance of communist Party and administrated by the government at different levels. Teaching programmes including curriculum and a number of teaching hours for primary and secondary schools are formulated and promulgated by

the Ministry of Education, while for higher education institutions, the Ministry defines the guiding principles of teaching programmes. Unified standard textbooks are prepared by the Ministry of Education for primary and secondary schools, while supplementary or native teaching materials are prepared by the provinces, municipalities and local school systems. For higher education the Ministry develops unified textbooks for common core courses and specialized foundation courses while the universities can compile some of their own courses.

The courses include teaching in Marxist theories, and ideological and moral education. The principles of integrating theory and practice is emphasized at every level. Teaching methods include lectures, group discussion, lab experiments and field studies. Productive work is an integral part of all teaching programmes.

Activity

Discuss with your friends the aims of education in China.

7. CURRICULUM DEVELOPMENT IN THAILAND

7.1 Introduction

Thailand formally known as Siam is a tropical South East Asian country. As one of the few developing countries, never to have been colonized, the education system of Thailand is free of foreign domination and language of instruction at every level is Thai.

Thailand has a stratified occupational and social class structure. Traditionally, high social prestige is attached to government employment and thus schooling has been seen as a major answer to social mobility.

The educational philosophy of the Ministry of Education in Thailand is based on the Philosophy of Sufficiency Economy as proposed by His Majesty King Bhumibol Adulyadej, which envisions a 'Green and Happiness Society'. The philosophy should apply to individual, family community and national level including education. It emphasizes moderation, reasonableness, and self-immunity. It furthermore distinguishes between morals and wisdom. Morals mentioned are honesty, integrity, diligence, patience, and perseverance. The development of the curriculum for primary as well as for secondary education is done by the Ministry of Education's Department of Curriculum and Instruction Development.

Thailand offers children twelve years of free public education, although only nine years are mandatory. School consists of six years of primary school, three years of secondary school and three years of upper secondary school. National exams are given at the end of the third, sixth and ninth years. Children start primary school at the age of six and study eight courses. Both the top secondary schools and private schools require an exam in order to be accepted. Upper secondary school also requires an exam for entrance and students can study either a general, vocational or comprehensive path.

Thailand also has a non-formal education system, which is much more flexible than traditional schools. These schools are adopted to the needs of the student. These informal schools are intended for those who are underperforming in regular schooling, allowing them to finish formal primary schooling. This system also offers general and vocational programs for adult with day and evening classes.

7.2 Educational Systems and Curriculum

A new 6-3-3 structure of education was introduced in 1978. The private sector and local communities are encouraged to set up kindergartens and early childhood centres to serve children throughout the country. Only 1.7 percent of all pre-school centres are run by the Ministry of Education for demonstration and experimental purposes.

Primary education is free and provided universally by the government. The responsibility for the development of curriculum at this stage lies with the Ministry of Education. Primary education has an integrated curriculum comprising four learning areas, basic skills (literacy, numeracy, communication skills and abilities relevant to future occupational roles.) Emphasis is also put on character development.

Secondary curriculum covers five broad fields; languages, Science and mathematics, Social Science, Character Development and Work Education. A wide range of exploratory pre-vocational subjects is also available. Credit system is used to facilitate flexibility in teaching learning process. The Educational Technique Department with the assistance of cooperating agencies is responsible for the preproduction and improvement of learning materials, such as lesson plans, textbooks, supplementary reading material, and teacher's guides. Short term training programmes are launched to train in-service teachers for efficient implementation of curriculum. Methods of teaching are generally suggested in syllabus and teachers. Are encouraged to keep abreast with educational changes and teaching methods. Traditionally, Thailand's examination and promotion system was highly structured with major emphasis on end-of-year examination to determine promotion to the next grade with examination at grades 4, 7, 10 and 12 administered externally by districts, provinces, regions, and the Ministry of Education. Entrance to grade 11 and joint university examination were highly selective. But curriculum reform brought changes in examination system also, and grade 11 and 12 end-of-year examinations were abolished in 1975-76 and 1976-77. The new system emphasizes internal assessment and reduces emphasis on end-of-year examination. In primary schools reforms have increased emphasis on the day-to-day accomplishment of specific behavioural objectives. This has improved the promotion rates and has made educational system more efficient.

With respect to entrance examinations to upper secondary schools and universities, the traditional achievement tests have been revised and regional universities have also established specific quotas to ensure more even representation of students from the major regional areas.

Activity

Highlight the functions of Educational Department Thailand.

8. CURRICULUM DEVELOPMENT IN MALAYSIA

8.1 Introduction

Malaysia occupies two distinct geographical areas, Peninsular Malaysia, comprising the Malay Peninsula to the south of the Isthmus of Kra, and East Malaysia (the states of Sabah and Sarawak), consisting of the north and western regions of the Island of Borneo. Both parts are separated by about 644 kilometers (400 miles) of the South China Sea. The total land area of Malaysia is about 336,700 square kilometers (130,000 square miles), of which Peninsular Malaysia occupies 134,640 square kilometers and East Malaysia 202,020 square kilometers.

Western influence came with the capture of Malacca by the Portuguese in 1511 and later by the Dutch in 1642. Britain's connection with Peninsular Malaysia began with the establishment of trading settlement in Penang in 1786, in Singapore in 1819, and in Malacca in 1824. British influence and authority over North Borneo (Sabah and Sarawak) were established almost concurrently with British expansion in the Malay Peninsula.

In 1955, Malaya achieved self-government, gaining independence in 1957 and adopting a system of constitutional monarchy with a popularly elected government. The tin industry brought in large number of Chinese, and the growth of the rubber industry resulted in an influx of Indian immigrants. These events gave rise to the existing plural society comprising the three major ethnic groups i.e. Malaysian, Chinese, and Indians.

The population of Malaysia in 1980 was estimated at 14.3 million with a yearly increase of 2.88 per cent.

Agriculture remains a major occupation and accounts for the highest percentage of the labour force.

Malaysia is now an elective constitutional monarchy. The Federal government has authority over external affairs, defense, internal security, justice (except Islamic and native-law), federal citizenship, finance, commerce, industry, communications, education and other related matters.

8.2 Educational System and Curriculum

Formal education in Malaysia begins at age six in the primary schools and has its 6+3+2+2+2 system of primary, secondary (lower and upper), and postsecondary education.

At the primary level, there are three media of instruction, Bahasa Malaysia, Chinese, and Tamil. In all schools, and at all levels, English is taught as a compulsory second language. Promotion at the primary and lower-secondary levels is automatic. In 1980, 2,006,748 children attended primary schools, more than 93 per cent of the population cohort between the ages of 6 and 11.

It is expected that about 90 per cent of the cohort will progress from standard 6 of primary to form 'I of lower-secondary education.

All primary schools, irrespective of the medium of instruction, use a common syllabus to ensure that all pupils follow a course whose content reflects a Malaysian outlook. Each school conducts its own evaluation of pupils. Tests are administered regularly, whether weekly, monthly, or at term end. In addition, centralized assessments are conducted yearly for all pupils in standard 5. This national assessment is used to determine the level of pupil achievement and the remedial activities required before the pupils enter secondary schools.

At the lower-secondary level (forms 1-3); pupils undergo automatic promotion through the three levels.

Thus a child has a minimum schooling of nine years. Pupils in standard 6 in the Chinese - or Tamil-medium schools have an additional year in the 'remove class' before proceeding to form 1 of lower-secondary school. In the remove class, pupils are expected to acquire proficiency in Bahasa Malaysia.

The lower-secondary level offers a comprehensive type of education. In addition to academic subjects, studies of a prevocational nature such as industrial arts, home science, agricultural science, and commercial studies are included. All pupils are required to take at least one of the prevocational subjects, the main aim being to expose them to some practical studies. At the end of form 3, pupils sit for the Lower Certificate of Education Examination. On the basis of results in this examination, pupils are selected to proceed to the upper-secondary level and are channeled into various streams, such as science, arts, technical and vocational.

At the upper-secondary level (form 4-5), education consists of academic (arts or science), technical and vocational streams. At the end of the second year, pupils in the academic and technical streams sit for the Malaysian Certificate of Education, or Sijil Pelajaran Malaysia examination (in English and Bahasa Malaysia respectively), and pupils in the vocational stream sit for the Malaysian vocational certificate of education. These examinations provide entry qualifications for posts in the public and private sectors. The tests are also utilized as a basis for selection into the post secondary level (form 6) or for entry to the various courses at the tertiary level.

At the pre-university level (form 6-lower and upper), education is streamed into science and arts. Pupils are selected on the basis of their performance in the Malaysian Certificate of Education or Sijil Pelajaran Malaysia examinations. At the end of the second year, the students sit for the Higher School Certificate or Sijil Tinggi Persekolahan in English or Bahasa Malaysia respectively. The results in this examination determine student entrance into the local as well as accredited foreign universities and colleges. It is also a qualification for appointment to certain jobs in the government and the private sector. All out-of-school training programmes are run independently of the formal school

system. However the curricula of all programmes complement the vocational and technical subjects offered in the schools.

The agencies responsible for out-of-school training programmes include the Board of National Unity of the Prime Minister's Department, the Agriculture and Community Development Division, the Veterinary and Fisheries Department of the Ministry of Agriculture and Rural Department, the Manpower Department of the Ministry of Culture, Youth, and Sports, the Ministry of Welfare Services, the Department of Prisons of the Ministry of Home Affairs, and the Department of Information. The programmes they provide are mainly concerned with the development of technical skills either on the job or in preparation for employment. Links are maintained with the Ministry of Education through the participation of officers and teachers -brought in from time to time to assist in the preparation of curriculum and to conduct specific portions of the training programme. In an effort to provide maximum opportunities for the rural population, the Malay and Rural Development Agency (MARA) and the Community Development Division of the Ministry of Agriculture have developed training programmes geared mainly towards rural youths.

Prior to January 1973, curriculum development was coordinated by the curriculum section of the Educational Planning and Research Division of the Ministry of Education. Curriculum Development was subject based consisting mainly of the preparation of subject syllabi, the development of teacher guides and teacher retraining programmes, and the supervision of textbook production either by the Dewan Bahasa dan Pustaka (the language and literary agency a statutory body of the ministry) or by authors in the private sector.

The Curriculum Development Centre, which was established in 1973, was assigned the responsibility of helping to raise the standard of education on the basis of national aspirations. The centre plays an important role in the development of a national curriculum. It continuously evaluates schools curricula, develops curriculum related models, and disseminates curricula by retraining primary and secondary school teachers through in-service courses.

The Cabinet Committee Report (Ministry of Education 1979) recommended two major curricular innovations within the school system: (a) a review of the primary school curriculum with a focus on the basic subjects; and (b) a general education programme for the secondary level.

The new primary school curriculum was implemented under a phased programme. In 1982, 302; primary schools began the programme in standard 1, and in 1983, the programme was implemented in standard, in all schools. By 1988, all, primary schools; at all grades, began to use the curriculum.

Activity

Discuss the curriculum development arrangements in the education system of Malaysia.

9. CURRICULUM DEVELOPMENT IN SAUDI ARABIA

9.1 Introduction

Saudi Arabia covers most of the Arabian Peninsula, which occupies the South western corner of Asia. Of the Peninsula's total land area of about 3 million square kilometers, Saudi Arabia comprises nearly 2,200,000 square kilometers (849,420 square miles). The country is bounded by the Arabian Persian Gulf, Qatar and the United Arab Emirates to the east; Oman, the Yemen Arab Republic, and the people's Democratic Republic of Yemen to the south, the Red Sea and the Gulf of Aqaba to the west, and by Jordan, Iraq, and Kuwait to the north.

Historically, the country's harsh environment, resulted in a low population density. During the 1930s the population was estimated at 1.5 to 2 million people. The increase in oil income, especially during the 1960s and 1970s and the subsequent improvements in income, nutrition, and health care, have resulted in a reduction of the rate of infant mortality, a rise in life expectancy, and almost the elimination of emigration. Today the country has a population of about 3 to 5 million. With an annual birth rate of 49 per thousand and a death rate of 19 per thousand with about 45 per cent of the population being less than 15 years old, the native population can be expected to be around 6 million in the year 2000,. Besides the native population, however, an estimated 1.5 to 2 million foreigners live in the country, Constituting more than half the labour force.

The oil industry and development related works and, projects have resulted in the rapid urbanization of the peasant and nomadic population. In 1970, some 20 per cent of the population was estimated to be living in metropolitan areas (towns of more than 100,000 people); 20 percent in small towns; and 60 percent in rural areas. Corresponding percentages for 1980 were 42, 12, and 46 percent, respectively. (South Arabia, Ministry of Planning 1980 p.56). The nomadic (Bedouin) population: is gradually decreasing. It is now estimated to be about 3 to 6 per cent of the total native population.

The oil income has increased. This income increase has resulted in fundamental demographic, social, and economic changes such as rapid urbanization of most of the population, an almost total dependence on oil-based income, diminution of the value of most forms of traditional production (e.g. agriculture, herding, and fishing) and an unprecedented rise in the importance of the government's role as receiver of national income, provider of social services, and-planner and administrator of national development. The first five-year development plan was initiated in 1970, second in 1975, and a third in 1980. The major goals of the latter have been; (a) to diversify, the economic basic by encouraging development in agriculture, mining, and industry; (b) to provide sufficient medical, education and social services to the population; and (c) to increase the number of and skills of the Saudi labour force. Within the national development effort, the educational system is charged with three-objectives: (a) to provide at least basic education for all citizens; (b) to provide students with the skills that are required by the changing needs of the economy; and (c) to educate the students in the beliefs, practices, and values of the Islamic culture.

9.2 Educational System and Curriculum

The Supreme Council of Education has the role of coordinating the educational efforts in Saudi Arabia. Under its authority are four major educational bodies whose varying sizes and continuous independence from each other, reflect, the efforts of the cultural and socio-economic factors mentioned above. Each of these bodies will be briefly described as follows.

Firstly, the Ministry of Education was established in 1954 to replace 'the Director General of Education which had been in charge of the educational efforts since 1926. Prior to 1926, the educational effort was mostly limited to the Qoranic schools which taught the fundamentals of religion, literacy and arithmetic. Trades and crafts were learnt through apprenticeship. Scholarship had an almost exclusively religious nature and talented students also obtained further training in Arabic and the Sharia (Islamic Law) by attending more specialized lectures from established authorities in the subject.

Attempts to introduce more secular topics were started in the late 1800s by-Moslem philanthropists from other lands. A few partly secular, schools were established in al-Hijaz, the western province of -Arabia. In 1926, when the Directorate General of Education was established the country had about 12 such schools with a total enrolment of about 700 pupils.

Nearly 25 years later, in 1950-51, the country had 325 government schools and 40 private schools, with a total enrolment of about 42,000 students.

The rise in school enrolment reflected the changes in the socio-economic conditions of the country. These changes have continued to take place at an accelerated pace and in 1978-79, nearly 25 years after its establishment, the Ministry of Education operated 6,560 schools with a total enrolment of 758,614 male students at predominantly the elementary, intermediate and secondary stages. This number accounted for nearly 57 per cent of the total student body in the country.

Secondly, the General Administration of Girls Education (GAGE) as established in 1960. Objections from concerned parents and Ulama (religious savants) to girls school, based on the fear that such modern schools might have undesirable effects on girls; delayed the establishment of these schools, by the government, until 1960. Girls schools were put under the Ulama's own administration and were this independent of the Ministry of Education. In the first year, the GAGE opened 16 schools. Less than 20 years later, in 1979, the GAGE operated 2,644 schools, mostly elementary, intermediate, and secondary, with a total enrolment of 425,042 (female) students. These students make up 32 per cent of total student body in the country (Saudi Arabia, Ministry of Education, Centre for Statistical Data, 1980).

Thirdly, there are other government educational organizations. In 1979-80, almost 6 per cent of all students in Saudi Arabia were enrolled in educational institutions that did not come under either the Ministry of Education or the GAGE. These institutions were

operated by the Ministry of Higher Education or the Ministries of Defense, Health, Social Affairs, Communications or one of the other government agencies which offer specialized kinds of instruction.

Fourthly, private schools are the oldest type of schools in modern Saudi Arabia. Prior to the availability of government schools, well-off families used to send their children to private schools in neighboring countries or to the few private schools that existed inside Saudi Arabia. In 1950-51, private schools constituted about 11 per cent of all schools in the country (40 out of 365). In 1979-80, they made up about 4.3 per cent of all schools (433 out of 10,018). The decline in the share of private schools in the educational efforts reflected the tremendous increase in the number of government schools. Never-the-less, there has been an actual increase of 393 private schools since 1950-51. The increase in these schools reflects two developments in the socio-economic conditions of Saudi society, namely (a) the rise in the number of working mothers who send their small children to day care centres and kindergartens, which make up nearly one-third of all private schools, and (b) the increase in the size of the upper-middle and middle classes some of whose members often choose to send their children to privately run schools where the quality of instruction is thought to be usually better than that in the public schools. In 1979-80, there were 65,635 students enrolled in private schools in the country (41,154 boys and 24,481 girls) accounting for nearly 5 percent of the total student body.

While the organizations that administer formal education in Saudi Arabia are various and independent of each other, the basic plan of their programmes is almost identical. There is elementary school of six years that begins after the child has reached the age of six. The next stage is the intermediate or middle stage which lasts for three years. The third stage is the secondary stage which also lasts for three years. Students who go on to college, spend an average of four years for obtaining a bachelor's degree in the social sciences or arts or an average of five years for obtaining a bachelor's degree in the exact sciences.

With little prior expertise in modern education, the educational system in Saudi Arabia basically adopted the Egyptian school curricula, adding a heavier emphasis on religious subjects. The curricula of both girls and boys schools are identical except that girls schools offer classes in home management, cooking, and sewing which boys schools do not offer. There is a heavier emphasis in boys schools on physical education than there is in girls schools. Private schools are supervised by the Ministry of Education or the GAGE and their curricula are basically identical to those of the public schools.

Both the Ministry of Education and the GAGE have a curriculum department although little has changed in their educational programmes since their inception. Both organizations hire the authors of the required textbooks, print the books and distribute them among their schools. Thus there is a uniform curriculum in the country. The general composition of this curriculum shows that great time is allocated to religious subjects in the first grade. As the students go in higher class, the emphasis decreases accordingly. On the contrary, English is not taught at the initial grades, while it is given due importance in higher grades.

Implementation of the curriculum is ensured through a variety of means such as the school-principal and visits by inspectors from the district office, as well as by a system of final examination which covers all the material that is supposed to be taught in a particular semester.

Teaching methods differ from subject to subject. Teachers of religious subjects emphasize memorization of religious texts and rarely use any teaching aids other than the blackboard. Teachers of Arabic use the blackboard and also, require a fair amount of text memorization. Teachers of science subjects use laboratories when they are available in their School. Most school laboratories, however, are deficient either in equipment or in qualified personnel, or in both. Language laboratories exist in some elite schools for teaching English.

Arabic is the language of instruction throughout the elementary, intermediate, and secondary levels. At the college level Arabic is the medium in the arts, humanities, and social science. English is the medium of instruction in engineering, medicine, and the natural science. College level textbooks in Arabic and college instructors who have to use Arabic often type up their own notes and use them as basic required texts. The result is shallowness in educational standards in some college departments.

From grade 1 to 12, the school year is divided into two semesters. The required instructional material for a year is divided into two halves. At the end of each semester, there is an examination that covers one half. The student's marks in two semesters are added up to make up his or her mark for the whole year. If the final mark is below a certain percentage, usually 50 per cent the student fails in that subject and sits in another examination in the subject at the end of the summer recess.

If the student fails again to attain the required minimum marks, he or she has then to repeat the whole year, retaking all subjects of that year including those already passed. Success in passing examinations thus constitutes the only criterion for promotion from one year or grade to a higher one.

Colleges also operate on semester basis but, in a number of universities, the credit-unit system has been adopted and, thus, students who fail in a particular subject do not have to repeat the whole year or semester but, rather, only the subject they failed in, if it is a required one.

10. CURRICULUM DEVELOPMENT IN PAKISTAN

10.1 Introduction

Pakistan inherited a system of education which had been designed to produce literate manpower to assist the colonial masters at lower levels of government and economic administration. Education was meant only for the privileged few who were supposed to govern the masses rather than to serve them:

Education policy of 1979 placed greater emphasis, upon religious education and Pakistan Studies. It also tried to integrate the religious institutions with mainstream national educational institutions. In order to achieve the target of universal primary enrolment, revival of mosques schools and makhtabs was proposed. A women university was proposed to be set up in the country to strengthen the female education,

10.2 Curriculum Development and Revision and Reforms

The Education Commission, 1959, analysed the situation pertaining to curriculum development and reforms and pointed out in their report that:

The responsibility of the Textbook Board should be:

- i) to frame the syllabuses according to the recommendations made in this report and
- ii) to lay down policy for the, preparation, printing and publication of text books.

10.3 Process of Curriculum Development

The process of curriculum development which is generally followed in Pakistan, with slight variations, Audit 2010 way described to consist of the following stages:

i) Determining the aims and goals of education

The first step in the process of curriculum development pertains to determining-the aims and goals of education. Guidance to the curriculum developers is provided in this respect by the prevalent education policy, Cabinet decision or some other policy statement by the President, Prime Minister or the Federal Minister for Education;

ii) Formulation of various committees by the curriculum Wing

In pursuance of the policy statement or policy guidelines, the Curriculum wing of the Ministry of Education appoints two types of Committees at the national level viz (1) National Committee on Secondary education and Primary Education each and (2) Subject Committees of primary and secondary levels separately. These committees which include teachers, subject's specialists, administrators further delineate aims of education for subsequent input;

The Curriculum Wing along with constituting the above mentioned committees also communicates the aims and goals of education and other policy guidelines to the Curriculum Research and Development Centres at the provincial level for appropriate action in respect of curriculum development,

iii) Proposals by the CRDC's and Curriculum Bureaus

The Curriculum Research and Development Centres and the Bureaus of Curriculum functioning at the provincial levels take appropriate initiative and finalize their proposals, keeping in view the overall aims of education, local situation and their research experience etc and send the same to the National Committee on Secondary/ Primary Education, the case may be for further processing,

iv) Processing in the National committees

Having received the curricular proposals from the provincial CRDC's and BC the relevant committee i.e either the secondary or primary level committee ascertains

their suitability in the light of overall aims of education and then with its recommendations and observations, sends the curricular proposals to the relevant subject committee. The relevant subject committee considers the whole package and sends it back to the primary/secondary level committee at the national level from whom it had received;

The primary/secondary level committee functioning at the national level reconsiders the original and the subsequent recommendations and accords final approval of the curriculum.

10.4 Textbooks

Textbooks play a very important role in educational activity. It was in recognition of this role that a full fledged textbook sector was established in the Bureau of Curriculum and Textbooks in 1974. Its main objectives are given as under;

1. To coordinate the work of four Provincial Textbook Boards;
2. To keep a check on the prices of textbooks published by the boards;
3. To ensure that the textbooks prepared by the provinces conform to national aims and objectives expressed through national curriculum,
4. To maintain uniform standards in textbook for both in content and production;
5. To provide leadership to the boards by preparing model textbooks.

10.5 Production of textbook

Production of textbooks in Pakistan is basically the responsibility of four Provincial Textbook Boards. These Boards are autonomous organizations under the administrative authority of the Provincial Education Department. The process of textbook production for classes I to XII starts from the Federal Ministry of Education. The Federal Ministry formulates curriculum and devises schemes of studies. The finalized curricula are forwarded to CRDC's and the Boards for preparation of textbooks.'

For the preparation of manuscripts of textbook, two types of practices are prevalent. Some of the Boards appoint a panel of authors for writing a textbook and assign different chapters to them. Others through open competition invite written manuscripts. A committee, of Boards' experts examines the manuscripts. The best manuscript is selected for publication and prescription. In certain cases where no manuscript is found upto the mark, lessons/chapters are selected from different manuscripts and the Boards own book. The finally selected/ adopted manuscript is submitted to the Federal Ministry of Education for approval.

The Ministry with the consent of the Provincial Education Departments constitutes a National-Review Committee for all subject areas. The nominations for the members of the National Committee are made by the provinces consisting of subject experts, curriculum planners and teachers etc. The committee for various subject areas examines the respective manuscript with a view to ascertain that true spirit of the national curricula is reflected in the textbooks: The Committee determines adequacy of content sequentially from grade to grade as well as to age and ability level. It also sees that the prices of the books remain uniform and ensures that there is no overloading. Measures to reduce prices

are considered as well. The examined manuscripts with the recommendations of the committees are sent back to the Boards for printing.

The job of printing and publishing the textbooks is contracted out to private printer's publishers. The distribution of these textbooks is done by the private agencies. The publishers are mostly centered in big cities like, Karachi, Lahore, Peshawar, Hyderabad, and Quetta, and sell these books through retailers.

Since the prices of the books are to be kept at minimum, the amount of the profit of the books is to be kept at minimum, the amount of the profits of the publishers and commission to the retailers are specifically prescribed by the Textbook Boards.

10.6 Redefined Federal and Provincial Roles in Education

Eighteenth Constitutional Amendment has a phenomenal impact on the education sector in terms of the respective roles at federal and provincial levels. The enactment has introduced a number of changes which have modified the education governance framework. The new framework has reconfigured the federal and provincial relationship in terms of education governance. Emerging scenario will result in a rearticulation of the federal role in the education sector and will significantly enhance the roles and responsibilities of the provinces. The new roles of the federal and provincial governments are shaped by two key features of the amendment i.e. introduction of Article 25-A, and removal of the concurrent legislative list. The shift will result in significant implications for federal as well as the provincial governments.

Redefining the Federal Role

The most notable change at federal level is considerable limitation of the federal role consequent to the omission of the Concurrent legislative list. The key roles of planning, policy, curriculum, standards, etc. have been moved from the shared jurisdiction to the exclusive mandate of the provinces. Most of the constitutional provisions mandating a federal role in education vis-à-vis provinces were in the concurrent legislative list. The federal legislative list contained only two entries relating to education i.e. entry 16 and entry 17. Entry 16 related to "Federal agencies and institutes for ...research, for professional or technical training, or for the promotion of special studies" and Entry 17 covered ". Pakistani students in foreign countries and foreign students in Pakistan". These two entries have remained unchanged, thus the primary role of federation will be positioned on the basis of these two entries.

11. SUMMARY OF SYSTEM OF EDUCATION AND CURRICULA OF SOME COUNTRIES OF THE WORLD

Name of the country	System of the Education	Rule of state	Responsibility of curriculum	Compulsory Education	Principals subjects taught at schools	System of promotion in Grades in school
U.S.A	- Diverse systems exist in various states. - In each state a Board of Education for policy and preparing budget. KG + 8 elementary grades + 4 years of high school lead to high school graduation.	Although education is state and local responsibility Federal Govt gives financial support for education of Indians veterans and student loans.	No official National curriculum State Department prescribe curriculum subject specialist, school administration and teachers are involved in curriculum development.	Free public education for 12 years from age of 6 or 7.	English language Moths, social studies, science music arts and physical education. New subjects ethics studies, consumers and environment education drug and alcohol abuse instruction.	- Promotion at elementary level automatic. - Examination at secondary level. - Regular attendance and school record of achievement is criteria for award of diploma.
United Kingdom	- National System - Local administered (LEA) Primary school in two of three tiers 6th from Tertiary Collage Technical Collage.	Secretary of the state for Education lays down policy and exercise supervision through her Majesty's Inspector of School.	w.e.f 1989 National Curriculum introduced	Compulsory Education from age of 5 to 16/18 years in two or three tiers.	Math, Science, Language, History, Geography , art, Music, Religious Education (From 1988)	No grade system. Children move through system on the basis of age. Examination at secondary level i.e CSF GCSE (O level) GCE (A level).
Canada	- Twelve Education Systems in different province. - Offers equality in education opportunities to all citizens. - System Comprises Ele. School, Special School, Community College and Universities.	Ministry of Education declares compulsory subjects and department issue guidelines.	No Uniform Curriculum. Even within provinces curricula differ among systems. School staff activity participates in course designing.	From age of 5 to 16/18 years at two tier i.e Elementary and Secondary.	At Elementary level emphasis on reading Computation science Social Studies, Music arts, and Canadian studies, At secondary level wide range of academic, business and technical subjects	Principal or class teacher determine whether a student should graduate on basis of his school performance.
Russia	Consists of state K.G system General Education vocation School specialized Secondary School Higher Education.	State exercise full control on policy curriculum and budgets.	Responsibilities for curriculum rates with the state.	After pre schooling primary education for these years is compulsory.	a) <i>General education</i> Native language, Math's Music arts Physical Education Foreign language & Science area introduced. b) <i>Secondary Education</i>	Promotion on the basis of assessment and tests.

Name of the country	System of the Education	Rule of state	Responsibility of curriculum	Compulsory Education	Principals subjects taught at schools	System of promotion in Grades in school
Japan	Kindergarten and Nursery 3-5 Elementary Education for six years. Lower Secondary School 3 years. Upper secondary school 4 years. Higher education 3-4 Years.	Education is the state responsibility. There are private schools also.	Ministry of education prescribes curriculum and provides guideline for instructional programmes.	K.G or Nursery Elementary Education 6 years plus 3 years or lower secondary education.	Literature History math's Physics chemistry foreign language economy geography labour Education. <i>Elementary</i> Japan language social studies arithmetic, general science, Music art handi-crafts. <i>Secondary</i> In addition foreign language provincial subject, technical and vocational subjects.	Promotion on the basis of tests/attendance/ performance
Peoples Republic of China.	Education starts at 3 which pre schooling education. Vocational schools. Undergraduate programmes in university 4-5 years Medical 6 years. Post-graduate M.A Phd.	Communist Party guides all educational programmes of the ministry of education.	Ministry of Education formulate curriculum, prescribes teaching learning programmes. Books and teaching material published.	Primary and lower Secondary education for 8 years.	Teaching in Marxist theories ideological and moral education.	Based on tests and performance.
Thailand	Kindergarten 6-3 3structure of education introduction in 1978 in higher education.	State controlled	The educational technique department develops and improve learning material textbook reading material teaching guide. Etc.	Primary education is compulsory and free (6 years)	<i>Primary</i> - Basic and abilities relevant to future occupation role. - Emphasis on character development <i>Secondary</i> - Language, science math, social studies character development & work education. - A large number of exploratory prevocational subject are available.	Promotion system higher structured. Emphasis on end of year examination. Entrance to grade 11 and join university commerce education highly selective. However from 1975 - 1976 and of year examination for grade 11 or 12 were abolished. New system emphasis internal assessment.

Name of the country	System of the Education	Rule of state	Responsibility of curriculum	Compulsory Education	Principals subjects taught at schools	System of promotion in Grades in school
Malaysia	Formal Education starts at 6 in the primary school. Has a 6+3+2+2+2 years system of primary, lower secondary, upper secondary and post secondary.	State controlled	Curriculum development centre established in 1973.	- Primary level education has been universalised. - Effort are under ways to universalise secondary education.	- Three media of instructions Malaysia , Chinese and Tamil. - English as the second language . - At lower secondary level comprehensive style of education + pre-vocational subjects. - At upper secondary level vocational subjects are taught.	- Promotion at primary and lower secondary levels is automatic. - External examination at secondary and higher level.
Saudi Arabia	- Supreme council of Education Coordinates Education. - Four major educational bodies: 1. Ministry of Education 2. General Administration of Girls Schools (GAGE) 3. Other Government Educational Organizations. 4. Private schools education structure: 6 years. Elementary 3 years Secondary 3 years Intermediate 4/5 College Education.	State Controlled	Egyptian School curriculum is mostly adopted with a heavier emphasis on religious subjects.		- Egyptian model + heavy emphasis on religious subjects. - Curriculum of both boys and girls school are identical except that girls schools offer subjects in home management, sewing & cooking, while heavier emphasis is given on physical education in boys schools.	Promotion through examination from grade 1 to 12 years is divided in 2 semesters. Semester system introduced also in Universities credit system.
Pakistan	Formal Education primary lower secondary, (middle) secondary, higher secondary and college/university professional levels.	State Controlled	Curriculum development at the federal level by the Federal Bureau of Curriculum and Textbooks.	Nil, Target of achieving universal primary education is yet to be achieved	Regional language number skills, social studies at primary level. English, math, science and home vocational subjects are added at	System of promotion is based on annual examinations at all levels except at some universities/professional colleges where

Name of the country	System of the Education	Rule of state	Responsibility of curriculum	Compulsory Education	Principals subjects taught at schools	System of promotion in Grades in school
Pakistan		State Controlled			lower secondary levels. A wide range of vocational subjects offered at secondary level. Subject taught at higher Secondary level are meant to prepare student for medical engineering and arts studies at higher level. Islamiyat and Pakistan Studies are compulsory from primary to higher secondary levels	semester system has been introduced. Old system of divisions has been replaced by grade system.

11.1 Self-assessment Questions

1. System of education and curriculum of a country reflect the national characteristics and aspirations of the people. Discuss this with reference to Canada and Malaysia.
2. You have studied the systems of education and curricula of some countries of the world. How would you classify the curriculum development. Explain with examples.
3. Describe the salient features of the educational systems of Russia and China.
4. How would you evaluate the Japanese system of education and curriculum? How far can we draw some lesson from it?
5. From the comparative study of various curricula, suggest some changes in the school curriculum of Pakistan?
6. Go through the following statements and tick 'T' if the statement is true and 'F' if the statement is False
 - a) Education system of a country has got a close relationship with the process of curriculum development. T/F
 - b) In the USA, the School lunch programmes are funded by the local authorities. T/F
 - c) There is no official national curriculum in the USA T/F
 - d) The General Certificate of Secondary Education (GCSE) was introduced in the UK in 1988. T/F
 - e) In Japan, the schools prepare their own detailed instructional programme in the light of policy guidelines given by the Ministry of Education. T/F
 - f) In China, each of the schools has got its own curriculum. T/F
 - g) In Thailand, the curriculum at all levels of education is heavily dominated by foreign influences. T/F
 - h) In Malaysia, all the primary schools follow a uniform curriculum. T/F
 - i) Saudi Arabia has primarily adopted the Egyptian pattern of curriculum T/F

11.2 Answers of Self assessment Questions

Q1-5 For answers to questions No1 to 5, consult the relevant portions of the text.

- Q. 6 a) T b) F c) T
 d) T e) T f) F
 g) F h) F i) I

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UNIT: 5

INNOVATION IN SCIENCE AND MATHEMATICS CURRICULUM

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INTRODUCTION

You are living in a highly innovative age. Scores of innovations, in different fields of human activity, are flashed across the globe daily, leaving-behind a trail of successive creative sparks for the thoughtful minds to pursue and venture. Perhaps you would like to be innovative too. Then let us see what innovation is and how it can be effectively manage and handled 1andled. And we should also carefully note the difference between innovation and invention and the discovery as well.

In a very interesting report prepared for the National Science Foundation entitled, 'interactions of Science and Technology in the Innovative Process', the diverse ways in high research and development activities support each in the innovative process are considered The National Science Foundation report begins with a definition of innovation:

"A technical innovation is a complex activity, which proceeds from the conception of a new idea (as a means of solving a problem) to a solution of the problem, and then to the actual utilization of a new item of economic or - social value. Innovation should be distinguished from scientific discovery, Which involves the observations of previously unknown or unobserved phenomenon or the acquisitions o new knowledge: although relevant discoveries may he incorporated into the innovation. Innovation should also be distinguished from invention, with s the creation of a novel product or process or a concept of a means of satisfying a need. The invention, however, may provide the initial concept leading to innovation. Finally, innovation must be differentiated from diffusion of technology, which is the evolutionary process of replacement of an old technology by a newer one."

This, in brief, is a comparative analysis of these inter-related terms

In order that innovation should succeed, four conclusions stand out in several case histories on innovations:

- a) the technical entrepreneur is an important - perhaps the single most important driving force behind innovation; .
- b) recognition of technical opportunity and of the technical need to be fulfilled;
- c) funding is important;
- d) confluence of technology, unplanned in most cases, was important to all case histories.

In another report dealing with case histories of physical science study committee (PSSC) UNESCO physics project, of the Harvard University and the Science Foundation Course team of the Open University, British ended up with the following six guideline independently:

- a) There must be something inadequate/disturning in the existing system/ program/courses which promote individuals or groups to do something about

changing it. Someone must be sufficiently motivated into a desire for change and improvement.

- b) Innovation often requires a visionary pioneer who is willing to plunge into the unknown usually with incomplete knowledge of what the final product will be but with a drive that leads him on to the process of design and development.
- c) The effort will have to involve a full time team and the leader must be able, by virtue of his personality, his position, or his talents, to attract a group of knowledgeable and enthusiastic followers.
- d) A project of this sort requires substantial financial assistance.
- e) The innovators can dream of new ideas but they will never be implemented on a large scale without the approval of the decision-makers (in many cases Ministry of Education) who hold the power of implementation in their hands.
- f) A built-in feedback system for its appropriate diffusion in the system.

A very brief review of modern innovative activities particularly in the area of science and mathematics education is quite appropriate here.

After the second World War during which technology had played such an important role, scientists in the advanced countries of the West were shocked to find out that their children's science textbooks had not changed appreciably since the turn of the century. Their content was no longer familiar to the scientists who were engaged in science. The physicists, in particular, were concerned because physics textbooks had come to give more attention to technology, thus minimizing the concepts of unity of science itself. The initiative for change was taken by university scientists. They broke with their traditional role of non-involvement in secondary education and became vigorously active in reform. As they looked deeper into school education they found that science was still being taught in an authoritarian manner and dispensed as a set of stable facts to be memorized in rote fashion by students and handed back during examinations. They found that the excitement of discovery, so characteristic of science, was missing and that teachers were poorly prepared. There was a minimum of hand on activities by the students and a dearth of relatively inexpensive laboratory materials that could be used by the students themselves. There was considerable reliance on chalk and talk presentation and very little use of the newer audio-visual learning aids.

In the light of what has been said earlier about the innovative process, the first requirement of felt need was there in abundance. The second requirement, the pioneer and entrepreneur began to appear among the scientists in the United States, through the National Science Foundation and other agencies, also in the mid 1950's.

In Pakistan, science and mathematics syllabi remained static both in content and approach for several decades. Since it was believed that science was a systematic knowledge of facts and principles, the students were taught the history of science and that too in a manner which emphasised factual knowledge with unnecessary details. Students did not grasp concepts and process of science and little effort was made to generate spirit of inquiry or independent thinking among students: Teachers usually

employed chalk-and-talk method of teaching; a single textbook with laboratory verification type experiments, and demonstrations were prominent. Examination questions were highly memory-oriented, requiring the knowledge of basic facts and principles. The questions asked in the examinations were highly subjective, and of questionable validity and reliability resulting in colossal drop-out and failures unprecedented in the history of education-in any other country during the last four decades.

The rapid march of science in the last four decades has caused educators of science and mathematics in Pakistan to realize that traditional approach to science and mathematics teaching can in no way meet the scientific, technological and socio-economic challenges of the modern society. Therefore, teaching of science and mathematics in this era dominated by nuclear supremacy must differ in emphasis, purpose and kind from that of pre-nuclear era. In order to meet the present day challenges of a scientific age requiring more of critical thinking than memorization, necessitating greater emphasis on science process and developing scientific attitudes and skills, it was felt in Pakistan (1967) that science and mathematics curriculum needed corresponding changes at all levels of education.

Activity-I

Pick up the modernized science textbook of the secondary class and study its preface or introduction. Note the comments of authors on previous science textbooks and, their admiration for the new curriculum approach. Any difference you can find out?

OBJECTIVES

After completing this unit, you should be able to:

1. describe at least four elements of an innovative process in general.
2. outline at least three reasons which promoted the innovations in science and mathematics curricula.
3. distinguish between the traditional and modern view of science.
4. outline the philosophy of successful science and mathematics curriculum improvement projects.
5. name at least two projects each in physics, chemistry, biology, mathematics and integrated science among the world's successful projects.
6. describe at least three common and three distinguishing features of any two projects in physics/chemistry/biology/integrated science and mathematics.

7. describe at least five unique characteristics of world's most successful projects in Science/mathematics.
9. describe at least three common and three distinguishing features of any two projects so far launched in Pakistan.

1. CONTRASTING VIEWS AND APPROACHES TO SCIENCE

There are basically two viewpoints of science, the traditional/static view of science and the dynamic/modern view-of science. Please watch carefully the characteristics, of both the viewpoints.

1.1 The Traditional View

This view considers science as a body of facts, principles, laws and theories together with vast field of systematized and organized information. Science is looked from this viewpoint as a way of explaining the universe in which we live. This viewpoint is still prevalent in our educational institutions. Existing science curricula and textbooks, teaching approaches and teacher education programs, examination question papers and examination system in Pakistan largely reflect this approach.

1.2 The Modern View

Modern viewpoint regards science as an activity, and something changing or modifiable. To the scientist, with the trained and curious-mind with a thrust for knowledge about the unknown, science means much more than mere products of discovery and tested knowledge but also a way, a method, a process to find out or acquire that knowledge. Science thus, has both content and method in its very nature. The Science Manpower Project (USA) provides us with a definition emphasizing the dual nature of science.

Science is a cumulative and endless series of empirical observations which results in the formation of concepts and theories being subject to modification in the light of further empirical observations. Science, is thus from this view, considered both a body of knowledge and the process of acquiring knowledge."

Inherent in this definition is the implication that science is at one and the same time a body of knowledge and on-going self-testing process of enquiry. On-going process of enquiry is the growing edge of science and scientific development, processes and innovations.

1.3 Major Approaches of Learning

A teacher's philosophy establishes the emphasis he puts on various aspects of science curriculum. This emphasis is often called his approach a somewhat value term and very much misunderstood in this country. A teacher may select any one of several subject matter approaches, each of which emphasizes a different organization of subject matter. Two distinct methodological approaches can be traced through the history of science education. On the one hand is the authoritarian approach which presents science as a

body of systematic and organized information for pupils to assimilate. On the other hand is the inquiry approach/ discovery approach which confronts pupils with problems to be solved through experiments and observations etc. These two approaches sharply represent different philosophies of science education.

1.4 The Authoritarian Approach

This approach dominates the existing educational system of Pakistan even today. The teachers believing in this philosophy most generally use lectures, single textbook and verification type of laboratory experiments without asking themselves whether these methods best serve the needs of their pupils. Science to them is simply a systematic and organized body of knowledge, and hence the emphasis is on memorizing laws, principles and facts. It is primarily, for this reason that in examination only direct questions on basic facts, principles and theories are asked and their application is almost never demanded.

The teacher believes in a monologue rather than a dialogue. Since there is little direct dialogue of students with the teacher by way of asking questions and participating in discussion a sort of barrier is built between the teacher and the taught. Such type of attitude on the part of the teacher ultimately kills creatively, original thinking and initiative among the student.

The authorization approach permits the teacher to rapidly cover the material and expects the student to be able to recall and apply it quickly. However certain assumptions are attributed to this approach with may be worth mentioning.

- a) Assimilation of information
- b) Concept of spoon feeding
- c) Understanding of Material
- d) Teaching is more knowledgeable
- e) Lecture Method is more Appropriate
- f) Student must follow Teachers Bindery
- g) Teacher is a transmitter of knowledge

Now you can see that the authorization approach is obviously teacher- oriented and perhaps over simplifies the teaching-learning process. The fact of the matter is that true understanding as opposed to mere memorization is a complicated process requiring many mental interactions. Presentation of broad generalization illustrated by one or two examples followed by drill lesson or repetition is not enough, especially for pupil who have few experiences upon which to build their understanding.

1.5 The Discovery Approach/Inquiry Approach

The major contribution of the discovery approach, when properly carried out, is the opportunity provided for understanding a scientific process through independent thinking pupils are challenged with suitable problems, question and situations; they are then asked to plan and carry out their own data and draw their own conclusion. The teacher discusses with his class and encourages creative thinking. He does not pose as if he knew all the

answers to all the questions. He recognizes variability in the level of intelligence and encourages student to ask questions and to participate in discussion. Have you even had such an experience with some teachers during your student life?

The teacher who believes in discovery approach actually works very patiently with his student. He invites queries and suggestion from his pupils. Therefore classroom discussion and questions do not bother him at all; they rather help him understanding students thinking the matter. More questions mean more learning and understanding. He also learns from his students. He puts more emphasis on the process of science rather than on content because he believe that it is through the enquiry process that student can meaningfully understand their subject and may hopefully create, discover and innovative new things. But discovery on innovation does not mean producing come thing completely new and fresh in all respects.

Therefore Bruner (1960) gave a word of caution when he said, "I do-not restrict discovery to an act of finding out something that before was unknown to mankind, but rather include all forms of obtaining knowledge for one self by the use of one's own mind". We cannot, therefore, expect the pupils at secondary and college level to make original contributions to the accumulated scientific knowledge of the world. What will be found, no doubt, is already known and probably found in some textbook: In short, discovery does not mean to discover something new and completely unknown.

When the child is helped or guided to discover a generalization imposed upon him, he is developing his rational powers, gaining an understanding of content and the process of learning. Authoritarian teaching consists of imposing upon the pupils the generalization which adults think he should know. The discovery approach, on the other hand allows pupils to observe, collect, classify and interpret data to arrive at generalizations which are truly their own. Children who learn science by the discovery approach will discover for themselves the true structure of the discipline in complete harmony with the modern philosophy of-science education.

Activity-II

Pick up leaves or flowers of two different plants, study them and list the characteristics of each. Then find out their similarities and dissimilarities. How would you account for this strange natural phenomenon?

1.6 Self-assessment Questions

1.
 - a) In what way is innovation different from invention?
 - b) In what way is innovation different from scientific discovery?
 - c) What, in your opinion, were some of the causes of reforms in science and mathematics curricula in the United States?
2.
 - a) What are the four basic requirements which were met to, make the innovation process a successful enterprise?

- b) Is there any other basic requirement which you think should also be met in addition to those mentioned part a) above. If the answer is yes, please give details below?
- 3. Define science on the basis of:
 - a) Traditional view/static view
 - b) Modern view/dynamic view.
 - c) Which view about science is prevalent in Pakistan? Give at least two examples to justify your claim.
- 4.
 - a) State any four assumptions underlying authoritarian approach to science teaching.
 - b) Which any four assumptions underlying discovery approach to science teaching science? Give at least two reasons for support of your answer.

2. EXEMPLARY INNOVATIVE PROGRAMME IN SCIENCE AND MATHEMATICS EDUCATION IN WORLD PERSPECTIVE

Highly innovative programs in science and mathematics education are dovetailed below for you to study and reflect over them. You study their various components and carefully determine their inter-relationship. You should also note the similarities and differences among them. This might give you a feeling of what a modern curriculum project is?

2.1 Project Physics

Formerly known as Harvard Physics Project (HPP), and at the project was initiated in 1964 at Harvard University Massachusetts, USA after extensive school trials and revisions. Support came from National Science Foundation (NSF), and other funding agencies. It terminated in 1970 upon publication of a commercial edition. Its cost was approximately 10 million rupees.

Objectives

To attract more student to physics with diverse sets of interests for emphasizing humanistic approach to physics relating in it to man's other intellectual, artistic and social activities i.e. linking physics with cultural aspect of man.

Materials Produced

Six basis textbooks, six teachers guides, six students handbooks, laboratory demonstrations apparatus, film loops, filmstrips, text booklets and programmed instructional booklets, 21 teacher training films and newsletter etc.

Evaluation

A new twist combining the test on understanding science (TOUS) and the science

inventory was developed. A random sample of experimental and control groups of teachers-was used to determine the effect of this program.

Characteristics

1. It reflects flexibility for teachers and students with regard to emphasis, experiences and teaching strategies as well as opportunities for varying student learning styles.
2. Modest requirements for mathematical skills permit a larger population of students to take physics. Thus it also helps checking the declining enrolment in physics at the high school level.

Activity-III

Indicate the difference of emphasis in objectives of the PSSC and the HPP. Which of the two projects would you rather recommend for development of curriculum in Pakistan and why. Write a 500 word summary of your reply.

2.2 Secondary School Mathematics Curriculum Improvement Study (SSMCIS)

Project History

Initiated in November 1965 at the Teachers' College, Columbia University, it had financial support from US Office of Education and NSF

Objectives

1. To formulate, construct and test a unified secondary school program (7-12) for university bound students.
2. To write, evaluate
3. and. revise text materials and teachers comments and to assist experimental schools in the implementation of the. SSMCIS Program.
- 4.

Material Produced

Text and teachers commentary course books, booklets and bulletins etc

Evaluation

Both formative and summative evaluation of the project has been carried out to test effectiveness of the project.

Characteristics

SSMCIS materials are meant for college bound students in the upper 20% academic ability group. Traditional division of school mathematics into arithmetic, algebra, geometry and calculus is replaced by unified study of mathematics in which all branches of mathematics are unified through fundamental concepts (sets, relation, mapping and operation etc.) statistics; computer programming and linear algebra are integrated into the program.

2.3 Idea Central Laboratory Science (ICLS)

Project History

Initiated in June 1966 by the Florida State University. It was funded by NSF and other funding agencies.

Objectives

1. To develop a comprehensive individualized science program for grades 7-9 including teacher education materials.
2. To provide student materials written in a self-pacing style which will permit students to work through them at their own rate and to determine their own success of science instruction emphasizing both central and process skills.

Material Produced

Textbooks commercial edition, equipment packages, teachers' edition students response, newsletters and brochures etc.

Evaluation

Formative evaluation has been done by the project staff through conventional teaching techniques.

Characteristics

The most unique characteristic of the ICLS material is the fact that the students using them progress at different rates and through different instructional path-ways depending upon their, interests, abilities and previous experience.

2.4 Elementary Science Study (ESS)**Project History**

The project was initiated in' 1960 at Cambridge, Massachusetts, USA. Grant was provided by NSF.

Objectives

1. The main purpose was to enrich the child's understanding rather than to create scientific prodigies or direct all children towards scientific careers.
2. To provide meaningful physical material to help him investigate through those materials-the nature of the world around him.

Material -Produced

Several interaction materials were developed for children to mess around with science, animal activity, animal in classrooms, balloons and gases, batteries and bulbs, butterflies, clay board, kitchen physics, light and shadows, micro gardening, mosquitoes, poas and particles, pattern blocks, whistles and strings, mystery boxes etc.

Evaluation

Formative evaluation was used to revise the programs. However, effectiveness of the material has not been evaluated by any outside agency.

Characteristics

Children learn basic concepts of science through investigation type activities. Child's inherent curiosity as the key, element in understanding science is used to cultivate deep understanding of science. Both the spirit and substance of science has been incorporated in this program Children find great satisfaction by-finding out for themselves how things work.

2.5 Science - A Process Approach (SAPA)

Project History

This elementary school science program was initiated by the Commission on Science Education of the American Association of the advancement of science in 1962 .in Washington DC and had funding support from NSP and such other funding agencies.

Objectives

1. To present instruction which is intellectually stimulating and scientifically authentic?
2. To prepare materials in order to develop intellectual skills among the children through science processes.

Material Produced

Several books on science - A process approach commentary for teachers, guide for in-service instruction, supplementary materials, process hierarchy charts, newsletter, teaching kits etc.

Evaluation

The program had been tested for five years-cycle using specially designed SAPA achievement tests forms A&B Centre submits a feedback and competency measure result for each exercise taught.

Characteristics

It is a major effort to emphasize the process of science Identification of the acquisition of skills in the process of science is the primary objective of the program Careful statement of objectives and competency measures are necessary to test the achievement of the objectives for each exercise. The sequential arrangement of the program is determined by the hierarchy of skills in the process of the science. Hierarchical order is based on the philosophy that higher process skills can be achieved only after acquiring lower process skills.

2.6 Conceptually Oriented Program in Elementary Science (COPES)

Project History

Initiated in 1965 at New York, USA, it had the funding support from US Office of Education.

Objectives

To prepare an elementary program based on major concepts of conceptual schemes approach. The ultimate goal has been to help develop scientific literacy by developing an understanding of the nature of the matter in terms of basic conceptual Schemes/big ideas.

Material Produced

Texts, descriptive brochures, teachers guides, assessment kits, newsletters etc.

Evaluation

Tests of science concepts are used: central group feedbacks also used.

Characteristics

Major emphasis has been on the use of conceptual scheme approach to curriculum development. The COPEs is an action oriented program. The order of sequence is in the form of 'spiral' development. Five conceptual schemes selected from the case of program (in hierarchical order) are:

1. the structural units of the universe
2. interaction and change
3. conservation of energy
4. degradation of energy
5. the statistical view of nature (order from disorder).

The curriculum has been prepared from a broad spectrum of socio-economic and cultural background. Because of the uniquely different approach to learning science concepts, it also challenges the above average child.

2.7 Science Curriculum Improvement Study (SCIS)**Project History**

initiated in 1962 at the University of California, Berkley, USA, it had the financial support from NSF and other funding agencies.

Objectives

Main purpose of the study was to develop scientific literacy. Scientific literacy aimed at development of scientific knowledge and understanding of the fundamental concepts of both the physical and biological science and secondly to develop a free and inquisitive attitude and the use of rational procedure for decision making.

Material procedure

Units on material objects and organisms, interaction and system and life cycles, energy, matter and ecosystems relative position and motion energy transfer, energy sources and ecosystems and model etc. we developed.

Evaluation

Extensive field testing has been done for over six years. Both formative and summative evaluation of the project has been done to find out the effectiveness of the program materials.

Characteristics

In SCIS program, children learn science in an atmosphere of intellectual freedom where their own ideas are respected, where they learn to list their own ideas by experiment. Children also learn to reject or accept their own ideas not on the basis of some authority but on the basis of their observation. Ideally some of these experience will carry out over to other areas of life and allow children to make rational decision by weighting the evidence involved more objectively.

2.8 Nuffield Biological Science Project

Project History

Initiated in January, 1965 at the Centre for Science Education, Chelson College, London, England, it had the financial support of the Nuffield Foundation. It was completed in 1971.

Objectives

1. To introduce students to a body of knowledge investigating living things and studying work of scientists.
2. To develop in students the habit and ability of independent study.

Material Procedure

Material for student laboratory guide, study guide, topic reviews for teachers guides projects in biological science and films loops etc.

Evaluation

Effectiveness of the material has been evaluated using central group feedback system for improvement.

Characteristics

Emphasis has been on development among students of intellectual and practical skills and abilities which are fundamental to the understanding of biological science. Independent thinking has been encouraged through critical exercise.

2.9 Nuffield-“A” Level Chemistry Project

Project History

Initiated in 1965 at College of Science and Technology London, England, it had financial support of the Nuffield Foundation. It was completed in 1970.

Objectives

The main purpose of the project was to develop a teaching scheme or program for Chemistry for 16-18 years age group. The project aimed at producing an integrated course in Chemistry which should demand maximum pupil involvement.

Material Produced

Student's books, teacher's guides, special study books, teachers guide, social studies, program test, overhead projector and film loops etc.

Evaluation

Limited evaluation was carried out by conventional and classroom techniques.

Characteristics

It is an integrated course in chemistry stressing on the technological application of the facts and principals of chemistry with built in assessment system in harmony with the spirit of the course. It is a practical course demanding more involvement by students.

2.10 Nuffield-Advance Level Physics Product

Project History

Initiated in 1967 by the physics department of the University of Birmingham, England it had financial support of the Nuffield Foundation. It was completed in 1973.

Objective

1. To produce and test materials suited to the education in physics of students aged 16-18 who will be examined at the advanced level of General Certificate of Education.
2. To develop understanding of significant concepts in physics and of the nature of physical inquiry.

Material Produced

Books for students, teacher's guides, film loops, 16mm films and slide etc.

Evaluation

The program materials have been tested in classroom situation. Present and post tests of position and special abilities and of attitudes using differential tests and teachers feedback, were made use.

Characteristics

The project lays down special emphasis on finding means of developing the abilities needed for independent study. Students are assisted to improve at independent inquiry in Physics. It helps them to become aware of the practical and social significance of developments arising from physical inquiry.

2.11 School Council Integrated Science Project (SCISP)

Project History

Having been initiated in 1969 by Chelsea College Centre for Science Education, London, it had financial grant from school council and Northern Ireland Ministry of Education.

Objectives:

1. To provide a broad integrated course in science for academically more capable 13-16 year's old pupils with emphasis on the social implications of science.
2. To enable students to understand the importance of patterns to the scientists and to use these 'patterns' in solving problems.

Material Produced

Teachers hand book; teachers guide, pupils manuals, brochures and bulletins etc.

Evaluation

In limited trials the materials have been tested using central and experimental groups. Feedback from the central groups was used to modify the program.

Characteristics

The integrating themes throughout the scheme are pattern searching and pattern using to

solve problems! A pattern is defined as a generalized explanation. There is an hierarchical learning structure based on-the sequence; recall, concept learning pattern binding and problem solving, Student' thinking is based on the three fundamental concepts of building: blocks, energy, matter and interaction.

2.12 Integrated Science Curriculum Project (ISCP)

Project History

Initiated in 1971 by the Science Department, Tokyo Institute of Education. Funding was done by the Ministry of Education.

Objectives

1. To develop an integrated science curriculum for the elementary junior secondary schools-as part of compulsory education.
2. To develop a philosophy of integrated science teaching, and to develop some sample integrated science units.

Material Produced

Some work books, work sheets and equipment for the sample units.

Evaluation

The program materials have been tested in limited trials using classical classroom teaching techniques.

Characteristics

Emphasis is on the complete integration of the, basic concepts and processes of science with environmental education and other related subjects.

2.13 Science Education Centre, University of the Philippines (SEC). (Now Renamed as Institute of Science and Mathematics Education, Development (ISMED))

Project History

Initiated in 1,964 by the Science Education Centre, University of the Philippines, it had funding support from the Ford Foundation, UNICEF, National Science Development Board and the University of the Philippines.

Objectives

1. To develop curricula for elementary and secondary school mathematics and science.
2. To improve teacher education and research in independent learning of mathematics rather than the dogmatic assertion and memorization of facts.

Material Produced

Elementary school science textbooks, school mathematics textbooks, teachers guides and student work books, high school textbooks of mathematics, fundamentals of physics, chemistry and biology textbooks for secondary schools, laboratory manuals and teacher guides etc.

Evaluation

The material has been thoroughly tested during micro-testing techniques and control group designs for monitoring feedback for revision.

Characteristics

The main emphasis has been on inquiry-directed approaches to teaching science and mathematics. It has full time staff of about 40 professionals in science and mathematics education.

2.14 Institute for the Promotion of Teaching of Science and Technology (IPST), Bangkok, Thailand**Project History**

It was initiated in 1976 by Ministry of Education, Government of Thailand. UNICEF and USAID grants were also provided.

Objectives

1. To improve and modernize Science and Mathematics, Curricula and Technology.
2. To promote new strategies in teaching and learning Science and Mathematics and technology.
3. To promote research studies and investigation related to Science and Mathematics curricula, teaching methods and evaluation.

Material Produced

Science and Mathematics curricula were developed including textbook, teacher guides and student workbooks along with curriculum materials. In query projects was developed. Trained 25,500 Science and Mathematics teacher.

Evaluation

The material has been thoroughly tasted in selected school by formative evaluation and feedback mechanism.

Characteristics

The main emphasis has been on inquiry oriented teaching-learning strategies for teaching Science and Mathematics and Technology. It has a staff 250 professionals mostly on full-time and some part-time from school teacher, college. The institute was assisted by several foreign agencies and experts in curriculum development, design and implementation.

2.15 Korean Educational Development Institute (KEDI), Seoul, Republic of Korea**Project History**

Established in 1973 with the main purpose of developing new educational system for primary and middle school that should provide educational program for high quality.

Objectives

1. To develop a new and effective educational system for the elementary and middle school.

2. To promote research and development projects.
3. To promote in-service teacher training and dissemination of innovative educational ideas to teachers, principals and supervisors.

Material Produced

Developed new curricula in terms of instructional goals, content structure, instructional design and methodology followed by field testing in actual classroom situations. Established educational broadcasting situation to enhance the effectiveness of instructional process in the classroom. Developed television and radio for classroom use.

Evaluation

Several try-outs based on predetermined criterion were made to validate the effectiveness of the material/programs produced.

Characteristics

Comprehensive educational reforms were introduced in the Korean Society. As a result of this innovation, teaching-learning practices integrating both formal and non-formal means of communication were used. Specialized high quality radio and television programs for classroom use were produced. It has one of the best equipped audio-video library in the Asian Region,

In the foregoing pages, you have gone through the synoptically description of some of the major projects in science and mathematics implemented abroad. In the following pages, you would be exposed to some major innovative projects in these areas in Pakistan.

2.16 Trg Activities

Introduction

Many international educational Japanese researchers have subsequently experimented with various forms of lesson study as a supportive way to improve in service teachers classroom instruction (Matoba, Crawford and Mohammad,2006;Ricks ,2011).Unknown to many western scholars ,the Chinese also conduct a form of lesson study called Teaching Research Group(TRG) activity. As a main and key form of teacher professional learning community, teaching research group is considered as a basic non-administrative organization (Xiong, 2004; Hu, 2005), which combines teaching, scientific research and daily management into an integral whole, started since 1957.

Teachers Role

Teachers in this group can promote their ability of knowledge management, advance their sense of teaching efficacy, improve their mental pattern and form a common prospect (Shi, 2007).

Trg System in Mainland China

TRG can also be subdivided into grade specific Lesson Preparation Groups (LPG).a PRIMARY SCHOOL with six grade levels, for example, may split the mathematics TRG into six smaller LPGs.

Current TRG Activity:

Current TRG activity is a highly organized cyclic process involving three sub activities:

1. Lesson preparation
2. Public teaching with observation
3. Post lesson discussion.

In TRG activity, a lesson is usually jointly prepared by members of LPG, with reference to various materials. All the materials in TRG and LPG activities are openly available to everyone in the TRG, including lesson plans and other data including student performance data.

Three Points of TRG lessons

Over the last 60 years, the Chinese have developed a common pedagogical framework to think about lesson preparation, observation and reflection called Three Points: these three points are

1. The lesson's key point
2. The lesson's difficult point
3. The lesson's critical point (Yang,2009b)

2.17 The Timss Video Study

The TIMSS 1999 Video Study was a study of eighth-grade mathematics and science teaching in seven countries. The study involved videotaping and analyzing teaching practices in more than one thousand classrooms. In conjunction with the International Association of the Evaluation of Education Achievement (IEA), the study was conducted by the National Center for Education Statistics, U.S. Department of Education under a contract with Lesson Lab, Inc. of Los Angeles, California.

Goals of TIMSS 1999 Video Study

- Investigate mathematics and science teaching practices in U.S. classrooms.
- Compare U.S. teaching practices with those found in high-achieving countries.
- Discover new ideas about teaching mathematics and science.
- Develop new teaching research methods and tools for teacher professional development.
- Create a digital library of images of teaching to inform U.S. educational policy.
- Stimulate and focus discussion of teaching practices among educators, policymakers, and the public.

Design and Procedures

At least 100 schools were randomly selected in each country. One math lesson and one science lesson was videotaped in each school that agreed to participate. Taping was distributed evenly throughout the school year so that the lessons represent the full range of eighth-grade mathematics and science instruction in each country. A teacher and student questionnaire, and worksheets and textbook pages used in the lessons supplement the videotapes.

Participating Countries

The countries participating in the mathematics portion of the TIMSS 1999 Video Study were Australia, the Czech Republic, Hong Kong SAR, the Netherlands, Switzerland, and the United States. The countries participating in the science portion of the study were Australia, the Czech Republic, Japan, the Netherlands, and the United States.

Although Japan did not participate in the mathematics portion of the study, the Japanese mathematics data collected as part of the TIMSS 1995 Video Study were re-analyzed for the TIMSS 1999 Video Study. U.S. mathematics data collected as part of the TIMSS 1995 Video Study were also re-analyzed.

Timeline

The TIMSS 1999 Video Study began with a field test in May, 1998. Most of the filming took place in 1999, and depended on the school calendar in each country. The international mathematics report was released in 2003, and the international science report was released in 2006.

Timss in 2015

The Trends in International Mathematics and Science Study (TIMSS) 2015 will be the sixth administration of TIMSS carried out since 1995, resulting in a 20-year trend measurement of 4th- and 8th-grade student achievement. TIMSS is sponsored by the International Association for the Evaluation of Educational Achievement (IEA) an international organization of national research institutions and governmental research agencies. TIMSS 2015 will assess the mathematics and science knowledge and skills of 4th- and 8th-graders internationally and will collect, via questionnaires, background information that can be used to improve teaching and learning in mathematics and science. A brochure providing a brief description of the study is available [here](#).

TIMSS 2015 was initiated in February 2013 when representatives from participating countries and education systems started developing the assessment frameworks that guided the international development of items (test questions). The data collection for the main survey was carried out in October–December 2014 for southern hemisphere countries, and March–June 2015 for northern hemisphere countries. The international reports will be released in November 2016, followed by the international database and user guide in February 2017.

Activity-IV

Before you go further, you may note down the salient points of the projects abroad and discuss the same with colleagues. Also note their similarities and dis-similarities.

2.18 Modernization of Mathematics and science syllabus in Pakistan

Project History

Initiated in 1968 by the Educational Extension Centre, Lahore. Funds were provided by the government and UNICEF.

Objectives

1. To modernize syllabi and textbooks in the light of modern curriculum projects.
2. To develop inquiry among learners.
3. To project and emphasis the structure of subject.

Material Produced

Textbook (Urdu language) in Mathematics and Science subjects for grade 6-10. Textbook (English language) in Mathematics, Physics and Chemistry subjects for grade 6-14.

Evaluation

Some of the material was micro-tested in the selected rural/urban school on a limited trail basis using conventional techniques of teaching and observation.

Characteristics

This project represents the first attempt to develop indigenous curriculum materials. University/college teachers were involved in these reforms.

2.19 University Institute of Education and Research, Science Education Project, Punjab

Project History

Initiated in 1971 by the Science Education Centre of the Institute of Education and Research, University of the Punjab, Lahore, it had financial support of the Education Department, Government of the Punjab and Institute of Education and Research, Lahore.

Objectives

The overall purpose was to set up a model science education centre in Punjab with modern facilities in labs, in physical and biological sciences for science teachers. A related purpose was to develop inquiry-directed experiments, demonstration teacher guides, and to serve as a clearing house for exchanging recent science curriculum materials being developed in Punjab and other provinces of Pakistan.

Material Produced

Discovery experiments (one each) in physics, chemistry and biology for high school students, preparation of 100 transparencies in physical and biological science and 35 mm slides in physics and chemistry.

Evaluation

The effectiveness of the material has been tested on a very limited scale through a survey followed by discussion sessions during an in-service training course.

Characteristics

This project represents the first attempt towards improvement of the experimental aspect of the science curricula in Pakistan by science educators, and science teachers. Main attempt has been on discovery/inquiry-directed experiments and demonstration developed by the science teachers themselves during pre-service program.

2.20 Science Teacher Education Project of Pakistan (STEP)

Project History

Initiated in 1979 by the Research Wing of the Ministry of Education, Government of Pakistan, Islamabad. Funds were provided by the Ministry Of Education.

Objectives

1. To develop, test and adapt science process skills instructional model for in-service secondary school science teachers of Pakistan.
2. To present instruction in intellectually stimulating and scientifically authentic manner through the use of science processes.

Material Produced

Self-instructional modules on 8 science process skills, observing, classifying, inferring, predicting, hypothesizing, controlling variables; interpreting data and experimenting were developed by the professional staff associated with the project. Inexpensive and indigenous science materials were also developed.

Evaluation:

The effectiveness of the material has been tested experimentally in a selected group of in-service teachers using experimental and control group design. The results have been highly encouraging.

Characteristics

It is a major effort to emphasize the importance of science process skills among science teachers. It is a competency based program with built-in self-assessment instruments to measure the performance of an Individual or a group using mastery teaching strategy.

2.21 Pakistan: Science Education Project (SEP-Pak) Ministry of Education, Islamabad**Project History**

Initiated in 1986 by the Science and Technology Wing of the Ministry of Education, Islamabad. It had the assistance in the form of soft loan from ADB of US\$ 30 million. It has a six year cycle (1986-1992).

Objectives

The overall purpose is to improve the quality of secondary science education in Pakistan by institutionalization of science education improvement efforts. Related objectives are:

1. To provide physical facilities such as science rooms, labs, and equipment to selected middle and high schools;
2. To establish Institute for the Promotion of Science Education and Training (IPSET) in Islamabad along with a network of four regional centres for science education, one in each province in order to ensure necessary coordination and continuity of policy and direction in science education. To develop research-based science curricula including instructional materials, model textbooks, low cost equipment, enquiry experiments and train master trainers in line with modern trends in science education; and
3. To implement this program in classroom situation.

Material Produced

The project is currently under implementation. Research based curricula for classes VI-X, model textbooks; teacher guides and inquiry oriented experiments are being developed. These will be ready after field trials by 1991.

Evaluation

The project is still under development stage. However, it has a built-in project benefit monitoring and evaluation (PBME) system to provide guidance and direction to the project. Midterm evaluation has been conducted by ADB Mission in December, 1990. Final report is still awaited.

Characteristics

Major distinguishing features are:

The project represents first attempt of its kind in this part of the world where science education improvement efforts have been institutionalized through a net-work of science education centre's ; secondly the project is primarily based on modern philosophy of science education, right from curriculum development activity to a full range of instructional material production, textbooks, achievement tests and competency based mechanism for continuous monitoring and feedback for improving classroom teaching. Thirdly, it intends to improve upon the experimental aspect of science. Finally, the main emphasis has been on developing inquiry/discovery-oriented teaching-learning strategies including experiments for students and teacher demonstration to ensure critical thinking, comprehension and understanding of science rather than memorization of scientific facts and laws.

2.22 UNESCO Program in Integrated Science Teaching

Project History

Initiated in 1969 by the Division of Science Teaching, UNESCO, Paris, France.

Objectives

The main purpose of the program was assisting UNESCO member states in the promotion of science teaching in a unified way in primary and secondary schools particularly in grades 1-9 in related teacher training program.

Material Produced

New trends in integrated science teaching vol. II integrated science teaching in the Asian Region Report of the workshop, elementary science materials etc.

Evaluation

UNESCO does not involve itself in testing program of this nature. Projects of this nature are however, tested by member states with the assistance from UNESCO.

Characteristics

Emphasis has been on the following:

1. A series of publications in integrated science teaching.
2. Workshops on a regional sub-regional and national basis to exchange information

- to examine particular aspects of integrated teaching of science.
3. Pilot experiment on a national basis for developing new method and material for integrated science teaching at primary and lower secondary level and for the training for science teachers.
 4. Technical services to member states through, UNESCO field experts concerned with integrated science teaching.

3. MAJOR CHARACTERISTICS OF SUCCESSFUL SCIENCE CURRICULUM DEVELOPMENT PROGRAM

In preceding pages you have read only a very brief summary of some exemplary innovative projects in science and mathematics curricula in USA, UK, and Asia including Pakistan. Out of such movement in science education (particularly in USA) grew many science and mathematics education projects all over the world. So much so that today we find more than 300 such projects in progress all over the world. The major work is being done in USA and Europe, but many commonalities appear in all these projects around the world. Some of the major characteristics of successful science curriculum development programs/projects are as under:

3.1 Instructional Characteristics

a) Determination to teach Science as Real Science

The most penetrating and all pervasive characteristics of these curriculum efforts have been their determination to, teach science as real science as it is known and understood by its leading practitioners and not the history of science (facts) as is usually done in a vast majority of schools and colleges of Pakistan.

b) Conceptual Scheme

In the development of science curricula, big deals/themes/concepts/conceptual schemes run throughout the course and provide a framework on which the facts, observations and experiences can be hung.

c) Emphasis on inquiry, discovery, application

The third common characteristics of modern science curricula's is their emphasis on inquiry, discovery, application, analysis and synthesis as opposed to memorization of facts, principles and laws. Thus the student becomes an active investigator. He is no longer a passive listener. He freely participates in classroom interaction. The teacher becomes a facilitator of knowledge and not a preacher or transmitter of information/facts.

d) Low cost inquiry oriented Experiment

The fourth common characteristic of modern science curricula is their emphasis on simple, low cost inquiry oriented experiments leading to profound ideas for further investigation rather than 'cook-book' or 'verification' type of experiments in which students are encouraged to follow step by step stereotype procedures laid down in

the textbook, to get at the known results. The aim is thus not to fill the students minds, but to open them up. The students try to discover the laws and principles n their own rather than told to follow a known path by pre determined procedure. This in turn helps them to develop critical thinking and scientific approach to solve other scientific problems not perceived before.

e) Timelines

Another common trait, in' all the modern curricula, is their timeliness, recency and possibility of its quick revision as science itself. Thus any modern science course uses the internationally adopter units, system of nomenclature symbol-ism, and units, rules for chemical terminology and the-modern biological classification scheme etc.

f) In-Service Teacher's Training

Teacher, education, particularly the in-service training has been given due importance in all such modern curricula. Thus in-service training program is an absolute necessity for all teachers supposed to teach new curricula. During in-service training the teacher himself performs all the experiments/ activities which his students will perform. Thus he is thoroughly exposed-to and made familiar with all important aspects of new materials before he is asked, to teach. This training varies from one program to another but in most cases consists of practical training sessions followed by lab Work through micro-teaching sessions and demonstration lesson plans.

3.2 Organizational Characteristics

Success-of a project is not possible without an effective organizational structure and, operational pattern. Some of the, organizational characteristics found in successful projects around the world are:

a) Competent Staff

A carefully selected and competent staff is a critical factor for successful launching of the project.

b) Project started with small but dedicated team of scientists

Projects started with small staff of dedicated and committed team of scientists, science educators and science teachers voluntarily joined together to do what they believed in.

c) Autonomy and freedom of operation

All the successful projects had the autonomy and freedom of operation. These projects have hand fiscal Independence. Thus in case of government funding, the funds were granted liberally and the director of the project, amid the governing board have had complete budgetary freedom within limits prescribed under the rules.

d) Sharply Focused

These projects have been sharply focused on a limited part of the curriculum within the area of competence. Some have been limited to a single branch of science such as physics, chemistry etc, while Others have included more branches of science but all have a common core of understanding as project team

e) Broad-based advisory Council

A broad-based advisory council or steering committee or board was set up in each case to determine policy guide lines by the project leadership. Development and production of the new material has been done by the project team with vetting being done by the advisory board to ensure wide approval and acceptance.

f) Trail revision cycle

A long term and small scale trial-revision-trail cycle was considered vital.

g) Integrated Curriculum

All aspects of the curriculum have been based in the curriculum development centre including design, writing, lab work, apparatus, testing and evaluation, in-service teacher training, school trails and feedback in its wide sweep. In this way a completely coordinated and integrated curriculum emerged.

h) Careful and long-team Planning

Carefully and deliberately long-term planning was done to ensure the time-phased matching of all aspects of the project. Thus trails are not started in school until the text books are produced, teachers are trained, the equipment is in the schools, the trained staff is available.

i) Establishment of sub-centers

Establishment of sub-centre for dissemination, trial, feedback and teacher education is apparent throughout.

j) Selective use of educational Technology

Selective use of educational technology, especially video-taping for research, modeling behavior, teacher education, feedback etc was very common.

k) Evaluate Materials

Tests and other evaluative materials have been designed, pre-tested and provided to the selected schools by the curriculum centre.

l) Borrowing, Adoption, Modification

A great amount of borrowing, adopting, modifying and adapting was done. The underlying pragmatic principle seems to have been to avoid re-inventing the wheel if somebody else has already done it.

3.3 Self-assessment Questions

1. Describe three characteristics of strength of any one science curriculum project of Pakistan which you think is comparable to that of the world's successful projects.
2. Describe any three weaknesses of science curriculum projects in Pakistan as compared to those of world's successful projects.
3. Suggest ways and means to improve science curriculum projects of Pakistan particularly in terms of instructional and organizational characteristics.

4. SOME PROMISING NEW TRENDS IN SCIENCE AND MATHEMATICS EDUCATION

Science curriculum improvement projects are underway in almost all nations of the world today. These evolutionary efforts lay emphasis on the qualitative improvement of science and mathematics education rather than quantitative improvement. Some of the emerging new trends in science-and mathematics education found in the-above projects are as under:

4.1 Place of Science and Mathematics in Total Education

Science and mathematics have become an essential part of general education for active participation of all individuals in the day-to-day affairs of the society. Knowledge of contemporary developments in science and mathematics and their sophisticated concepts are now being taught in the lower grades.

4.2 The Trend Towards the Use of Educational Technology and the System's Approach

Last three decades have witnessed the application of technology in the classroom. More and more visual aids are now made available for science teaching. Variety of instructional materials are being used for enhancing teaching-learning process, for example, use of films, film-slides, radio and television, integrated multimedia system, use of programmed learning, computer-assisted instruction, use of teaching kits, and use of self instructional modules etc.

The term educational technology is now almost synonymous with the use of systems approach. It means more use of educational technology. It means more than just the totality of instructional aids available. It now often implies a systematic development of teaching-learning strategies. In principle, what then the educational technologist is supposed to be able to do is to choose a particular combination of approaches, methods, material and media which, in his judgment will be maximizing the probability that student will learn more effectively.

4.3 The Trend Towards the Use of Research Studies on Learning

Many psychologists have contributed to our understanding of how a particular type of learning takes place. Some psychologists have succeeded in establishing relationship between learning outcomes and developmental stages of children. These efforts demands

- a) New designs in curricula development, specially sequential development of science

- and mathematics curricula from classes 1-12
- b) Proper pacing of the learning activities keeping in view the development stages of children;
- c) Some provision of individual differences in the form of individualized instruction.

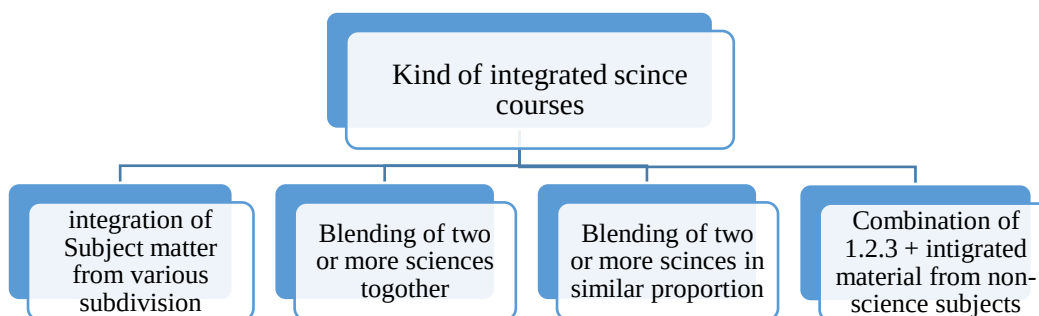
4.4 The Trend Towards Integrated Science Education

Integrated science is a strong world-wide movement. There has been so much activity in this area around the world during the last decade that it now shines as one of the strong and significant trends in science education. Two international conferences have been held on this subject and three separate volumes on integrated science teaching have been published by UNESCO. Despite all this activity around the globe, the concept of integrated science is still in its infancy. The reason being that it is a dynamic concept and not static. It is still adjusting to what people do when they say they are teaching science in an integrated way. Nevertheless, in a meeting concerning UNESCO program in integrated science teaching held in 1972, the following definition emerged:

"Integrated science teaching consists of those approaches in which the concepts and principles of science are presented so as to express the fundamental unity of scientific thought and to avoid premature, or undue.., stress on the distinction between the various 'scientific fields'".

This definition is also known as UNESCO's definition of integrated science. Under this definition, our science course which borrows content from many different sciences and is nothing more than collection of isolated short units in several of the individual sciences cannot be termed as integrated courses. Integrated science course is of four kinds:

- a) Those that integrate the subject matter from various sub-divisions of a major science generally chemistry, physics; biology etc.
- b) Those that blend two or more sciences together but with a strong emphasis on one.
- c) Those that blend two more sciences in similar proportions.
- d) Those that select content as described in any of the above three categories but in addition integrate material from the non-science subjects:



In order for "a course/program to be considered truly integrated in line with the

UNESCO's definition of integrated science, it is necessary that the concept of science be presented throughout in any one of the above mentioned unified approaches: Important condition for proper implementation is the unified approach.

4.5 The Trend Toward Inquiry-oriented Science Teaching

The Biological- Science Curriculum Study Project (BSCS) in addition to other recently developed science curricula has emphasized inquiry as a learning objective for science instruction. BSCS texts and supplementary materials in use in several thousand schools in USA have been designed to support among other concepts, science as inquiry and investigation BSCS defined inquiry as a set of activities directed towards solving an open number of related problems which the student has as the principal focus a productive enterprise leading to increased understanding and application The nature of the inquiry is complex. Inquiry engages the skill, interests and attitudes of a person in an interaction with substantive and cognitive demands of a problem and makes efforts to cope operationally with it. Inquiry activities may vary in form and sequence from one problem to another and from one person to another.

Inquiry teaching when properly carried out provides opportunities for understanding scientific process through independent thinking In it, pupils are challenged with suitable problems, questions or situations, and they are asked to plan and carry out their own attack on these problems Students collect and organize their own data and they draw their own conclusions. The teacher merely helps and guides them as a learner sharing the process of inquiry. He initiates question and discussion sessions and encourages creative thinking. He puts more problems to the process aspect rather than content/knowledge aspect of science because he thinks that it is through inquiry approach that he can help build a generation of young men who would think and create new ideas and things.

4.6 The Trend Towards Open-ended Inquiry-directed Experiments

In earlier part of this unit, science has been defined in a way which conveys, the process rather than a product orientation When looked from this viewpoint, science is a process of exploring the unknown and this is not random exploration; it depends on active observation and careful interpretation. The active observation and careful interpretation is called experimentation.

Open-ended, inquiry-directed experiments develop creativity and critical thinking which eventually lead them to the threshold of investigation. Secondly, these experiments are such in which the end is always open for further investigation. In this scheme, students never follow the set stereotyped pattern but rather make use of their mental capabilities effectively and come up with results unknown to them before conducting experiments. An open-ended discovery-oriented/inquiry-directed experiment does not have a predetermined outcome that the student is expected to obtain in order to consider his experiment a success. All experiments, if they are truly scientific, are open-ended and inquiry-directed in nature. Open-ended/discovery experiments are unique in this nature and show the following/remarkable characteristics:

- a) The experiment is performed to answer a question;

- b) The pupil performing the experiment does not know the results of the experiment before performing it;
- c) The design/method/procedure is determined by the pupil;
- d) The pupil works independently like a scientist and makes his own observations and draws his own conclusion;
- e) The conclusions arrived at by the pupils serve as a launching pad for formulation of new hypotheses which are tested, accepted or rejected;
- f) In these experiments the end is always open for further investigation;
- g) They develop critical thinking and accelerate curiosity, creativity and open mindedness among the students;
- h) Open-ended experiments create a sense of appreciation and tolerance among the students;
- i) Open-ended experiments require much preparation and a challenge on the part of the teachers as well as students.

Almost all successful curriculum development projects in chemistry and in biology lay emphasis on the open-ended inquiry-directed experiments.

Activity-V

Give your personal reactions to the procedure of open-ended experiments and discuss them with your tutor when you meet him.

4.7 The Trends Towards More Flexibility in Classroom/Lab. Facilities

The evolution of science teaching in the last four decades has also necessitated parallel evolution in the physical setting such as rooms, space facilities and furniture to match the demanding emphasis on inquiry teaching, the world over.

The modern science room is a multi-purpose room. It may be used for a large group teaching at the beginning of a period, followed by a small group discussion session or individual projects and a film showing or test at the end or in between followed by several types of activities going on at the same time. Such a room must not have the facilities for these activities but it should be designed in a way that it can be adjusted and readjust for various purposes. Therefore space and facilities are being dispensed with one important criterion in mind, i.e. flexibility following trends are visible in science facilities.

- a) Increasing provision for flexibility in design and construction of science facilities to permit flexibility in room work surface, storage space in teaching material.
- b) More flexible classroom and laboratories to provide facilities suitable for a wide range of learning and activities and abilities,
- c) Flexible laboratories to provide work area, storage facilities special equipment for wide variety of experiments and activities performed by the students as well as demonstrator.
- d) Independent work places/stations for one or small group of students with lockers and storage facilities,
- e) A trend towards the increased use of instructional material by individual students

- by small groups.
- f) Multipurpose, flexible laboratories instead of single laboratory with fixed furniture.

4.8 The Trend Towards Continuous Teacher Education Program

Although new ways of learning are being tried including computer-assisted instruction, television and radio program, self-instructional modules making good use of the educational technology, it seem safe to assume that for the foreseeable future, teacher will continue to be required in the educational enterprise. Mass shift to schools/without teachers seems extremely unlikely. What seems very likely however is that teachers will play a new but extremely important role in the near future. In almost all the projects we have discussed there has been a definite shift away from the old concept of the authoritarian teacher who supposedly is the fountain-head of knowledge and a strict disciplinarian to the new concept of teachers learning facilitator

Almost all sciences and mathematics teaching improvement projects have built-in strong continuous teacher education component. New innovations demand new teachers acquainted with new philosophy of science and mathematics with special competencies skills and attitudes of using the new materials. Some of the trends are:

- a) **Increasing Provision for Flexibility**
Role of teacher has been changing from authorization to democratic type.
- b) **Flexible Classroom**
Shift of emphasis has been from teaching learning.
- c) **Flexible Laboratories**
Teacher is a stimulator, motivator, helper and a guide rather than dispenser of knowledge.
- d) **Independent workplaces**
Individual deterrence among teachers ate also recognized as among students.
- e) **Increase use of instructional material**
Teachers are being involved in preparing and testing these projects/program.
- f) **Multipurpose, Flexible Laboratories**
Special competency-based skill-.oriented teacher education program are being developed to bring a change in behavior patterns of teachers.

4.9 The Trend Towards New Curricular Development

A few trends emerge from these efforts

- a) **Pupil awakening**
Pupils awakening and desire to get better and effective education.
- b) **Sizeable assistance of funding agencies for development**

Many funding agencies of the government and private gave size able assistance for the development of new materials.

c) Preparation of Materials in Collaboration

Never-before the university research scientists of repute tried to prepare and develop new science and mathematics materials in collaboration.

d) Laboratory work

Laboratory work was the main theme of all the projects inclusion of inquiry-directed, open-ended experiments helps in maintaining the thrust of inquiry.

e) Inclusion of Educational Technology

Never before-was educational technology included so heavily. Development of inexpressive indigenous materials, preparation of kits, use of computers, instructional modules and programmed material were included in most of the projects.

f) Preparation of Supplementary Material

Supplementary material was prepared to enrich and enhance the quality of learning. For these purpose students hand-books, teacher guides, films; filmstrips transparencies and VTRs were used as part of the program.

g) Use of Comprehensive skill based program

All major projects used some comprehensive skill-based program for teacher education.

h) Materials subjected to rigorous Experimental trials

The materials produced were subjected to rigorous experimental trial with built-in formative evaluation and followed by sanative evaluation after its completion.

i) Produced Material were Published on trial basis

Most of the materials produced were published on a limited, scale as trial editions. These trial editions were improved over subsequent years and helped in increasing the efficacy as well as its feasibility.

j) Development of Evaluation Instruments

Most of the projects also developed their own evaluation instruments after retesting cycle.

k) Unified view of Science by new Material

The new materials more or less give a unified view of science avoiding compartmentalized or topical approach.

l) Team of Reputed Authors

Instead of one major author, a team of reputed authors, well familiar with the particular philosophy of the project were commissioned for writing the materials.

m) Emphasis on Understanding the Nature of Science

Emphasis was placed on understanding the nature of science and scientific process rather than understanding of few isolated facts.

4.10 The Trends Towards the Establishment of Permanent Instruction Devoted to Science Education Improvement

As a result of science and mathematics curricular improvement movement, many permanent institutions have emerged in various countries. Most of these countries are devoted to educational research and the development and testing of new material books, teachers' manuals, inquiry-oriented experiments and demonstration, self instructional module, instructional aids, development and testing of in-service training models films and experimental kits etc. Some of the exemplar science education centres abroad are:

- i. University of Maryland Science Teacher Centre (STC, USA).
- ii. The Lawrence Hall of Science. University of California, Berkley, USA.
- iii. Centre for Science Education of Chelson College of Science and Technology, University of London, England.
- iv. Institute for pedagogic der Naturwise seneschafien Institute for Science Education (PIN) West Germany.
- v. Philippines Science Education Centre. Now renamed as, Institute of Science and Mathematics Education Development (ISMED).
- vi. Institute for Promotion of Science Teaching and Technology (IPST) Thailand.

At this stage it seems appropriate to give a brief description of the two centres setup in Pakistan.

- i) Science Education Centre SEC Institute of Education and Research, University of the Punjab Lahore Pakistan

This centre was established in June 1971 with grant of rupees one million from the Punjab Education Department, Government of Punjab. Science Exhibit room and facilities for research of science education are available. The objectives of the centre are as under:

- a) To conduct in depth studies in the area of physics, chemistry, geology, astronomy, and biological science.
 - b) To provide first rate learning experience by open ended laboratory practices, unique in the development of critical thinking among students.
 - c) To act as active centre for action research in new techniques of science teaching.
 - d) To coordinate the activities pertaining to curricular innovation and research in the method of teaching science (elementary and secondary) in the province of the Punjab.
- ii) The institute for the promotion of Science Education and Training, Islamabad (IPEST)

The institute is in autonomous body of the Ministry of Education with a Board of

Governors. It has been established in Islamabad since 1989 with the three fold purpose: firstly to provide leadership by promoting research based development, training and policy studies in science education; secondly to coordinate and monitor science education improvement efforts in Pakistan; and thirdly to provide continuity of policy and direction to ensure sustained development and growth in science education on long term basis.

The Institute has the following objectives:

- a) Promote Development of Science Curricula**
To undertake and promote development of science curricula, instructional materials and teacher training program and to coordinate all such activities for the post primary and-intermediate level (Grade 6-12).
- b) Develop and Test new Assessment Procedures**
To develop and test new assessment procedures including -aptitude -tests, achievement tests and attitude scales.
- c) Provide In-Service Program**
To provide in-service program for key science educators and supervisors of science.
- d) Organization of Training Facilities**
To organize training facilities for high level professional manpower in science education.
- e) Stimulate, Undertake and Coordinate Research**
To stimulate, undertake and coordinate research in science education.
- f) Dissemination of Information on Science Education**
To disseminate information on science education throughout the country and to act as a clearing house for exchanging information with other national, regional and international networks.
- g) Promote Interest and Scientific Interests**
To promote interest and scientific awareness for students, teachers and the general public through out-of-school activities and program for the popularization of science education.

4.11 Summary of the New Trends in the Science Education

- a) Place of science in total education.
- b) Use of educational technology and the systems approach.
- c) Use of research studies in learning.
- d) Inquiry-oriented science teaching.
- e) Open-ended inquiry oriented experiments.
- f) Flexible science facilities.

- g) Continuous teacher education program.
- h) New curricular developments.
- i) Establishment of permanent institutions devoted to science education improvement.

5. SUMMERY OF THE UNIT

Innovation is a highly complex activity which begins from the conception of a new idea (problem) to a solution of that problem followed by its actual utilization in the system with ultimate aim of social or economic benefit to the society.

Invention on the other hand is a creation of a novel product or process developed as a means of satisfying a need.

Scientific discovery involves observation of unknown natural phenomena or event or the acquisition of new knowledge through the use of scientific processes such as observations, inferences, interpretation, controlling variables and experimentation etc

In order for innovation to succeed the following conclusions stand out:

- a) a visionary pioneer willing to take leap into unknown with a drive and enthusiasm to accomplish his job.
- b) full-time team of professionally qualified, competent and dedicated members.
- c) technical need.
- d) funding.
- e) confluence of technology/technical entrepreneur.
- f) management.
- g) built-in feedback system.

Some of the causes for reforms in science and mathematics curricula were:

- i. Science was taught in an authoritarian way as a 'dogma' of facts, principles and laws.
- ii. Emphasis was not on real Science as its practitioners visualized and understood but rather on technology.
- iii. Excitement of discovery and critical thinking because characteristics of - science were missing in the teaching of school science.

Characteristics of some of the most successful projects are:

- i. All these successful projects were organized under a leadership of a full time visionary pioneer with a team of highly dedicated committed and professionally qualified staff.
- ii. The entire curriculum package consisting of curriculum textbooks, teacher guides, laboratories, manuals, student workbooks, in-service training program, achievement, aptitudes and attitude test, films, film slides and low cost equipment kits were developed and implemented by full time staff of the project
- iii. The entire project staff including the project director was paid handsomely

- iv. commensurate with their job requirement and undertaking.
- iv. The development was research-based using trial evaluation-revision-modification cycle:
- v. Implementation was phased out in limited schools System.
- vi. The trend was towards the use of educational technology in the reforms.
- vii. Package curriculum development, e.g. inquiry-directed science teaching,
- viii. Open-ended inquiry-directed lab experiments.
- ix. Integrated science teaching.
- x. Flexible science teaching.
- xi. Continuous teacher education program.
- xii. Establishment of permanent institutions devoted to science education improvement efforts.

Some General Characteristics of Projects:

- i. Determination to teach science as real science as it is known and understood by its leading practitioners and not the history of scientific facts.
- ii. Science curricula was developed on the basis of big ideas/theories/concepts/ conceptual schemes.
- iii. Emphasis on inquiry/discovery and application as opposed to memorization.
- iv. Emphasis on open-ended, inquiry-related, simple inexpensive experiments rather than verification type experiments.
- v. Teacher education, particularly in-service training has been closely integrated with the entire program.
- vi. "These curricula were tested rigorously before implementing them in selected schools.
- vii. Section of competent staff was critical input for successful launching of the project.
- viii. All projects were initiated by small staff of highly dedicated and committed team of scientists, science educators and science teachers voluntarily joined together to do what they behaved in.
- ix. Complete budgetary freedom to the project director within the framework of the funds allocated.
- x. A long term trial-revision, trial-revision cycle was considered vital.
- xi. Careful and deliberate long term planning was done to ensure the aim phased meshing of all aspects of the project. Thus, trials are not started in schools until the textbooks are produced, teachers are trained, the equipment is in the schools and the trained staff is available.
- xii. Tests and other evaluation materials were designed, pre-tested and provided to selected schools.

Modernization of Science and Mathematics Curricula in Pakistan.

- a) University of Punjab, Institute of Education and Research (SEP), Lahore: University scientists and science educators initiated this project. The main emphasis has been to develop modern science education centre in Punjab with modern facilities in science for conducting inquiry-directed experiments and

teacher demonstration etc.

- b) Modernization of Science and Mathematics syllabi, Government of the Punjab, Lahore.
University professors of science and scientists worked on voluntary basis. The main purpose of this project was to modernize syllabi and textbooks in mathematics and science in the light of modern thinking.
- c) Science Teacher Education Project of Pakistan (STEPP), Ministry of Education It was initiated by the Ministry of Education, Government of Pakistan in 1979 Major emphasis was on the research based development of science and teacher education through science process approach via developing modules on science process skills such as observing, classifying, inferring, interpreting, controlling variables to experimenting for training in-service science teachers in process skills under controlled experimental conditions in Pakistani setting.
- d) Pakistan Secondary Science Education Projects (SEP), Ministry of Education Islamabad.
This project was initiated by the Ministry of Education in 1986 with a loan from the Asian Development Bank. The main purpose has been to improve the quantitative as well as qualitative aspect of secondary science education in Pakistan by institutionalization of science education improvement efforts with ultimate goal of developing and implementing research-based science curricula including instructional materials, modern textbooks, teachers guides, low cost innovative equipment, inquiry oriented experiments and training of master teachers in line with modern philosophy of science education.

In order to bring out these reforms, an 'Institute for Promotion of Science Education and Training (IPSET)' as a think 'tank' for the project has been established in Islamabad with a network of four regional centers of Science Education, one in each province since 1989. This institute has started functioning with 10 full time faculty members headed by a Director General. Reforms in science education are likely to be introduced by 1991-92 in Pakistan through this project.

Long Term Planning for Science Education in Pakistan.

- i. It would be better if we initiate future reforms in science education by-establishing permanent institutions like Institute for Promotion of Science Education at the Federal level and similar centers in the provinces.
- ii. We should involve full-time team of competent and highly dedicated individuals to manage reforms or new project.
- iii. Sufficient funds, autonomy and freedom for utilization of funds by project director to achieve the objectives of the projects are necessary.
- iv. Development should be researched-based with a built-in system of feedback for its

- appropriate diffusion into the system, via school.
- v. Careful and deliberate long-term planning should be done to ensure the phased meshing of all aspects of project such as material development, textbooks, low cost indigenous equipment and teacher training etc.

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UNIT-6

**ANALYSIS OF EXISTING SCHEMES
OF STUDIES AND
CURRICULUM IN PAKISTAN**

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INTRODUCTION

Ever since the independence of Pakistan in 1947, national system of education was envisaged in the recommendations of Commission on National Education, 1959. The policy covered the major aims and specific objectives of education across the levels. An attempt was made to develop appropriate curricular programmes for various levels. The proposed system needed adequate try out and testing in the field.

The second major reform in curriculum at the national level emerged during early seventies. The education policy outlined the principles of developing curricular programmes. The major objectives of the education policy provided guidelines for affecting curricular changes. Shift from elitist to egalitarian society by reducing disparities and promoting equal educational opportunities and switch over from general to agro-technical based education constituted major goals. In the light of these objectives, the schemes of studies were modified and curricular programmes revised; reading materials were developed, teachers were retrained and other changes made accordingly.

The National Education Policy (1979), modified the goals of education and determined new priorities. In the area of curriculum and evaluation the policy emphasized the need for overall revision, based on research and evaluation studies. Adequate incorporation of the contents on Islam, ideology of Pakistan, and promotion of national cohesion and integration from major areas of emphasis for the revision of curricula. Innovations such as integrated curriculum and textbooks for class I and II, development of creative activities among the children, technical and vocational education, preparation of supplementary reading materials for children and teachers' guides/manuals, preparation of standard lists of laboratory equipment and instructional aids/kits; promotion of science and mathematics education, constitute some of the important aspects of existing national policy.

OBJECTIVES

After studying this unit, you should be able to:

1. Understand that directions of curricular programmes are drawn from and related to the objectives of education of a particular country system.
2. Be familiar with the goals, aims, and objectives of education, their priorities, in a particular country and the fact that they may vary at various points of time.
3. Comprehend the basic principles and processes of developing schemes of studies and procedures adopted for translating policy-goals into curricular programmes.
4. Analyse the existing schemes of studies across the levels with reference to the nature and weightage of various courses offered at each level.

5. Outline chief characteristics of the schemes of studies.
6. Analyse, in some detail, the selected courses of studies, highlighting their objectives, contents and guidelines for developing instructional materials.

1. PRINCIPLES AND PROCESSES FOR DEVELOPING SCHEMES OF STUDIES AND CURRICULA

To facilitate the analysis of schemes of studies and curricula, it is essential to understand the principles and processes involved in their formulation.

- **National plan and educational policy**

Education is an important sector of national plan for development. Overall goals, targets, and priorities are determined in a national plan. Based on this overall plan, education policies specially deal with goals, aims and objectives of education. This policy also reflects the aspirations, ideological moorings and socio-economic framework of the society. The national plan and education policy together present a programme of education for development, aiming at immediate and long term needs of society.

Activity-I

Show the difference between ‘plan and policy’ as mentioned above.

- **Goals and aims of education**

Drawing the principles from education policies, broad based committees consisting of eminent educationists, subject experts, teachers and administrators, are constituted to determine and delineate the goals and aims of education. The committees prepare a draft of goals and aims of education.

The goals and aims so formulated are then broken down into specific objectives classifying them into 4x3 matrix, comprising the following categories at various stages of the educational ladder:

	Cognitive	Affective	Psychomotor
a) Individual			
b) Social			
c) Cultural			
d) International			

Activity-II

Study the booklet on ‘Goals and Aims of Education’ prepared by the Ministry of Education in Pakistan. Briefly show the inter-relationship of various levels (individual through international) of objectives.

The above clarification clearly defines the aims under specific objectives at every level of education. The Draft report is then circulated throughout Pakistan for seeking feedback from educational authorities, curriculum centres, boards of education, teachers associations, institutes of education and research and a number of related institutions and experts. On the basis of total feedback, the committees scrutinize the proposals and formulate a plan.

First Process:	Identification of national process
Second Process:	Clarification of objectives in educational terms
Third Process:	Approbation and priority determination
Fourth Process:	Broad assessment
Fifth Process:	Work of specialist committees
Sixth Process:	Review

1.1 Process for Identification and Transition of National Goals of Development into Curriculum

The process and strategies, adopted for translating national goals of development into curriculum, are as follows:

- a) **The first process** must be the identification of national goals. Sometimes they are explicit and sometimes implicit, National goals may have quantitative or qualitative meaning in education and each demands different curriculum strategies. They may relate to social, economic, moral and political aspects of national goals. Regular mechanism exists for relating these to education departments in some countries from the ministries more directly responsible. In others, these goals are much more implicit and their identification is a more diffused process in which the initiative must be with the education ministry and its curriculum sections, but context with other ministries is still essential.
- b) **The second process** is one of clarifying the objectives in education terms and here the interested groups could be educational planners and curriculum specialists.
- c) **The Third Process** is one of the approbation and priority determination. Here the educational interpretation of the objectives needs to be shared with the originators of the national objectives to check the faithfulness of the translation, to allow the “priority of the possible” to be given to education and to ensure that suitable economic support will be available for the education resources needed.
- d) **The fourth process** is one of a broad assessment of how the balance of the total curriculum needs to be altered to meet these objectives.
- e) **The fifth process** is the work of specialist committees who are devise programme within their sphere. These committees are charged with matching detailed curriculum in their specialty to the national objectives.

- f) **The sixth process** is one of review in which a higher level body including “outside” adviser-reviews the work of the specialist curriculum groups to ensure that the intentions for the education programmes are still related to the national goals. The “outsiders” here may well involve persons like community practitioners who do not normally become involved in the curriculum process.

The fifth stage should also involve the classroom teachers, since only they can ensure the practicability of the curriculum as teaching-learning experiences. In this way curriculum will be changing in smaller measure year as better understanding of the match of the curriculum to the national objectives is gained and in larger measure whenever more major change to national goals are decided.

Activity-III

Add or delete some process, if possible, and justify your proposal

2. PREPARATION OF SCHEMES OF STUDIES

Level-wise committees are constituted to prepare overall schemes of studies. Identification of the nature of courses, weightage, allocation of time, combination of various elements, marks, etc. are determined. The major guidelines for drawing the schemes of studies are outlined in education policy. Inter-connectedness of the courses of studies within the level and linkage across levels are ensured. The scheme of studies thus become a blue print and facilitates the subject committees to formulate specific programmes of studies in terms of objectives, concepts, sequence and materials of each subject in relation to the age grade and ability level of classes.

Subject Committees

Subject committees of each level are constituted. Education policy, scheme of studies, and other relevant materials are the basic sources for the subject committees to demine specific courses. The objectives of courses (general and specific) are drawn in a systematic way. The draft curriculum is then circulated. The feedback from cross section of population provides for adequate materials for the finalization of draft curriculum. The objectives of curses, commensurate with the experiences of children, their coherence and sequential arrangements are analysed critically. Thus finalization of the report involves reflective analysis, and critical assessment.

Activity-IV

Who should be the members of subject committees? Identify their required qualification and characteristics.

Micro-studies

Micro-studies, generally known as micro-testing of curriculum are undertaken as try-out of preliminary draft curriculum materials. The methodology generally adopted is that different learning experiences in the curriculum for various subjects are selected in terms

of the objectives of learning packages in cognitive, affective and motor-sensory aspects. The teachers from various schools teaching a particular subject at that stage are trained in technical-learning processes and provided with necessary instructional aids. The experts visit schools selected on the basis of stratified random sampling in urban and rural areas, and observe the teaching of these lessons. Pre-tests and post-test, on experimental and control groups, are conducted so as to measure whether the objectives are achieved and to what extent. In addition, teaching-learning problems are identified and total effectiveness assessed. Curriculum materials are modified on the basis of the results of micro-testing.

To sum up curriculum generally includes the objectives of teaching the subject in measurable terms, course contents, methodology for facilitating learning, system of evaluation, instructional material to be used, guidelines for training teachers. Following the finalization of curriculum, work on the production of textbooks, training of teachers, production of instructional aids etc. is undertaken. This means that when the new curriculum at any level is introduced, the effort is to train teachers and see that all instructional materials are concurrently made available for effective implementation of the revised curriculum.

3. ANALYSIS OF SCHEMES OF STUDIES

As elsewhere, Pakistan is currently imparting education through three-tier system: elementary, secondary-cum-higher secondary and tertiary. A perusal of Annexure-I would indicate a diagrammatic view of the levels/tiers of education in Pakistan and extensions thereof. A brief description of these levels follows.

3.1 Elementary

Stage one, generally known as elementary, offers eight years education including five years programme, popularly known as primary followed by three years education, known as Middle: different organizational structures are practiced for imparting education at elementary stage. A larger proportion of primary education is imparted through separate primary schools. In dependent institutional arrangements, supervisory personnel, and administrative checks are organized for primary education. Limited number of schools offer teaching facilities for the complete elementary stage.

In the curricular programme, 7-8 courses are offered at the elementary stage: language (2-3), mathematics, general science, Islamiyat, social studies, and practical art constitute a cluster of courses for primary classes. Languages mathematics, and Islamiyat are given equal weightage in the scheme of studies, i.e. each course is assigned 15% of total time: science occupying the next position, i.e. 12.5% and then social studies (10%).

Weightage to the teaching of language, Mathematics and Islamiyat is same in all classes of primary stage. There is increased weightage (from 12.8 to 15.4%) to science from class-III onwards. Pakistan/social studies carries 10.2% weightage in classes I to II, 7.7% in class-III and 10.0% in class IV and V. the practical course in arts gets 12.8% time allocation in classes I and II, 7.7% in class III, and 7.5% in classes IV and V. The

explanation for these variations may be accounted for relative importance to languages. The average number of periods at primary stage is 40 each of 40 minutes duration. Analysis of the weightage to various courses indicates small variation within the primary stage, across the courses and classes. The differences are insignificant which may be necessary in view of age, grade, and subject needs. Annexure-I present an overall view of the scheme of studies for primary stage.

The curriculum at middle stage offers 9 subjects, including practical work (such as, tree plantation, manual work etc.). The language component is considerably heavier which in the case of Sind provides consists of 3 languages: Under (national language) , Provincial language (when required by law), and English. Fifty four percent of time (13.33+8.88+13.33) is allocated to language component. This is a relatively higher percentage compared to Asian programmes, rearing less weightage assigned to science and mathematics at the middle stage. At primary stage science is assigned 12.5% and mathematics 15.0% and at the middle stage time allocation for science is reduced to 6.66% and mathematics to 8.77% (half of the weightage). Another significant characteristic at middle stage is the inclusion of agro-technical component which constitutes 3 major branches of studies, i.e. agriculture home economics, and industrial arts. Only in a limited number of schools (1,000), (this component is offered). Where agrotechnic is not offered, the time is distributed among other subjects. Study of Islamiyat occupies an important position. In terms of time allocation, equal weightage has been assigned to Islamiyat and Mathematics. Inclusion of Arabic-Persian at this stage has altered the position of Arts and crafts. These three courses form alternatives. Thus there is variation in the position of arts and crafts at primary and middle stages. The position of health and physical education at middle is more stable and substantial, particularly where middle stage forms integral part of institutional framework and health and physical instructors are available.

3.2 Secondary

The current scheme of studies for classes IX-X comprises of four components,-out of which first and fourth components are common. Under component I, four courses: Urdu, provincial language (where required by law); English. Pakistan Studies, and Islamiyat are common courses The languages, under component I, carry one/two papers of 100 to 150 marks, 4-6 periods each course. Pakistan Studies and Islamiyat carry equal weightage. Islamiyat in component I is meant for all Muslim students. Non-Muslims may, at their free option, study Islamiyat or ethics (a course in universal morality) or any subject from Y list offering over 25 optional courses study as an alternative, if Islamiyat is not taken in component II.

Component II presents two major streams; 'Science' and 'general' streams. The former offers a package of four basic science courses (mathematics, physics, chemistry and biology), one paper in each course. The weightage of these courses is equal. This is a departure from the previous schemes. Previously, mathematics and biology formed separate units of study/ whereby very early selection of career in science was determined.

Under the general group two courses are common; general mathematics or mathematics and general science-of equal weightage. Household accounts or elements of home economics was offered as alternative for general mathematics/mathematics for girls. The option has been withdrawn since 1981. This change has been effected because of increased importance of mathematics at higher levels of learning. Two additional courses have to be chosen from a list of over 25 offerings, known as Y list of subjects.

Component III offers skill-oriented subjects: This is known as Z list, and offers five sub-groups: general, commercial, agriculture, industrial and home economics. This component combines theory and practicals of 250 marks with a time allocation often periods per week. Each sub-group presents 6- 12 courses. The courses are practical-oriented and provide a basis for developing skills-at advanced stage. This component, has been adopted so that education may be related to community needs. The Y and Z lists are suggestive and the schools may curtail and expand the programmes according to the requirements and resources of the area. Additional details may be seen in the scheme of studies appended as Annexure-III.

3.3 Higher Secondary

The scheme of studies for intermediate classes presents three components: component I comprises of two common courses, Urdu and English. Where required by law, a provincial education department may include a provincial language within the provision of time allocation for Urdu. Additional course on Islamic Educational/Ethics and Pakistan Studies has been prescribed for all students. Components I and III are common, plus any one of eight groups from component II. All the groups, and the courses written each carry equal weightage. The groups have been formulated to make the courses more coherent and interrelated. The subjects included in each group supplement one another. Preparation for higher studies, under the proposed scheme of higher secondary level, is more direct and relevant. General mathematics/mathematics form an integral part of each group of study. However, the content and scope of general mathematics, is of applied nature. The course is aimed at providing fundamental discipline as well as functional utility.

Similarly general knowledge of science is included in most of the subjects; earth sciences, economics, education, social science. Major features of the scheme may be as outlined below:

- a) Proportional weightage to languages, under common courses in component I. For foreign students Pakistan Culture is offered as an alternative;
- b) Islamiyat/ethics and the Pakistan studies each has been assigned the status of a full subject. Under the previous programmes some material was incorporated within language component;
- c) Component II provides eight streams of equal weightage. Three streams are classified as basic sciences economics, and earth sciences;
- d) The "basic science" stream offers four science courses and thus introduces more plausible opening in the scientific areas of study, both theory and practice. The graduates of this stream can move to medicine, engineering, pharmacy, agriculture

and any other related scientific field. This change is based on the rationale that 12 years school education should offer a general 'base of education and provide for wider openings and discourage relatively earlier decisions. This is in line with contemporary practices and is a departure from the old practices prevailing in the formal system of education in Pakistan.

- e) The stream leading to higher studies in economics offers three allied courses (mathematics, economics and statistics). The fourth subject offers a few alternatives;
- f) Stream C is known as Earth Science. The four courses (mathematics, geology, general science, geography) form the subjects to be studied in this stream.
- g) Stream D is known as 'social sciences' wherein general mathematics and general science are common. Wide choice for third and fourth courses is available;
- h) "Humanities stream" offers general mathematics Islamic studies and languages (including) oriental and Western;
- i) "Home Economics stream" includes two common courses (general mathematics and general science). For the selection of other four courses of equal weightage, a list of 15 courses has been offered.
- j) A new stream, "Education" has been included in the scheme, which offers foundation courses in education. This stream is intended to provide a professional base of the discipline. Considerable weightage has been assigned to 'academia preparation'. The courses include mathematics, sciences (both physical and social);
- k) The last stream is known 'commerce'. Three courses of equal weightage (mathematics, principles of accounting, and economics) are common. Two other two courses may be selected from a list of over 12 courses. Annexure IV presents the scheme of studies for Intermediate (classes XI-XII level).

4. ANALYSIS OF CURRICULUM IN SELECTED COURSES ELEMENTARY

Curriculum in science and mathematics at primary stage is based on discovery approach' in which children are confronted with selected phenomena and situations, and in which they suggest the problems to be solved and propose methods of solution. Some salient features are outlined below:

- a) **Emphasis on first-hand experience**
Emphasis is to be placed on the use of first-hand experiences wherever possible to make learning in science more meaningful; the children are expected to actually undertake activities; These experiences include experimenting and discovering as well as observing application of scientific principles in everyday life;
- b) **Open ended approach**
An open-ended approach is emphasized in which the solution of problems leads to new problems, or in which there are a number of correct but different solutions to the same problem;

- c) **Stress on method of Science**
Increasing stress has been placed on the method of science. Children learn this method by involvement in discussion situations;
- d) **Adjustment of Science content according to learning needs**
Persistent efforts are made to fit the science content and the learning method to the needs, interests and abilities of learners;
- e) **Programme direction towards learning of basic Science concepts**
The programme is directed towards the learning of basic science concepts and understanding their relationship rather than towards the learning of facts. The goal is to understand the concepts and not rote memorization;
- f) **Integrated content**
The whole content is integrated. Superficial boundaries between the various science subjects such as physics, chemistry, biology, etc., have been done away with. The syllabus is no longer a patchwork of topics taken from different subject areas. The subject matter has however, been divided into broad content areas i.e., living things, energy, earth and universe. This division does not mean any rigid grouping of concepts. Rather the concepts in all the three areas overlap and are repeated through spiral approach at different levels of maturity. (How do you view this approach?);
- g) **Broad content areas broken down in basic concepts**
The three broad content areas have been broken down in terms of basic concepts which the children can grasp at their particular stage of development;
- h) **Activities for concept understanding**
Activities have been suggested for the children to help the children understand the concepts through their own experiences. Use of pictures, charts, newspapers and improvised equipment has been suggested.
- i) **Usage of modern methods of evaluation**
Teachers are expected to use modern methods of evaluation in respect of each unit, testing the objectives achieved in the cognitive; affective and motor-sensory domains so as to validly and reliably test the knowledge; skills and attitudes of children;
- j) **Provision of guide books for teachers**
Provision of guide-books for the teacher is also considered a necessity for successful implementation of the programme.

4.1 Secondary

As from mid-70s, the component of science and mathematics has been strengthened in

Pakistan school system. The nature, objectives and scope of each subject (physics, chemistry, biology, and mathematics) have been redefined. Physics, by virtue of its importance and covering fundamental branches of science, occupies a central position. Its utility to applied sciences, such as engineering, industry, etc., has been adequately stressed. The recent explosion of knowledge has opened several new avenues with special reference to physics. The selection of content and its treatment have, therefore, been based on rediscoveries of the laws of nature. The new concepts about physical quantities have appropriately been introduced. Attempts have been made to familiarise the students with the use of S.T. units from the very beginning. The concepts have been presented in more coherent and logical order. The molecular theory of matter and the atomic structure have been introduced

Theoretical topics have been supplemented to enrich the content of physics. An open-ended approach has been stressed in experiments to be conducted by students.

4.2 Chemistry

The objectives of teaching chemistry have been based 'on assimilating the basic principles governing the facts of chemical process rather than process itself. The curriculum in chemistry, as in physics, has been designed in continuity of the scope and content developed for I-VIII classes. The curriculum consists of following three major parts with their weightage in terms of subject needs:

	Determined weightage
Structural theory of chemistry	50%
Elements and their simple compounds	40%
Introduction to other branches of chemistry.	10%

Demonstration and practicals, students exercises, list of charts, models, approaches and chemicals form integral part of the curriculum in chemistry. An in-built stem of evaluation in relation to objectives has been proposed.

4.3 Biology

Inclusion of biology as a subject in school system is a relatively recent development in Asia in general and in Pakistan in particular. From late 50s to early 70s, biology was included in the scheme of studies for secondary classes in science and home economics groups, as an elective. Along with this, physiology and hygiene also formed one of the optional courses for science and humanities groups. This course included related material on human body, its different systems, and systems of some other living organisms. This subject was considered essential at higher secondary level with a view to preparing graduates for advanced courses in various fields of specialization such as medicine, agriculture pharmacy, etc. However, selected areas of biology were incorporated in allied courses of science such as physics, chemistry and general science.

Limited concepts of biological sciences were incorporated in science courses for various stases (classes I to VIII). Biology has gained progressively important position in various

schemes of studies at elementary and secondary levels. At the primary stage, science is a common course which includes 30% of biology in terms of content. At the middle stage, science is also one of the compulsory courses and includes 27-28% content of biological sciences. At both levels science is an integration of various scientific disciplines.

At the secondary level, biology is one of the compulsory courses for the science group. This group offers courses in physics, chemistry, mathematics and biology, where biology has been given equal weightage.

In addition, general science is a separate course placed in the humanities group, there it is a compulsory course. The course content possesses 13 themes, out of which biology carries 4 themes, i.e. about 13%.

The major objectives of teaching biology at the secondary level include:

- a) Understanding the world of nature, physical and biological.
- b) Ability to interpret natural phenomena.
- c) Gaining a better understanding of the meaning and purpose of life.
- d) Effective participation in solving problems of the human society.
- e) Maintaining and improving their health and share in the responsibility for protection of the health of the community by applying their knowledge of biology.
- f) Attaining an emotionally stable personality and making a worthy social adjustment.
- g) Utilizing a scientific approach towards solving problems dealing with the society and human welfare.

The curriculum covers two parts. In part 1, five broad themes are meant for class IX, There are twenty-four practical activities for covering the above broad themes. Part II has nine broad themes for class X. Thus there are fourteen themes and thirty-eight practicals for teaching biology as a unit of study at the secondary level.

5. INTEGRATED SCIENCE: AN INNOVATIVE PROGRAMME

There is a wide variety of ideas about the meaning of 'integration'. This has given rise to a large number of courses built around different concepts of 'integration'. It seeks to present science through a unified approach disregarding boundaries of other disciplines. The movement for integrated science has gained sufficient currency and studies of the integrated projects have been made by UNESCO which has brought out considerable material on integrated science teaching.

5.1 What is Integrated Science?

The UNESCO publication, *Integrated Science Vol. II* mentions thirty-four different definitions of 'integrated science' The UNESCO Integrated Science Teaching (1972) has defined integrated science as "those approaches in which the concepts and principles of science are presented so as to express the fundamental unity of scientific thought and to avoid the distinction between the various scientific fields". Different approaches to achieving integration are possible.

5.2 Philosophy and Rationale for Integration

Philosophical, psychological, pedagogical and practical reasons are often cited in support of integration. The arguments are summarised below:

Many thinkers believe in the unity of all scientific knowledge. It is thought that all natural phenomena can eventually be explained in terms of a given set of unifying laws that govern the universe. The explanation of the electro-magnetic phenomena through a common set of laws is cited as an example. They search for a 'unified field theory' that includes the phenomena of gravitation as well as a manifestation of that belief. There are other thinkers, however, who are not so optimistic and consequently oppose this view. The unified view of scientific knowledge obviously supports the idea of integration. If all scientific knowledge is intrinsically unified then compartmentalization becomes superficial;

The appearances of the 'boundary discipline' such as bio-chemistry, biophysics, physical chemistry, bio-engineering, etc., also lends support to the unity view. The unrolling of the structure of DNA molecule and the resulting genetic technology is a triumph achieved through the application of the laws of chemistry towards the explanation of biological phenomena. Knowledge of one field of science is increasingly and effectively, being used in other fields of science because many of the concepts of science do not stop at conventional boundaries which seem more and more artificial, as scientific knowledge advances.

If science is 'not only a body of knowledge but also a method of enquiry' then it is argued that the sciences are "Methodologically united." All the scientific disciplines use the same processes of discovering knowledge. The sequence of discovery-problem, data, hypothesis, experiment inference, verification is common to all scientific investigation.

5.3 Psychology and Integration

Psychological theories supporting 'transfer of training' favour the idea of integration. Not all psychologists however, believe in 'transfer of training'. Bruner, however, seems to believe that massive transfer of concepts, principles and strategies is possible from one learning situation to another. If concepts are transferable then teaching-learning schemes should provide opportunities for such transfer to take place. Integration does offer such opportunities where concepts learnt in one situation can be applied in another entirely different situation. Thorndike acknowledges only limited transfer while Ausubel seems to hold an intermediate position. Some psychologists hold that the child looks at the environment as a whole. For the child the environment is not compartmentalized. He is not concerned with the structure of the discipline. The logical sequence of knowledge is, in most instances, not a good pedagogical sequence.

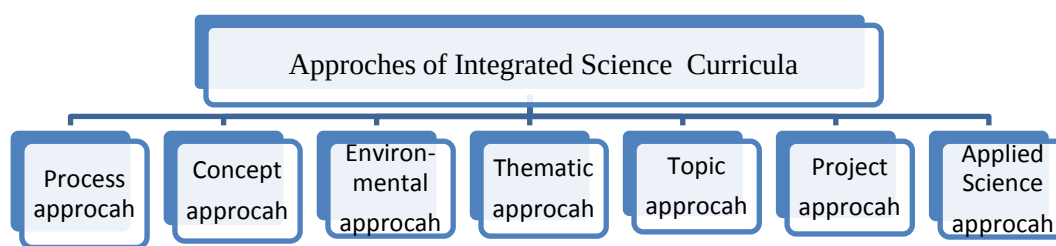
5.4 Practical Needs for Integration

The objectives for teaching science at the secondary stage provide ample ground for integrated science teaching. Large majority of pupils in the secondary schools will not go

into the world to work as scientists. Whatever they do, they will be members of a technologically oriented society (in the context of developed countries) or of a society aspiring towards that end, in the case of developing countries. They need to understand what science is about (not what only physics or chemistry or biology is about). What is scientific method? What science can and cannot do for mankind? They need to have rational attitudes towards the problems of life. These objectives, if considered valid, cannot be achieved through in-depth knowledge of any one or two of the branches of science. Only an integrated picture of the scientific enterprise can develop and inculcate the desired outlook and attitudes.

The current trend towards comprehensive education has given rise to the need for common core curricula suitable for all children of a given age. Science in such a curriculum no longer remains a specialist subject suited only to an elite minority. It takes on a different case. It becomes a course in its own right with its own boundaries, priorities and criteria of relevance.

Different approaches to integration in science curricula are almost as varied as the definitions of integration. Some of the more important approaches are described below:



i. The Process Approach

This approach is amplified by the AAAS Project (1967) developed in the USA. The scheme emphasizes the learning of the processes of science by the pupils. The facts and principles are of secondary importance. Observing, classifying, measuring, communicating, predicting, formulating hypotheses, experimenting, verifying are some of the processes. The learning of processes is considered more important because they are employed in the discovery of all human knowledge. As the children learn these processes they learn how to solve problems and how to discover new knowledge. In fact, it is claimed, they learn 'how to learn'. Even if the young does not continue his formal education he has mastered the tools of discovering knowledge. He is capable to carry on, his own.

Criticism

To a critic of this approach, it is not clear how inquiry gives unity and how unity is to be found in method. The general parts of inquiry cannot form a basis for logical integration of subject matter.

In relation to the above criticism it must, however, be remembered that it is not the acquisition of subject matter that is aimed at in the process approach. The acquiring of discovery skill by the learners is the main aim. The process approach achieves integration in-so-far as it avoids the distinctions between the various scientific fields and expresses the fundamental unity of science, if science is to be defined as a method of inquiry.

Activity-V

Think of a problem that necessarily involves the process approach. State the problem clearly and identify its main parts.

ii. The Concept Approach

The Conceptually Oriented Programme in Elementary Science (SOPES, USA) is another approach to integration. The basic assumption of this approach is that broad concepts of science are inter-disciplinary. Broad concepts such as energy and matter of mass are not confined to particular subject boundaries. Understanding of the concepts of science is considered more important than the memorization of a large number of incoherent facts. The facts are useful in-so-far as they lead to understanding of concepts. The concepts are gradually built up over the length of the course. The Pakistan Elementary Science Project is also a concept-based scheme, wherein an attempt has been made to present the concepts in a structured sequence.

iii. The Environmental Approach

This approach treats the children's environment as the criterion for content. The environment is the object of children's, immediate interest. Guided exploration of the environment leads to the attainment of scientific knowledge and skills. The subject boundaries are not visible anywhere in such an approach. It is particularly applicable and useful to junior schools. The Nuffield Junior Science Project employs this approach.

Activity-VI

Do you think that this approach can be applied to all subjects in secondary schools? React.

iv. The Thematic Approach

The Nuffield Secondary Science Project uses broad themes to present integrated content. The themes are loosely structured and provide for a great amount of flexibility in the choice of material. The themes, however, do not specifically relate to any structural or methodological unity in the science.

v. The Topic Approach

Some integrated science schemes are built around topics. The integration so achieved is neither structural nor conceptual. It is rather superficial. One example of such a scheme is the New South Wales Science course (National Science on Integrated course for schools 1970).

vi. The Project Approach

In a project an individual pupil or groups of pupils plan and carry out investigation into a problem or topic of scientific interest. The pupils' investigative activities are necessarily spread over the boundaries of the disciplines and thus constitute a basis for integration. The Nuffield Junior Science Scheme recommends the use of such projects. The project approach however cannot be used as an exclusive technique for teaching integrated science because it is rather time-consuming and a process of acquiring knowledge and skills and can, at times, be frustrating to the pupils. Projects can be very useful, if skilfully guided as part of the overall teaching strategy. Nuffield physical science projects use this approach as part of the course work and assessment.

vii. The Applied Science Approach

A study of the industrial and technical problems can cover a large area of science and integrate science with its social context as well. But such an approach can also neglect other large areas of science. Some technical institutions claim to teach integrated science through this approach.

5.5 The Different Bases for Integration

A study of the above approaches reveals that a different basis is used in each case to achieve integration. Topics such as air, water, and broad themes such as 'interdependence of living-things' are used as bases for integrating science content in the 'topic approach' and the 'thematic approach'. The methods or processes of science is another basis upon which an integrated science scheme is built up. The 'concepts' as a basis attempts at presenting the structural unity of science. The applied science as a basis relates science to industry and to society. The project investigations disregard discipline boundaries. The curriculum wing of the Ministry of Education launched a project entitled "Integrated Science Curriculum for Secondary Classes (IX-X)" to develop integrated science curriculum for Pakistani schools. The wing organized many workshops for this purpose in collaboration with the provincial bureaux of curriculum and extension centres. In these workshops maximum participation was given to the working teachers. The original draft prepared at Hyderabad was studied, discussed, revised, and improved at each provincial workshop. The four draft versions thus developed were scrutinized by an editorial committee. In the light of the recommendations made at the provincial workshops, this committee finalized the draft syllabus into following two parts:

Part-A:	physical sciences
Part-B:	biological sciences

In part-A, mainly physics and chemistry are integrated, whereas in part-B is placed an integration of life science and, where possible, chemistry has been integrated with life science, and where possible, chemistry has been integrated with biology.

The editorial committee also made some recommendations for successful implementation of the course. It is hoped that the integrated science curriculum if and when implemented would help achieve integration in secondary level science education in the country.

General objectives of teaching integrated science:

- a) **Stimulation of students**
To stimulate the students to reflect upon the Natural Phenomena in accordance with the injunctions of the Holy Quran.
- b) **Presentation of Science as an integrated form**
To present science to the students in an integrated form so that they see science in its total perspective.
- c) **Create an understanding**
To create an understanding of the fundamental principles, theories and concepts of science and recognise its limitations.
- d) **Create an awareness**
To create an awareness of the uses and applications of science in daily life situations.
- e) **Development of Scientific attitudes**
To develop scientific attitude towards problems of life.
- f) **Development of appreciation of contribution of Science**
To develop an appreciation for the contribution of science and scientists with special reference to the contribution of the Muslims.
- g) **Development of ability to practice**
To develop an ability to practice scientific process.
- h) **Development of ability of critical thinking**
To develop the habit of critical thinking.
- i) **Help students in innovation**
To help the students become innovative.
- j) **Enable student to communicate through symbolic expression**
To enable students communicate their thought through symbolic expression and graphs.
- k) **Presentation of Science as an Ever changing body of knowledge**
To present science as an ever-changing, ever-developing body of knowledge and to make the students realise that many of the so-called basic facts or truths of science need to be continuously revised in the light of new discoveries.

Curriculum Content

The nature, objectives, and cope of teaching integrated science have been determined under (i) physical and (ii) biological sciences. Eighteen topics have been selected for

Part-A physical sciences, and thirteen for Part-B biological sciences. An in-built system of practicals related to each theme has been lifted. The major themes of integrated science are outlined below:

Part-A: Physical Sciences

1. Science and scientific thinking: concepts traced from the Holy Quran and contributions made by major Muslim scientists.
2. Physical quantities and their measurement
3. Simple laboratory skills.
4. The world of matter around us.
5. 'Modern atomic theory and chemical bonding.
6. Force and motion.
7. Energy.
8. Work and energy.
9. Heat energy.
10. Waves.
11. Electricity.
12. Magnetism and electro-magnetism.
11. Electronics.
14. Hydrogen, electrolytes and water.
15. Oxygen and sulphur.
16. Nitrogen and phosphorus.
17. Halogens.
18. Source of energy and energy crisis.

Part-B Biological Sciences

1. Biological sciences.
2. The biosphere.
3. Diversity in living organisms.
4. Diversity within the individual organisms.
5. Food energy.
6. Growth.
7. Excretion.
8. Coordination,
9. Movement and locomotion.
10. Reproduction and development.
11. Heredity.
12. Nature and/or origin of life.
13. Biology and human welfare.

Steps for successful Implementation

1. Place in curriculum.
2. Weightage.
3. Schedule.
4. Experimentation.
5. Materials to be organized.
6. Teacher training.

6. ANALYSIS OF CURRICULUM IN MATHEMATICS

Mathematics occupies a central position in curriculum. It is a compulsory subject from class IX. It is being taught as an integrated subject. It covers various areas of mathematical studies: arithmetic, algebra, geometry, statistics etc. Mathematics has gained the status of a universal language which enables man to express his ideas about shape, quantity, and relationship. Knowledge of mathematics is essential for a successful life.

With the advent of computer, the traditional concepts of mathematics have been changed. In the past the application of mathematics was limited in extent. It is to be conceived as an integrated study of the learner's environment which contains the element of mathematics.

The development of mathematical concepts in children will be best achieved through an inductive process. Experiment with each subject and needs of the child's environment should be the starting point for the growth of mathematical ideas. The abstracting of mathematics concepts from concrete situations needs perceptive teaching. It should be based on understanding that the child at this stage is to be led to comprehension of patterns of relationship through experimentation with the concrete.

An attempt at modernizing the curricula was made in 1969. At that time a complete departure could not be made from the traditional contents and approach in teaching. However, a process was initiated, which ultimately led the way to the present revolutionary modernization. In the present curriculum for classes VI-VIII it should be kept in view that besides the change in contents, emphasis is placed on a complete change in approach to the subject. Some educationists think that abstract concepts can be taught at any age level. According to Bruner "any subject can be taught effectively, in some intellectually honest form, to any child at any stage of development". The present curriculum in Pakistan has been drawn up keeping in view the following main points:

- a) The child's previous mathematical background.
- b) The development stage of the child.
- c) Basic mathematical concepts.
- d) The process of developing concepts.

In devising mathematics curriculum, the following were the guiding principles.

- a) Every child has his own rate of growth and his own ways of learning and growing. Implied in this is an opportunity for individualized growth for a curriculum which provides for continuity in understanding mathematics, for recurrence of opportunities to sharpen concepts and for practice which is necessary to produce proficiency in using mathematics.
- b) Certain characteristics seem to be exhibited by children of similar chronological age. A sequence of major experience seems pertinent to each grade level.
- c) Mathematics pervades all areas of living opportunities for development of mathematical understanding, therefore, pervades all areas of the curriculum.
- d) Mathematics, deriving its meaning from the environment, in turn, develops greater understanding of the environment. Therefore, children should be given

opportunities to explore mathematical situations, relationships and possibilities in the environment.

- e) Mathematics may be regarded as a medium of communication of ideas regarding quantity, shape and relationships. The parallel between the development of the language of mathematics and the native language of the child has become widely recognised in current teaching practices at the kindergarten and the primary level.

Objectives of teaching mathematics:

General (for classes I to VII)

- a) To provide for the mathematical interests of the child throughout his development so that he may act effectively in his personal and social life.
- b) To develop a disciplined mind to exercise sound judgement and reasoning in relation to the events of everyday life.
- c) To provide the basic ground work for the understanding of scientific reasoning and calculation.
- d) To create favourable attitudes towards and interest in mathematics showing the contribution it has made and is making to our present civilization and culture.
- e) To provide opportunities for the guided discovery and creation of patterns.

Specific (for classes I- V)

- a) To acquire basic knowledge of numbers.
- b) To develop appropriate skills of computation in four fundamental operations.
- c) To acquire basic knowledge of two and three dimensional geometrical figures.
- d) To develop ability to solve practical problems by the application of fundamental measures (money, weight, length...).
- e) To enable the child to understand the presentation of data in visualized form.

Selection of contents in relation to sequential growth of mathematical concepts.

Selection of contents for classes I-V including

- Prenumber concepts.
- Real numbers.
- operations.
- Recognition of Pak coins, notes.
- Names of days of week, calendar, (time, Islamic and solar months).
- Geometric figures (3-dimensional familiar type of objects, identifying a circle, quadrangle, squares, segment, circle, triangle, concepts of angle, boundary and region, units of area, right angle, triangle, quadrilateral, determining area of a right angle, perimeter of a triangle, types of quadrilaterals, concepts of volume and units).
- Measurement.
- Unitary method.
- Average.
- Reading a graph picture, bar and line graph.

Specific objectives for classes VI- VIII

- a) To enable the child to acquire elementary knowledge of number system.
- b) To develop skills in the application of numbers and other mathematical structures in relevant situations.
- c) To develop understanding of modern mathematical concepts.
- d) To enable the child to solve mathematical problems which have a practical value in life situations.
- e) To enable the child to develop the ability to measure and construct geometric figures.
- f) To develop the ability to present and interpret quantitative data in tabular and graphic form.

Sequential growth of mathematical concepts (VI-VIII).

Selection of contents for classes VI- VIII in a graded form included

- Algebraic operations
- Unitary method
- Average
- Concepts of point, line segment, ray, measurements, types of angles parallelograms, construction of various geometric figures, surface, volume etc.
- Graphs (bar, line; etc.)
- Sets
- Ratio and proportion
- Percentage
- Real numbers
- Simple factors.

General mathematics (IX-X)

Objectives

1. To enable the student to acquire competence in solving computational problems of daily life.
2. To develop in the student appreciation for precision and logical thinking.
3. To create in the student an ability to use and interpret symbolic language and to enable him to convey information about quantitative relationships.
4. To develop ability to apply mathematical skills in different spheres of life.
5. To provide a sound basis for higher secondary stage in social sciences.

Selection of contents

<i>Unit</i>	<i>Weightage</i>	<i>contents</i>
I	1/10%	Ratio and proportion
II	1/10%	Percentage
III	1/10%	Average
IV		Numbers
V	1/10%	Laws of exponent logarithms
VI		

VII	1/10%	Fundamental operations on Algebraic expression
VIII	1/20%	Formulate the factors of the select forms
IX	1/10%	Sets
X	1/20%	Algebraic sentences
XI	1/10%	Geometry
XII	2/10%	Geometrical Practicals

Curriculum in mathematics (IX-X): science stream electives

Objectives

- To enable students to acquire an understanding of concepts of mathematics and to apply them to the world they live in.
- To provide the students with sound basis for specialization in mathematics at higher stages and to apply it in scientific and technological fields.
- To develop sense of distinction between relevant and irrelevant data.
- To enable the students to reason consistently, to draw correct conclusions from given hypotheses and to inculcate in them a habit of examining any situation critically.
- To enable the students to communicate their thoughts through symbolic expressions and graphs.
- To give the student basic understanding and awareness of the power of mathematics in generalization and abstraction.

Content analysis

<i>Units</i>	<i>Weightage</i>	<i>Contents</i>
I	1/10%	Sets and numbers
II	1/20%	Exponents and radicals
III	1/20%	Algebraic
IV	1/10%	Factorization of the expressions of select forms
V	1/10%	Algebraic sentences: 1. Linear equations and inquisitions in one variable. 2. System of linear equations 3. Matrices 4. Quadratic equations
VI	1/20%	
VII	1/20%	Variation
VIII	1/10%	Logarithms
IX	1/20%	Trigonometry
X	1/20%	Vectors in plan
XI	5/20%	Deductive geometry: 1. Fundamentals concepts 2. Postulates 3. Select theorems
XII	1/20%	Practical geometry

Guidelines for writing textbooks and teacher guides with particular reference to mathematics.

The recommendations formulated for modification of mathematics textbooks and developing teacher guides include:

- a) At primary level, the textbooks, as far as possible, should contain practice material, graded illustrations and examples involving application of concepts in different situations.
- b) At primary level, mathematical symbols, except for basic operations, should not be used. The symbols should be gradually introduced in middle and high classes.
- c) Terms introduced for the first time in the text should be written in bold letters.
- d) Glossary of symbols used in the text should be given at the beginning or end of the book.
- e) Each sub-topic of a unit should contain practice exercises comprising adequate number of problems for developing ability to apply mathematical concepts and knowledge in different situations. Oral question should also be included in the exercises wherever desirable.
- f) Practice material should progress from easy to difficult and from simple to complex.
- g) At the end of each chapter, there should be evaluative exercises which may help diagnose specific difficulties of students in understanding the related concepts.
- h) At the end of the book comprehensive revision exercises and model papers should be given.
- i) In general, answers to all questions in the exercises should be given in the book. (Except oral, graphic and constructional).
- j) Consistency in the use of language, terms, symbols, definitions etc. should be strictly adhered to. It is proposed that mathematical symbols/notation to be used in the books (especially in geometry) should be decided by the National Curriculum Committee and level-wise lists should be prepared and made available to the concerned authors.
- k) One teacher-guide for each level, i.e. primary middle and secondary be prepared. The guide-book should essentially contain supplementary material. The government should ensure that enough school funds contingency are at the disposal of the headmaster to provide the relevant guide books to all teachers.

Recommendations for production of textbook/guide books:

- a) More than one textbook in mathematics may be made available; and schools be permitted to adopt the book suiting their requirements. The textbook board may produce model textbooks.
- b) Open competition, rather than commissioning, may also be adopted for writing textbooks. In case writers of textbooks are commissioned, a panel of writers/editors may be preferred over a single writer/editor. If the same person is commissioned to write a number of textbooks, due time may be given for each book.
- c) A standing committee for reviewing manuscripts of textbooks may be constituted.

Names of the reviewers should be kept secret at the time of review, but should be printed on the title page of the book. If the review committee approves a manuscript in principle, the modifications, if any, should be consulted with editors, authors etc.

- d) It should be the responsibility of the textbook boards/publishers to ensure that the feedback is incorporated in subsequent editions of the textbooks.
- e) Final proof-reading of textbooks should be a responsibility of the authors; and the print order should be given by the respective authors.
- f) The books should be made attractive by improving their general get up, i.e. paper, print, binding, spacing, margins, placement of figures, headings, serial numbers etc.
- g) As a long term project, the textual materials may be developed by curriculum planners, specialists and working teachers through experimentation and participatory approaches.

Major Characteristics

The major characteristics of modified curriculum in mathematics are outlined below:

Objectives

In the light of the latest developments in the field of mathematics, objectives of teaching mathematics at school level have been analysed and weightage re-determined. The objectives of the current mathematics education are more general and theoretical. The modified version of objectives have been updated and systematised. Needs of the society and requirements of the subject were equally taken into consideration. Specific objectives were drawn from general objectives and their weightage established. The objectives (general and specific) have been closely related to the nature and contents of mathematics.

Concepts and Contents

The concepts of education of mathematics, within a class and across the classes, have been drawn from the objectives of mathematics education and in-built system evolved whereby any change in the concepts or contents of curriculum would mean to affect the objectives of mathematics education. This has been clearly defined in the sequence chart. This is another major new direction.

Sequence Chart

The most updated pattern of mathematics curriculum in any developed system has been introduced in the sequence chart. Previously sequence chart was prepared for classes VI to VIII. This too had limited framework. Sequence charts for all classes have been developed from simple to complex and on analytic approaches.

Weightage

Assigning weightage was considered more relevant to general mathematics and elective mathematics for classes IX-X. Unit approach was selected whereby each unit has been assigned proper weightage.

Workload

The existing curriculum in mathematics was considerably overloaded in terms of time and capability of teachers.. Mathematics for primary classes and for classes IX-X was considerably overloaded. This has substantially been reduced and a balanced programme developed.

Textbooks

Drawing up on the experience and expertise of curriculum planners, working teachers, and students, some systematic guidelines/check list has been developed for modifying textbooks and reducing constraints on the textbook writer to evolve systematic principles for writing and reviewing textbooks. In addition, imperative need has been realized to develop teachers' guides/handbooks for teaching mathematics. This would particularly be useful where qualifications of mathematics teachers fall below the requirements.

Equipment

It is intended to develop a standard list of equipment/instructional aids for the teaching of mathematics in varied school situations in Pakistan. Further work on this standard list is still being carried out.

Training of teachers**a) In-service**

A phased programme has been chalked out for imparting in-service training programmes at various levels.

b) Pre-service

The programme offered in mathematics education through pre-service training courses needs to be adjusted at PTC, CT and B. Ed levels, so that the prospective teachers may have requisite skills and knowledge of school mathematics education.

7. CONCLUSION

The main aim of this unit was to analyse the characteristics and process of development of existing scheme of studies and curricula in school system of Pakistan, This has been examined in various ways. In the introductory note, major policy provisions and characteristics which shape the policy for development of curricula at national level were outlined. Objectives of the unit have been outlined.

In part 3 of the unit, a brief analysis was presented to help understand the principles and processes directly relevant to policy formulation, with special reference to the preparation of schemes of studies and designing curricula. References were drawn from national plans and policies which provide goals and aims of education. This has been explained by a 4x3 matrix. Six processes have been identified which provide the basis for translating national goals of developing the curricula. This unit provides theoretical framework for the development of schemes of studies and curricula in a national system of education.

In part 4, various schemes of studies, from elementary to higher secondary, were examined. The nature of courses, rationale, weightage, relative position of each subject within and across the levels have been dealt with.

In parts 5 and 6, analysis of curriculum in science upto secondary level- was presented. The objectives of the course, weightage of sub-units, nature of concepts and contents in various scientific disciplines have been considered. In addition, an emerging innovative programme in the area of integrated science for classes IX-X has considerably been covered. Rationale and various approaches of integration have been presented. This innovative programme is at a fairly advanced stage in Pakistan. The textual units are under preparation. On experimentation, the data would provide results to determine areas of improving the programme.

In part 7, curriculum in mathematics, from classes I-X, has been examined. The place of teaching mathematics, guiding principles in division mathematics curriculum, general and specific objectives, across the levels, sequential growth of mathematical concepts, their weightage, guidelines for writing textbooks and teachers guides etc., have been examined.

CURRICULUM REFORM IN SCIENCE EDUCATION IN PAKISTAN

INTRODUCTION

Pakistan, like many countries in the region inherited its system of education from the British. Lord Macaulay (1835, Minutes on Education) aspired to make Indians into 'Brown Sahibs' who would mimic the British in dress, food and mannerisms, but who would lack the intellect to forge ahead on their own. Thus both the Hindus and Muslims of the sub-continent would become the 'workhorses' of the empire, and would do the bidding of the conquerors. As a consequence the system of education that the British installed produced not individuals who could think for themselves, but clerical staff who could deal with the bureaucracy of the Raj. Very little attention was paid to science education, and it was only included in the curriculum at the secondary level after the formation of Pakistan in 1947. This chapter provides a picture of science education in Pakistan, and examines how the gaps in science education were addressed with the help of huge investment in practical science teaching, but how this effort has not born fruit. Lastly, some ways in which science education might be enhanced and improved in Pakistan are proposed.

Science Education: Post Partition To Date

In 1947 the Indian subcontinent was divided into two countries, the Muslim majority provinces in the Northwest and Northeast of India was called (East and West) Pakistan and the rest became India. East Pakistan became Bangladesh and West Pakistan, became Pakistan. Since, its inception Pakistan has been disadvantaged as majority of universities and schools were in the territory that now comprise modern day India. However, through a huge effort Pakistan has enhanced its education sector, and there are now more than 100 institutions of higher education (Isani, 2002) and a literacy rate of more than 50% (World Bank, 2007). From the outset, science and technology were seen as a way to allow the young Muslim state to enter the twentieth century, and a concerted effort was made to improve the teaching and learning in science through the use of innovative strategies (Warwick & Reimers, 1995).

Until the 1950s science was taught only in post-secondary institutions, and very little science was taught at the primary and secondary school levels (Iqbal & Mamood, 2000). The topic nature study was introduced into primary classes in 1959 and, in principle, general science and mathematics were compulsory for Grades 1 to 8. But the implementation of science remained difficult, and the thrust of education in general focused more on the liberal arts.

More ambitious curriculum reforms, particularly in the area of active science learning, were initiated in the 1970s when practical work was first introduced in school curricula at Grades 9 to 12. In 1972 the new education policy of the Pakistan Government represented a massive shift from a general, to a more technical and scientific education, at the

secondary and higher secondary school levels. However, appropriate long term planning was not undertaken. As a result, a severe shortage of science teachers at the time was solved by rather ad-hoc measures, such as inducting untrained teachers (or teachers with minimal qualifications in science) into the profession. This resulted in a dramatic drop in the standard of science teaching. In 1979 governmental education policy documents acknowledged this gap in educational planning, and observed that no system could be better than its teachers. Efforts were subsequently made with the help of loans from the Asian Development Bank to develop new science curricula. A new body called the Institute for the Promotion of Science Education and Training (IPSET) was established for in-service training of science teachers. Although these efforts helped to increase the profile of science in the school curriculum, science teaching remained rooted in the past for a number of reasons, which are discussed below.

In 2002 the Pakistan Higher Education Commission (HEC) was formed under the charismatic leadership of Dr. Attaur Rahman. Dr. Rahman was able to enhance the funding for higher education substantially, and a Task Force on Higher Education was formed. A large number of the Taskforce recommendations to improve the standard of education generally, and science education in particular, were accepted and are in the process of implementation as of 2007. However, none of these efforts questioned basic assumptions about practical work in science. It has been assumed, for example, that 'more of the same' will be effective in improving science learning, and hence the focus has been on improving practical work in the same way as practiced in the past, through provision of more laboratories and other resources. However, fundamental questions and issues about practical work have not been addressed, and these haunt science education in Pakistan. Some of the challenges facing practical work are specific to Pakistan; others are more general and impinge on the way practical work is envisaged all over the world.

Pakistan engaged in 'post-Sputnik' reform efforts in science education, and practical work in science was made compulsory for Grades 9 to 12. Every examination of science learning in schools includes a 'score' for practical work and this comprises 25% of the total marks. So, for example, a student assessed for physics at say Grade 10 would be allocated 75 out of 100 marks for a pencil and paper type test, and 25 marks from a hands-on practical examination in a laboratory. A large amount of funds were spent on teacher training, and for procuring science kits and other materials necessary for practical work. This was done with high hopes of increasing Pakistan's human resources in science and technology. However, the reforms have not produced the desired results. Practical work consists of activities that verify known scientific principles, or to illustrate scientific processes. The context of teaching and learning in the schools is such that even these activities are reduced to the level of rote memorization of the steps needed to complete 'the practical'. Hence, this form of practical work has not really helped Pakistani students develop understanding of scientific concepts or an understanding of 'doing science'.

Challenges Facing Science Education in Pakistan

The problems facing science education in Pakistan are two-pronged. One is the 'deficiency' problem that dominates many developing countries with limited resources. This results in consequential problems that include: (a) a shortage of science teachers, (b)

poor training of science teachers, (c) poor quality of textbooks, (d) a system of examinations that encourages rote memorization, and (e) a lack of laboratories, equipment, and other resources needed to teach science. However, there is a deeper problem in Pakistan that I call the 'conceptualization problem'. The conceptualization of science education Pakistan requires us to ask questions such as, 'What kind of science education is needed for Pakistan?', 'What kind of practical work is needed for Pakistani students?' and 'What are the skills that we need to teach students through practical work in science?'. These have been left largely unanswered.

I first discuss briefly the deficiency challenges faced by Pakistan science teachers and educators as this relates to practical work, and then consider the conceptual difficulties and some ways I think we can address them.

Training of Science Teachers

Teaching science at different grade levels in Pakistan, as elsewhere requires different levels of specialization. The emphasis at earlier stages in Pakistan is on pedagogical skills of teachers, and their ability to convey concepts and ideas to students. Up to say Grade 5, after 10 years of schooling, primary certificate level training only is required. To teach Grades 6 to 8 requires a general certificate after 12 years of schooling. At higher levels, more advanced subject knowledge and technical expertise in the laboratory is required, in the form of BSc and BEd degree qualifications. Hence, primary level teachers with only 10-12 years of schooling are not able to do justice to the teaching of science. As in many other parts of the world, Pakistani primary teachers do not necessarily have an academic background in science, and yet are expected to teach science at the primary level. Not surprisingly, Pakistan primary school teachers often lack confidence about teaching science. Their teaching is at best textbook-based.

In addition, the training and practice teaching for Pakistan science teachers leaves much to be desired. Most of the pedagogy of science is taught via lectures and, rather ironically, pre-service teacher trainees are exhorted to use activity-based methods in science in these lectures. Hence, 'trained' teachers of science usually do not have much idea of how to teach through 'activity means', or about classroom management issues that often occur when more exciting activities or demonstrations are done in class. There has been a huge growth in the private education sector in Pakistan involving teacher training through private universities either in Pakistan or abroad. This has led to some improvement in science teaching in some private schools, but key core questions that affect science education and particularly practical work in Pakistan remain.

Shortage of Science Teachers

There is a significant shortage of science teachers in Pakistan. Statistics even for the largest and the most developed province of Pakistan show that at the elementary level one science teacher per school is the norm, while at the secondary level three science teachers is the norm (Social Policy & Development Center [SPDC], 2002-03). The situation is much worse in rural areas, and in rural Pakistan many primary schools have no science teachers, and most secondary school science teachers do not possess a degree in science. It is not unusual to find those teaching science who have never studied science in school.

However, in large cities such as Karachi, it not difficult to find teachers who teach science at the secondary and middle school levels who have a BSc or MSc.

This shortage of science teacher then creates two kinds of problems, science teachers who are available are expected to teach a large number of classes, and cannot do justice to their teaching. Instead they tend to focus on covering the syllabi for the examinations. Second, science teachers, particularly at the college level, are expected to teach very large classes, often of more than 100 students, meaning it is not possible for the teacher to communicate well with students, let alone teach them well.

Quality of Science Textbooks

In many developing countries textbooks are often the only resource other than the teacher that the students can utilize in learning science. Hence, science textbook are even more important in science learning than in developed nations. "An examination of prescribed textbooks for secondary and higher secondary schools reveals that they:

- present science in a manner that is too abstract and formal;
- are deficient in content as well in presentation;
- are lacking in focus and precision that is essential in understanding and working with scientific phenomena; and
- are unsuitable in terms of developing concepts and creating and maintaining the interest of the students" (SPDC, 2002-03, p. 140).

In Pakistan, as elsewhere, textbooks lay a great deal of emphasis on definitions and facts rather than developing conceptual understanding of ideas. Nor do they try to make coherent the big ideas in science (American Association for the Advancement of Science [AAAS], 1993) so that students can, for example, see that light, magnetism and heat are all different forms of energy, all of which are governed by the same principles.

In Pakistan even after completing a science masters degrees the graduates who may become teachers may not develop conceptual understanding or and analytical capability in science, and are often unable to draw graphs, read and interpret data or otherwise analyze scientific data. Hence, poorly prepared graduates often become poor science teachers, who in turn teach inadequately in a cycle that reinforces a limited view of science.

Assessment of Science Learning

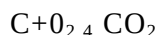
Secondary and higher secondary examinations in Pakistan are centralized, conducted by multiple boards of education, and set for this purpose in each province. The Federal Government of Pakistan also has a Board of Examination for schools under its gambit. The examinations occupy a central position in both students' and teachers' lives in both schools and colleges. Teaching approaches in the classroom, the assessment system in schools, the textbooks prescribed, and students' and teachers' attitudes towards teaching and learning are strongly influenced, if not governed, by these Board examinations (Halai, 2002). Schools and colleges are assessed, and assess themselves, on the basis of their students' performance in these exams. This would be acceptable if the examinations

at least attempted to test conceptual understanding, reasoning ability or the ability to problem-solve. However, the question papers are structured in a very specific way, meaning those who teach to these examinations are rewarded. Only about 33% is required to gain an examination 'pass', meaning students need to know relatively little of the topics covered in the syllabus.

Competition for entry into each grade of study is very stiff, and this has given rise to the phenomenon of teaching Grades 9 and 10 science in Grade 8, and sometimes even in Grade 7, whether or not students are prepared for study at these levels. As an illustration, there is no requirement to use symbols and equations to denote chemical reactions in Grades 7 and 8. So the reaction between carbon and oxygen would be represented thus:

Carbon + oxygen → carbon dioxide

However, many science teachers in the school expect the students to write it such an equation using symbols in the form,



and then teach the balancing of equations; thus expecting Grade 7 and 8 students to memorize symbols and valences for elements and radicals, along with the concept that equations are expressions of molar quantities taught in Grade 9. Such teaching encourages rote memorization undertaken in order to keep up with teaching for Grades 9 and 10. The examinations thus have become a test of memorization, and encourage even progressive schools to 'teach to the test'. Any efforts to bring about changes to teaching are resisted strongly both by parents and students because of the high stakes nature of the examinations.

Poor Implementation of the Science Curriculum

In Pakistan science is integrated up to Grade 8 after which the students are given the choice which stream to take, one of which is the science stream where the major branches, physics, chemistry, and biology, all taught as separate subjects. From a pedagogical standpoint, the argument in favor of integration is that that real life situations demand the application of scientific knowledge which is not 'compartmentalized' into physics, chemistry, or biology, but that exist as an integrated whole. In developing countries like Pakistan few students pursue higher education, and so a compulsory integrated science curriculum up to Grade 10 is deemed more appropriate. It is further argued that it is too early to stream at Grade 8, and to do so would deny students in non-science streams valuable learning not covered in general science. In Pakistan, streaming into science starts as early as the end of Grade 8, and student performance in science and mathematics at this grade thus acts as a 'gatekeeper' to further science study. Science 'graduates' are privileged, in that they can then reenter any other stream such as art or commerce, but the reverse is not allowed.

The implementation of an integrated science curriculum is not without problems. The main problem lies with the teachers, their capabilities and their resistance to change. Pakistan teachers find it difficult to hold mastery of all disciplines of science such as physics,

chemistry, biology, geology, and astronomy, especially considering that they typically specialize in only one field. It is argued that if the different branches of science are to be taught with some depth in Grades 9 and 10, they must be handled by specialist teachers.

However, the weakest aspect of the science curriculum in Pakistan is probably in the implementation of the curriculum. The science curriculum documents overall are well written, but the resources necessary to put them into effect are simply not in place. Overall, the poor quality of the teachers is probably the major barrier to good science teaching in Pakistan.

Lack of Science Laboratories and Resources

A lack of availability of science laboratories for Grades 9-12 students is a cold reality in Pakistan, and much more needs to be done to ensure that the requisite materials are available to science teachers. However, it is also true that science teachers need to be empowered to obtain the required materials. It has been my experience that schools actually often have allocated funds which go unused, since no requests for materials are made by science teachers. Under-utilization of *allocated* funds is actually more of a problem in government schools than lack of funds. Additionally, the teaching of science in Grades 1 to 8 does not require much laboratory equipment. My work in teaching a science methods course for primary science teachers, suggests that using simple, readily available materials can lead to positive learning outcomes at this level (see Halai, 2002).

Needed Reform in Practical Work in Science

Practical work has the potential to deliver many benefits for students' learning of science (see, e.g., Nakleh, Polles & Malina, 2002) in allowing hands-on experience of natural phenomena, but there are also limitations that need to be considered. There are a number of assumptions about practical work that need to be very carefully considered when designing practical activities (Halai, 2002). It is, for example, assumed that 'teaching science' 'doing science', and 'teaching *about* science' are much the same thing. Through these three aspects overlap I would argue that they are distinct.

Changing Conceptions of the Nature of Science

There is reasonable consensus among science educators all over the world that teaching about the nature of science should be a part of science curricula (see, e.g., AAAS, 1993). While this thinking has been taken on board in the Pakistan science curriculum tacitly, no attempt has been made to define it more explicitly, or to actually include it in teaching of science. Most science teachers in Pakistan have been exposed to a very positivist conception of science. As a consequence, many local teachers do not understand the nature of science themselves, and assume, for example, that observations are independent of theory, and also assume that all students observing a given phenomenon will see the same thing as the teacher. A related assumption is that practical work 'speaks for itself', and that after practical work no discussion of outcomes is necessary.

Pakistan science teachers often assume that students *see* what the teacher does while looking at a science demonstration. All students have to do is to *see* the activities, and

they will inevitably abstract the same principle or concept that the teacher wants to illustrate. Roth (1995, p. 3) expressed similar views when he started to teach science: "I began to teach science assuming that all students had to do was to look and recognize the truth about nature; I assumed that what I saw happening in a test tube should be seen equally by students". Roth soon changed his views with experience! The reality is, of course, that students often see things very differently from their teachers. Teachers bring their own theoretical framework with them, and look at the particular activity with a specific *lens* that guides their observations. Not sharing that lens (because of their own more limited experiences), students often see things very differently from the teacher. Studies in which students are expected to draw the internal structure of a plant cell after observing it under a microscope show clearly that students often focus on something entirely different to that of the teacher. Hodson (1998, p. 10) sums up the theory-dependence of observation very succinctly:

The traditional school curriculum description of science says two things about observation. First, nothing enters the mind of the scientist except by way of the senses - that is, the mind is a *tabula rasa* on which the senses inscribe a true and faithful record of the world. Second, the validity and reliability of the observation statements are independent of the opinions and expectations of the observer and can be readily confirmed by other observers. Neither is true. In reality, we interpret the sense data that enter our consciousness in terms of our prior knowledge, beliefs, expectations and experiences.

Chalmers (1999) agrees that theory precedes observation, and says it is false to claim that science starts with observation. Even with highly guided activities, students do not see 'eye-to-eye' with their teachers. For example, in a science class, the teacher was using balloons to show that air has weight, but the students instead focused on the color of the balloons seeing this as an important variable in the experiment. Gunstone (1991) comments that 'looking at things' is an active process, in which students check out their perceptions *against their expectations*. In fact, students' personal theories may lead them to reject particular conclusions, by way of denying the legitimacy of observations.

This is a boarder problem than practical science Pakistan. In the 1980s as part of the *Learning in Science Project (LISP)*, Tasker and Osborne (1985, p. 27) investigated difficulties students face when learning science in the classroom. They concluded that:

- There was a disparity between the *ideas* children brought to the lesson and the ideas the teacher assumed that they would bring to it;
- There was a disparity between the *scientific problem* the teacher would have liked the children to investigate and what they took to be the problem;
- There was a disparity between the *activity* proposed by the teacher and the activity undertaken by the children, despite considerable teacher intervention; and
- There was a disparity between the children's *conclusions*, and the conclusions proposed by the teacher.

Tasker and Osborne (1985) argue that the teacher's intentions cannot be directly transferred to students; rather the teacher has to *contrive* to see if the mental constructions of the students match what the teacher wanted to convey. Further, they state that appreciation of the perception the learner brings to the classroom (among other things) is essential if the gap between the teacher's intentions and the students' learning is to be reduced. This sort of thinking, about the importance of student prior knowledge, is what led to the development of constructivism and learner-centered education (Wheatley, 1991).

Meaning Making in Practical Work

Practical work in science, or 'using activities' has a long history in many parts of the world such as the United Kingdom (Wellington, 1998), but practical work was only introduced into Pakistan schools in the early 1960s (Iqbal & Mahmood, 2000). While practical work can motivate, illustrate, clarify and enhance understanding, it also has the ability to confuse. Driver (1994) attributes this problem to a simplistic and empirical view of science that *knowledge is based on observation*, and that scientific laws are acquired by a process of induction from the 'facts' of sensory data. The cliché 'I do and I understand' is often used to support the use of practical work in science teaching. If children are to understand science concepts more than that is needed. Driver comments that the slogan 'I do and I understand', instead is more likely to become, 'I do and I am even more confused!' Many science teachers have a rather naïve trust in the ability of practical activities to expose students to sensory data that will help them to construct scientific concepts. They may believe, for example, that observations give reliable information about the world, rather than being interpretations of phenomena based on one's own views and prior knowledge.

There has been an effort to reappraise the use of practical work in science teaching (Hodson, 1990; Wellington, 1998), and engage in a fair assessment of what practical work can and cannot achieve (Millar, 1998; Nakhleh et al., 2002). Science teachers think of activities as cognitively effective tools for teaching science because students can 'see' what is happening. But sometimes these tools became more like 'fun-work' rather than an activity that actually enhances understanding. Thus meaning making in science is often considered to be complete once the practical work ends. In fact the end of the activity is often the time when meaning making really starts. Driver (1983, p. 49) comments:

It is common to see science lessons which end with the clearing up after the practical work is finished. The time for the important discussion of how the important experiences gained relate to the new ideas is missed. Activity by itself is not enough. It is the sense that is made of it that matters.

Gunstone (1991, p. 74) reiterates, "For practical work to have any serious effect on student theory reconstruction and linking of concepts in different ways, the students need to spend more time in interacting with ideas and less time interacting with apparatus".

Using Practical Science to Help Students See Science as More Than Received Knowledge

Let me now link some of these ideas from the literature to the situation in Pakistan. During a research project I was involved with I observed a science teacher explain the five major classifications of vertebrates as:

(a) Fish, (b) Birds, (c) Amphibians, (d) Reptiles and (e) Mammals

Over two class periods the teacher brought in some preserved samples of dog-fish, flounder, and a frog - all preserved in formalin. In each case she explained the dominant characteristic of each species. Then she explained that human beings are vertebrates, and she brought in four bones from the vertebrate column of a human skeleton. She finished her lessons by demonstrating the characteristics of all the five classifications. The treatment given to classification was as if nature *intended* the animals to be divided in such a way. Interestingly, this science teacher was well aware of the Swedish biologist Linnaeus and his achievement in devising the classification system for animals, as it is a part of the microbiology curriculum at the undergraduate level (which she had studied). However, in her instruction it appeared as if the classification system was received from a 'divine authority' rather than something devised by a human scientist. By pointing out the human effort that went into the classification process an important aim of teaching students something of the nature of science might have been achieved. Talking of the theory behind the classification of vertebrates, could then have added to a bigger picture of biological knowledge. Instead the students viewed these two lessons as separate examples of fish, amphibians, reptiles, birds and mammals.

This brings us to the nexus of knowledge and authority in Pakistan. In Pakistan society, as in many other countries of the world, knowledge, and hence scientific knowledge, is seen to reside with authority (Fuller & Snyder, 1991; Shumba, 1999). The concept of knowledge as truth, and 'truth is for all time', is a dominant way of thinking about science knowledge for many people (Krugly-Smolka, 1995). The idea of challenging authority is very difficult for Pakistani students in particular. Much of the knowledge in books is accepted *without question*. Questions in science such as, 'Why are animals classified in this manner?' are never raised. They are instead accepted as a fact, or as a truth. This is not only a problem in developing countries like Pakistan, but appears to be endemic even in developed countries. Lemke (1990, p. 175) goes so far as to comment that: "It is dangerous to society to have students leave school believing that science is a perfect means to absolute, objective truths, discovered by people of superhuman intelligence".

So Pakistan science teachers teach science in a way that adds to the 'mystique' (Lemke, 1990) or the 'mythology' of science (Smolicz & Nunan, 1975). They seldom make it clear that science is a human endeavor, and therefore, subject to human frailties. Questions such as, 'What are good reasons for believing that?' are very rarely encountered in Pakistan science classrooms. Acceptance of authority as a source of knowledge, and hence not challenging the knowledge provided by the teacher, is thus deeply embedded in the culture of Pakistan schooling (Aubusson & Watson, 1999).

Is Science a Superior, Value-free and Stable Way of Knowing?

In a similar way, science teachers that I have encountered in my role as a science teacher educator, generally see science as a body of knowledge based on empirical evidence. Science knowledge is then considered to be different from other kinds of knowledge because of its ability to yield empirical evidence. One can perform an experiment and 'prove' a claim in science, whereas one cannot do that in other forms of knowing such as religion. Pakistan science teachers thus lay a great deal of importance on experiments to 'discover the laws of science and develop scientific theory'. Generally, teachers see science as knowledge that is neutral and value-free, free from religious beliefs, the latter which falls within the realm of 'faith'.

Personally I do not view science as belonging to any religion or group, and like Pakistan's most famous physicist and only Nobel laureate Abdus Salam', I believe in maintaining a distance between science and religion (Hoodbhoy, 1998)". However, at the same time I acknowledge and value Sardar's vision, as quoted in Loo (1996, p. 288), of science as a human activity that is "subject to the moral philosophy of Islam", and envisage a *halal* environmentally-friendly science that promotes social justice and public interest. The key issue of the control of science by the community of scientists, or a higher moral authority, in my view needs rethinking. But the concept of the nature of science is essential for school science. Furthermore, there is a paucity of literature that discusses the nature of science from an Islamic perspective. Haidar (1999, p. 808), however, summarized the fundamental Islamic beliefs about the nature of science:

The purpose of science is to discover God's wisdom in the universe; knowledge can be acquired by the scientific method as well as by other means, e.g., revelation; truth is not absolute, we see only what God permits us to see; and the only absolute truth is what God knows.

It is important to emphasize that these views may represent just a particular point of view, and that other denominations of Islam may have views that are somewhat different. However, in Pakistan, these views would certainly find a fair degree of acceptance. This is an important element to consider in response to the work of Lederman and Niess (1997), who question the ability of science teachers holding traditional views about science, to execute reform in science education. Does this mean that societies (not only Islamic societies) that espouse traditional views cannot reform science education? Or does it mean that science reforms need to adjust to belief systems in these parts of the world? Fuller (1997) explains the Islamic perspective about the nature of science, saying that Muslim thinkers question the sharp distinction that Western philosophers draw between *episteme* and *ethics*, and do not espouse a view of science that is value-free. Muslims view science as a knowledge that should be pursued for universal human good rather than for its own sake.

A WAY FORWARD

Teaching Science: A Balancing Act

Science teaching is characterized by a number of tensions. Tension between a desire to teach for understanding, and the need to complete the syllabus. Tension between a need to see that all students 'succeed' in the Board exams, and teaching for understanding. But teaching for success in examinations, and teaching for understanding ought not to be different, or have mutually exclusive goals. But in the less than ideal top-down, centralized examination system prevailing in Pakistan, it seems that skills needed to pass examinations are valued above understanding. Science holds the key to entry into fields such as medicine, engineering and computer science, which are highly valued in Pakistan. Hence, science marks are used as a 'weeder' to select students who can or cannot study science. These tensions are exacerbated in the teaching of science (and mathematics) as compared to subjects such as social studies and Islam.

Pakistan is a developing country, and has the ethos of a traditional Muslim society where conceptions of knowledge are very different from those prevalent in the modern and postmodern developed countries. In Pakistan, like many other developing nations, knowledge is seen to lie with authority and tradition (Shumba, 1999). Within such a framework students find it almost impossible to question and challenge their teachers - teachers are seen as the source of knowledge. In the same way, teachers themselves find it difficult to challenge authority, and are inclined to perform their duties in line with the dictates from 'above'. This contrasts markedly with modern views of teaching science, for example, inquiry-based learning, that requires students to construct their own knowledge and challenge and question traditional ways of knowing. Non-traditional modes of teaching also envisage a different role for a teacher, removing the teacher from the center of the classroom as the source of knowledge or the knower, and giving at least some power to the learner. The teacher's role then would become that of a facilitator, a part rather than the whole of the learning environment. This would clearly constitute a huge change in teachers', students', parents', and administrators' views of teachers and teaching and learning in Pakistan. I believe that this issue needs to be tackled much more seriously at the teacher education level than is being done at the present.

Knowledge of Subject Matter Is Not Enough

I suggest here that a teacher having strong content knowledge is an essential but not a sufficient condition, to ensure good teaching. Even if teachers have a good understanding of science, they may not know it in ways that help them to 'hear' their students, select appropriate activities and enhance student understanding. In Pakistan, a very large number of teachers, particularly those employed in private institutions, are not trained teachers. Additionally, the kind of teacher training available is so theoretical in nature that does not meet the needs of teachers. Thus there is something of a Catch-

22 situation: teachers do not seek teacher education because the education and training does not meet their needs. School administrators do not insist on professional training for the same reason. As a consequence, teachers continue to use their own experiences as students as the basis for teaching. Thus the cycle continues. This cycle can be broken if teacher educators are seen to provide education that extends content knowledge, and also teaches how to present this knowledge in a pedagogically sound manner. One of the ways that might be done is to teach teachers using methods, activities and projects that they can use with their own students. This would expose teachers to new methods of learning, and having experienced these methods they might be more likely to use them in their own classes (Stofflett, 1994).

There is a basis to this suggestion in the literature. Research on science teachers' pedagogical content knowledge suggests that understanding of a subject matter and experience in teaching contributes to the development of pedagogical content knowledge (van Driel, Verloop & Vos, 1998). Adams and Krockover (1997) report beginning science teachers' pedagogical content knowledge depends both on their experience as a learner *and* as a teacher. Hence, a system of in-school professional development for teachers that suits the particular context, culture and needs of the school could go a long way to helping teachers who have not been exposed to professional education.

There is increasing evidence in the literature (e.g., Hodson, 1996, Nakhleh et al., 2002; Wellington, 2000) that practical work as currently conducted in both developed and developing countries does not necessarily help teachers achieve curricular goals. Open-ended investigations around relevant issues, project work, discussions, using reading and writing to learn science (Glynn & Muth, 1994) can enhance science learning - sometimes more than structured hands-on science activities. In Pakistan, teachers use demonstrations as their preferred model for bringing practical activities into the science room. A slight modification in the manner in which demonstrations are conducted, for example, incorporating activities like prediction-observation-explanation (Gunstone, 1991) may increase the effectiveness of demonstrations. However, the greatest challenge lies not in developing curricula and new ideas, but in supporting teachers to implement them and to further refine them to suit their particular needs and the needs of their students.

ACKNOWLEDGEMENT

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Notes

- a) Abdus Salam received the Nobel Prize in 1979 with Steven Weinberg and Sheldon Glashow for developing the unified theory of elementary particles.
- b) However, there are other Islamic philosophers, such as Jaafar Sheikh Idris (1987), who believe in the concept of Islamic Science.
- c) That which is legitimate or accepted in the Quran.

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UNIT-7

CURRICULUM AND DEVELOPMENT

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INTRODUCTION

There is a growing concern in the developing countries to reconstruct educational systems to respond to the Socio-economic changes necessary for providing a minimum quality of life to the masses who live untouched by economic growth. This had led to a critical reappraisal of the entire structure and content of education in these countries. More and more countries in the Asian region are now shifting their curricular emphasis from general and theoretical education to some form of productive work by weaving community skills and crafts in the school curriculum. The move towards rural transformation through school curricula stems from the fact that the majority of the people in these countries live in rural areas.

Most countries with a sizeable proportion of their population in rural areas living in acute conditions of poverty and ignorance are of necessity responsive to the growing demands of modern times to provide purposeful, skill-oriented education to vast masses of its people to enable them to engage in new patterns of self-employment and gainful occupations within their communities. Without this, education, in the context of general poverty, is a luxury which the rich may well afford but the poor do not need.

Curricular reforms introduced during the past few years in countries of the region have made initial moves towards this direction by introducing skill education at various levels. Unfortunately, these reforms have not yet stabilised for a variety of reasons, some of which are:

- a) ineffective articulation and transmission of the concept of work-oriented education,
- b) resource constraints,
- c) the traditional respect for academic and theoretical education,
- d) ineffective mechanism for implementation of suggested improvements,
- e) lack of arrangements for adequate supply of suitable teachers and essential equipment for their programmes.

Anyhow, the consciousness to improve the situation is certainly very conspicuous both at the national and the provincial levels. The study of this unit will hopefully helps to clarify the basic concepts about this movement and facilitate the streamlining of other necessary arrangement to implement such an innovative programme in an efficient manner.

Since the approach is similar in most developing countries of the world, this unit contains some relevant extracts from APEID-UNESCO publications.

Now let us see the situation in Pakistan.

Pakistan is a poor country mainly because of its untapped and unexploited resource potential, poorly planned growth and uneven distribution of resources. More than 70% of the country's population lives in rural areas where the main source of subsistence is agriculture and related occupations. The bulk of the population in rural areas is living, at best, at survival level.

In the rural areas, people are continuously confronted with survival problems of food, clothing and shelter. The basic amenities of sanitation, health, education and other social welfare services are, at best, marginal and at worst almost non-existent in the rural areas. Most often educational facilities either are not available or, if available, they are so poor and depressing that a child would normally feel extremely uncomfortable. For instance, there are hardly any buildings and furniture and most often the children have to squat on the floor in the open, exposed to the vagaries of weather, or are huddled in dark rooms. There are no toilets and facilities/opportunities for games or recreation are non-existent and children suffer from malnutrition and hence severe disease. In, the cold and hot season, families are exposed to the treacheries of weather owing to poor accommodation and insufficient clothing combined with poor nutrition. In a number of villages and backward areas even drinking water is not available. It is a common sight in the villages that animals and human beings use the same pond for drinking water. Similarly, in the areas, where it is extremely cold, such as the northern areas of Gilgit and Baltistan, animals and human beings are huddled together in the same room in the night to protect themselves from the severe cold.

In a situation like this where the majority of the population is confronted with basic survival problems, the urgent will have a tendency to take precedence over the important and the priorities would tend to tilt in favour of survival. Education, therefore, in a society like this, must contribute towards facing survival problems and improving the life style of the people.

Need and Relevance

Whatever development may have taken place in the country, whatever may have been the increase in the national income or export outputs etc., there has not been any significant improvement in the life styles of the common man, particularly, in the rural areas. If at all economic development took place, its effects did not percolate to the lives of the ignorant, down-trodden masses. This is not peculiar to Pakistan; in fact, the situation is strikingly similar in most of the developing countries of the world.

There has, therefore, been a growing interest in Pakistan as well as other developing countries of the Asian, African and Latin American regions to link education with development. As the need of such an effort increased, the consciousness sharpened and the demand gained momentum. Consequently, several development-oriented programmes appeared. The Asian Programme of Educational Innovation for Development came into existence in 1974. Similar programmes for Arab States, Africa and Latin America also started subsequently. It is also relevant mention that while the effort is aimed at development, the focus is on the poor down-trodden people particularly in the rural areas and deprived population groups.

The pressing problem of education for community developed has led educators and development planners to a serious re-thinking on the whole question of development, and its relationship with education in the Asian region.

Education in Pakistan's Context

In Pakistan, basically the entire problems stem from the fact that during the days of foreign rule, the colonialists devised an educational system which would, on the one hand, reduce the productivity of the locals and thus enhance their dependence on foreign sources and, on the other, produce people who would have a respect for the foreign

culture and way of life and would make a positive contribution toward its perpetuation and continuance.

Thus with the imposition of this system on us, education, which was in the hands-of foreigners, lost its contact and linkage with the masses and the socio-economic context in which they lived. The content of education became a source of cultural alienation so that its recipients became strangers to their own society and lost touch with their needs. They were ignorant of the-problems faced by the masses. Education became counter-productive, Theoretical and academic with no roots in the community. So in -the Pakistan context while it is recognised, that to be able to read and write, to collect social and scientific information are goals worth, pursuing, theoretical education for its own sake becomes a questionable endeavour, an effort out of place and meaningless. Let us take an imaginary situation which is exaggerated only to bring into sharp focus the need for relating education to community development. This is it:

Imagine a far-flung area in rural setting situated in the mountains. The area is by and large, barren and, therefore, the population is very thinly scattered. Most of the inhabitants depend for their livelihood upon cattle grazing and reading. Water is scarce and the-nearest source of water is a couple of kilometers away. During the winter, told is very severe most often well below freezing point at night. At night, the winds howl and groan. Occasionally, one could hear the cry of jackals. Around that place, there are hardly any trees or plants. There are scattered fields where some corn and wheat is grown only when there is rainfall. When there is no rain, the land remains barren.

In an area like this imagine a small hut which accommodates a family of five children, mother and father. During winter, at night the cattle also live inside the hut. On a winter night the cold is severe. The winds are howling. Outside it is all dark. Inside the hut there is complete dark. One of the five children of the family is suffering from high fever and is coughing continuously. Every time there is a fit of cough; one has the feeling that the child's breathing is going to be choked to a point that he may expire. The breathing of the child is irregular and spasmodic. It groans and whistles. Because of the fever and cough, the child has not taken anything for the last two days. In any case, there is not very much with the family that the child could eat. The mother of the child has not slept for a few nights because she has been sitting night after night holding the child in her lap. The child's lips are dry and parched and there is no water to moisten them. The occasional tear that trickles down the mother's eye, moistens the child's lips.

In the absence of any treatment or medicine, the mother is giving the child emotional support to recover and is praying to God for help. The father is taking care of the other children who are uncomfortably huddled in one torn blanket. There is nothing that the parents can do to save the child who is involved in a life and death struggle for the last 24 hours. The parents and other children are anxiously watching the struggle, but are helpless. The family is surrounded with hunger, poverty, ignorance and with the shadow of death, looming large on it. There is complete darkness all round the darkness of the night and the darkness of ignorance.

If you are thinking of educating this family, a number of possible questions arise. Some of them are as follows:

- i. What kind of education would one like to give to the children of this family?
- ii. Would one like to say to the parents, when they are confronted with a situation like this, that they should send their children to the school?
- iii. How would one convince the parents of these children to send them to school?
- iv. What modifications would one like to bring about in the educational programmes to make them respond to the needs of a community of this kind?
- v. How would one sell educational programmes to members of community like this?

In trying to find tentative answers to the above questions, perhaps it is possible to understand at the conceptual level the pressing need for relating school curriculum to community development.

Activity-I

Propose a set of useful and productive activities for primary school village with such families that solve their problems and promotes their economic well-being

OBJECTIVES

After studying this unit, you should be able to:

1. Describe the progressive linkage of education with economic development with reference to National Education Policies in Pakistan.
2. Give a general view of education and development projects and approaches in the Asian region
3. Describe the various aspects of the complex nature of community development.
4. Identify the problems of the community particularly in rural areas and the role of education in solving those problems.
5. Design educational programmes which are relevant to the surrounding.
6. Draw the implications of development particularly in respect of new roles and responsibilities of teachers.
7. Assess and evaluate the role of the existing curricula in practical problems and critically review the implication of educational programmes.

1. EDUCATIONAL POLICIES AND DEVELOPMENT TRENDS

Educational policy makers and planners have been sensitive to this problem, though not to the extent that it deserved. Even in the initial stages, although, at the policy level, the expression of this particular role and dimension of education is distinct, yet at the implementation level, owing to paucity of resources, it did not get the priority it deserved. However, one may not accept the excuse of shortage of resources and the failure may be referred-to the major implementing agency. What is your opinion?

After the independence of Pakistan, the first Education Conference at Karachi took cognizance of this situation and the Quaid-i-Azam's message to the Conference, which is a Policy statement for education, is reproduced below.

"You know that the importance of education and the right type of education, cannot be over-emphasized. Under foreign rule for over a century, sufficient attention has not been paid to the education of our people and if we are to make real, speedy and substantial progress, we must earnestly tackle this question and bring our educational policy and program me on the lines suited to the genius of our people, consonant with, our history and culture and having regard to the modern conditions and vast developments that have taken place all over the world.

There is no doubt that the future of our state will and must depend upon the type of education we give to our children and the way in which we bring them up as future citizens of Pakistan. Education does not merely mean academic education. There is immediate and urgent need for giving scientific and technical education to our people in order to build up our future economic life and to see that our people take to science, commerce, trade and particularly well planned industries. We should not forget that we have to compete with the world which is moving very fast in this direction".

(Extracts from National Educational Conference, 1947 proceedings of the Pakistan Educational Conference, Ministry of Education (Interior Division, P. 6).

Activity-II

Draw implications of the Quaid-i-Azam's message for developing secondary school curriculum for Pakistan.

In the following pages we review the development oriented concepts found in different statements, policies on education formulated and announced in Pakistan from time to time.

1.1 The Inaugural Address of Dr. Fazalur Rehman

Dr. Fazalur Rehman, the then Education Minister, addressing the Education Conference, 1947, said:

"Our existing educational system, as originally conceived by Macaulay, was intended to serve a narrow, utilitarian purpose and its growth has been largely a matter of artificial improvisation. It has been rightly condemned for the lack of realism and its inability to adjust itself to the needs of a rapidly changing society, its over-literary bias and its utterly uninspiring, soulless character,... For a succinct but brief summing up of the aims of education in a democratic society, one cannot do better than quote a living authority on education. "Education", he says, "is a vast continent and it will make far clearer thinking if we divide it into three provinces... corresponding to the three main needs of human life. All men need to make a living not a bare one, but the best that conditions allow. All men live in a society, all men have a personality to develop and the power, of living ill or well. For all these education must provide and it must therefore include a vocational element, in social, or as the Greeks would have called it, a political element, and a spiritual element. Men must learn to earn a living, to be good members of a society, to understand the meaning of the phrase "the good life", and education must help them to achieve these three ends. It must do this not for a limited class but for every citizen, though it will do it in different ways for different people.

In mentioning the third element of education, namely, vocational Education, list I should not be understood to minimise its importance; in as much as it must provide for the material existence of society, it must receive first consideration in any plan of educational reconstruction. In the last analysis, however, all the three elements spiritual, social and vocational must cohere and form an integral whole for thus alone can we achieve complete fusion between the spirit and substance of education".

1.2 National Commission on Education 1959

From here we jump over to the observation of the National Commission on Education. We lay stress throughout our report on the concept of education as a public investment in economic development. This argument, we are convinced, is academically sound and we could cite many examples of public figures and economic specialists in North America, Europe, and the Soviet Union who subscribe to this view. The history of the economic development of these countries begins with the education of their citizens, and the remarkable progress they have made in developing their national wealth is largely accounted for by the efforts they have made in educating their citizens at all levels. The advantages of technological progress have been publicly recognized in Pakistan and incorporated in various development plans of previous governments. We are convinced that one of the missing elements which has partially accounted for our failure to accomplish these plans has been the insufficient attention paid to the training of scientific personnel and the large body of technicians and vocationally skilled workers necessary for the practical application of the advanced work of the scientist and engineer. We believe that we shall continue to fall short of our development at all levels. The reading of our chapters on engineering, technical and vocational, commercial and secondary education, will show not only how provision for the training in these fields can be made

but also what are the different categories of personnel needed in our conditions and what are the special qualities that they should possess. We believe that, in particular, there is need for the training of a leadership group in engineering, the skills of government and commercial development. This group should possess imagination high professional ability and a determination to use local resources and not remain dependent on the skills and material imported from outside. We stress throughout our report that one of our greatest national assets is our manpower but that this asset can only become the creator of national wealth when its energies have been released and enriched with the skills and training necessary in a complex modern society.

We have given special emphasis on the need for scientists, engineers, and technicians because we believe that this has been our greatest weakness and the greatest failing of our education system. However, in Pakistan there is, if anything, a more pressing need for the development of agriculture and the utilization of the products of our soil. Our present methods are in the main primitive and have led to more than one food crisis for our people; in addition, they provide little scope for the whole range of industrial use of agricultural products which modern science has made available. (Extracts from the "Report of the Commission National Education" Ministry of Education, January- August, 1959, pp.11-12).

1.3 The New Education Policy 1969

The entire educational structure has to be reorganized and reoriented according to, new demands and requirements. The New Education Policy (1969) rightly pointed out the colossal wastage of national resources in the field of education. Referring to the twin purpose of elimination of unemployment among the educated youth and the redesigning of education, the policy states:

"If this problem is to be tackled, it will be necessary to completely reorganize the educational system at the secondary level. At present, education at this level is designed not so much as a terminal stage but as a preparation for entry to college and later to university. As such, there is preponderance of academic learning and not enough attention is paid to vocational and technical training at this stage. No more than 4% of the total enrolment at the secondary stage is in vocational and technical subjects. This situation must be reversed. A massive shift towards vocationally and technically oriented education is required if the secondary stage of education is to stop wasting resources in producing unemployable manpower which continues to overcrowd the already meagre college and university facilities and swell the ranks of the educated unemployed, while development needs of the technically trained manpower remain unfulfilled."

Elaborating the technical component the policy further states:

"The educational system should aim at providing vocational training to at least 60% of the students leaving the elementary school between the ages of 13 and 15 so that, they can acquire useful skills which would enable them to

earn their living. In rural areas, an attempt should be made to 'make vocational education agriculture-oriented. Commercial subjects, such as book-keeping, legal drafting, typing and shorthand, etc. should also be introduced into the school curricula at this stage. To encourage the shift to vocational and technical education, the system should provide for recognition of accomplishment by introducing the diploma and degrees such as Metric (Tech.), Inter (Teach.), Inter (Tech.) and B. S. (Tech.) in well defined technologies like printing, wood-work, plumbing, tailoring etc. which would add to the dignity of labour. In this way, it is hoped that the educational system will be able to serve better the development needs of the society and, at the same time, lead to a reduction of the problem of educated unemployed.”

1.4 The Education Policy 1972-80

The Education Policy 1972-80 envisaged to make elementary education productive and useful. It clearly states:

“The system of elementary education will be so designed that the knowledge and skills imparted, attitudes implanted, and the learning methods employed will ensure that those not proceeding to secondary education can be usefully absorbed in the economy of the local community.

For those leaving school after class VIII, special courses of training in the skills of their vocational interests will be provided in the schools workshops. It is essential that children who drop out after class VIII should carry with them enough skills to return to their local or ancestral vocation as better farmers or craftsman....”

Regarding the integration of general and technical education, the 1972-80 policy further added:

“The integration of general and technical education will equip secondary and college students for gainful employment, including self- employment, in industry, agriculture, business, home economics and education in addition to providing them a programme of general education. The areas of vocational occupational studies for which facilities will be developed include:

Electronics; auto-electricity population; vegetable farming; sericulture; crop and livestock production; shorthand; typewriting, insurance and estate brooking; clearing, forwarding and shipping practical home management; cooking and baking; first aid and home-nursing; food production and preservation; etc.

Education will be introduced as an elective subject at the matriculation, intermediate and degree levels. In this way, a major part of vocational training of teachers will be conducted in institutions of general education.”

1.5 The National Education Policy, 1978

Watch carefully the renewed emphasis on technical vocational education as displayed in the National Education Policy of 1978:

"In spite of several efforts in the past the technical and vocational education is still not job-oriented. Moreover, there are hardly any arrangements for identifying the needs and providing training to 80% rural population and to make them more productive in order to strengthen this large sector of our economy. In order to improve technical and vocational education, it has been decided to introduce production-oriented curriculum related to the market requirements in all technical and vocational institutes. Advisory committees having representatives of trade and industry will be constituted to keep the training responsive to the changing market requirements.

All the technical and vocational institutions will be encouraged by generating funds for supplementing their resources by producing saleable goods during training. Small production units will be established with technical and vocational institutes under a phased programme. Evening programmes will be introduced in technical and vocational institutes for the benefit of the community, wherever needed. Separate vocational schools for dropouts of the school system will also be established. Equipment needed for various levels of technical and vocational institutes will be standardised. A mechanism for standardizing, testing and certification of technical and vocational skills required through formal, non-formal, or traditional system of training in consultation with trade, industry and other users of the output of these institutions will be introduced.

Practical on-the-job supervised training for Diploma and B. Tech. students will be made compulsory and suitable legislation for providing this training in industrial organizations and undertakings will be enacted. In order to provide close liaison with industry the teachers of polytechnics and technical colleges will be encouraged to provide consultancy and advisory services to the industry. Personnel from industry would also be invited to advise these institutions on production methods. A teacher training college for the training of teachers of technical and vocational institutes will be established at national level."

Activity-III

Analyse the policy declarations regarding work-oriented and development-related education from 1947 onward to the present education policy with a view to pinpoint the cause for repeated statements of the same type.

Also identify the factors responsible for the successive failure of various education policies with special reference to technical and vocational education?

1.6 New Education Policy 1978

The New Education Policy, as referred to above states that it is the declared objective to further consolidate, strengthen and improve the agro-technical programmes started under the 1972-80 policy and to introduce similar programmes of indigenous skill training in the rural areas namely the village workshop schools etc.

1.7 Problem and Issues

There is a variety of reservations that could be expressed about these programmes. Some of them are as follows

- a) The programmes required certain physical facilities, equipment and trained teachers. For providing physical facilities and equipment, finances were not made available as one would expect in a country like Pakistan, the resources of which are limited. Moreover, there has been and still is an acute shortage of trained teachers in technical subjects.
- b) The introduction of skill training as a separate cluster of curricular activities gives the impression that only these activities relate to development whereas the rest of the curriculum does not. This is a serious problem which brings a number of distortion in our educational system.
- c) The technical training programmes were organized in a manner that they were seen as an activity in itself, the final object and outcome of which was success or failure in examinations. No linkage was established between this programme and community requirements which could have inducted the students and teachers into community development programmes. Perhaps this was the greatest weakness of the programme.

As a matter of fact if education is to be something directly relevant and meaningful to the learner and to the community to which, he or she belongs, the entire educational package has to be related to the improvement of the quality of life. In a poor country where there is hunger, poverty and deprivation education has no chances of acceptance, continuance and growth unless it addresses itself to these problems.

The implication of this approach to curriculum issues is that community members and teachers should have the right to frame a curriculum related to local needs as seen and felt by them. In the context of the Pakistani situation however, we are confronted with a dilemma. Whether it is possible to make a choice for a variety of curriculum offerings, in Pakistan curriculum, syllabi, textbooks and standards of education are on the current list of to legislate on the subject of curriculum and syllabi, the federal legislation would take pre-eminence over provincial laws on this respect, in the present situation, the Government of Pakistan has brought out a federal legislation which empowers it to prepare the schemes of studies and prescribe courses of studies and syllabi from class I to XII all over Pakistan. Although schemes of studies and curricula for various levels and subjects are developed with the participation of teachers, parents and various provincial agencies, the net result is that the schemes of studies and the curricula, textbooks, etc. approved and prescribed by the Federal Government, have to be followed by all and no courses of studies can be taught without the consent of the Federal Minister of Education.

One of the major handicaps in the proper implementation of this approach is the attitudes, skills and competencies of teachers who are to be the agents of change. This again is a concern shared by most countries of the region where rural transformation is becoming a high priority.

There have been a series of seminars, workshops and conferences on the education and training of teachers to enable them to fulfil their new role..Some extracts of the reports of these seminars, workshops etc. are included in this unit.

One of the major reforms in the teacher education curricula in Pakistan is the introduction of "Community Development" as a compulsory subject. There are also regular in-service training programmes for agro-technical teachers at various teacher training centres.

It is the intention of this unit to revive and re-vitalize this concept of community development in the curricular offerings of education in Pakistan. This would help to create effective linkages between problems of the community and prospects of the solution on the one hand and the educational programme on the other. The practical exercises that follow will help the learners to have an in-depth experience of this approach, to clarify concepts and to find some practical propositions that would relate education to community development.

2. SELF-ASSESSMENT QUESTIONS-1

1. In order to know a community and its problems it is necessary that basic information about the community in relevant fields is available. You may, therefore, choose a rural community or a poor urban community nearby and design a comprehensive survey of the community. If the survey attempts to identify the major problems confronted and possible solutions through implementation of educational programmes, it should be divided into two parts, namely: (a) problems and (b) potentials. Some of the possible points on which information would appear to be necessary are given below:

a) Problems - Areas

- i. Size of population
- ii. Population structure and growth rate
- iii. Size of family
- iv. Per capita income
- v. Housing
- vi. Sanitation - water
- vii. Food and nutrition
- viii. Education
- ix. Communication - road, railway, air, telephone, telegraph, post
- x. Recreational facilities- games, cinemas, parks etc.
- xi. Any other problems.

b) Potentials

- i. Size of trained manpower: agriculture, industry, health education
 - ii. Raw materials available
 - iii. Avenues of enhancing production
 - iv. Avenues/possibilities of improving facilities of health, nutrition, education, recreation.
2. Select any particular level of education (primary, middle, secondary and higher secondary education) and study its scheme of studies and the goals and aims applicable to that level of education. Then select a subject area, study its curriculum and textbooks and identify how at various levels, practical exercises can be devised which would relate to practical problems confronted by the community.
 3. Prepare a brief report based on findings of surveys and studies involved in exercises 1 and 2. It may be pointed out for your guidance that the report would be by and large cover the following points:
 - a) Rationale of conducting the exercise
 - b) Aims and objectives
 - c) Design of the survey and instruments
 - d) Major findings
 - e) Review of curricula studied
 - f) Methodology followed in selection of appropriate units
 - g) Ways of contact with community members, teachers and students
 - h) Evaluation of the exercise and follow-up programmes
 - i) Synthesis of experiences gained.

3. EDUCATION AND DEVELOPMENT IN ASIAN REGION

In some Asian countries, the dual urban/rural economy often reflects various degrees of modernisation or adherence to traditional ways of living. This dichotomy is a consequence of an imbalance in socio-economic development, suggesting that national policies need clearer definition and continuity and perhaps re-evaluation of priorities. The problem is compounded by the migration of people from rural to the urban areas, aggravating unemployment in the latter.

Demographic factors exacerbate the situation, magnifying the problem of development into crisis proportions. Most of the countries in the area have a runaway population growth and a high dependency ratio. The result of a population structure is that overwhelmingly young, over 50% belong to the group aged 21 years or below, which is concentrated in deprived areas with low productivity. As a further consequence of uneven, slow economic progress, and excessive population growth, there are severe shortages of food, social services, electric power, water supply, and qualified manpower, as well as inadequacies in infrastructure, all of which are essential to national development.

(Reference: Teacher Education and Curriculum for Development. APEID- UNESCO, Regional Office, Bangkok 1975, pp.3-5.)

Educators are confronted with the problems of formulating and implementing educational policies, programmes and practices consistent with developmental goals. Inequalities in educational opportunity, lack of relevance in curricula to functional needs, irrelevance of educational programmes to social as well as individual requirements demand immediate rectification. It is in this context that educators from Asian countries deliberate on how to promote rural transformation, how to improve health and nutrition and how to foster employment skills through education in their respective countries.

The emphasis on rural transformation derives from the fact that the majority of the people in these countries live in rural areas. While producing food for the, urban sector, they are simultaneously exploited by being deprived of the minimum conditions for decent living. The modern buildings and conveniences of the Asian city contrast with the austere conditions of the countryside, despite the natural beauty. The problems of rural development are so diversified and complex that only a multi-faceted attack is likely to help resolve them. Therefore, a coordinated, institutional and concerted approach is more likely to have maximum impact than a fragmented one. Through the schools and other agencies engaged in non-formal training, education can contribute significantly to rural development. In particular, school teachers and community trainers should realise that a large part of the work of promoting social change is the crucial one of educating rural people— children, youth and adults —to identify their most pressing problems and actively participate in resolving them. This cannot be over-emphasized, for ultimately it is the will and motivation of the rural people to help themselves that will stimulate and sustain rural development.

The rationale for considering health and nutrition as urgent areas of concern is self-evident. Only healthy and adequately fed people can provide the manpower base necessary for socio-economic growth. Although there are current projects in many countries designed to improve health and diet, malnutrition contributes to plague the people of the region. Despite recent technological advantages in this field, total food production has consistently been outpaced by a geometric population increase. The limited resources and personnel at each country's disposal should be harnessed towards drawing up a clear and continuous programme to provide people of the region with proper food and the knowledge of proper nutritional habits. With respect to health in many countries in Asia, a large number of sick people die without receiving medical attention. What is needed is a health-care system that is adapted to neglected rural and deprived urban areas. There is urgent need for a core of health and nutrition education at the basic level, linked to national and nutrition education at the basic level, linked to national and local efforts to establish adequate health and nutrition standards.

The conventional conception of employable skills refers to those that prepare the learner directly for employment. It has been proposed that its meaning should be extended to include other simple skills that enhance an individual's capacity to function as a productive member of the community. Acquisition of simple elementary skills which are needed in homes, schools and community, and can be taught by these agencies, will strengthen the individual's capacity to be an active and productive member of his community.

An international workshop made it explicit that the relevance of curricular offerings to individual, community and societal needs becomes a major consideration for assessing their worth. The participants expressed the view that the task of curriculum development in the area of rural transformation, health and nutrition, and employable skills entailed the collective and continuing effort of teachers, educators, specialists and representatives of the community. Questions of relevant content and sound pedagogical strategy must be decided before suitable curricular programmes can be formulated. The important point is that the purpose of curriculum development should be kept in mind: meeting the needs of learners: and national development. This apparent duality of objectives should not be misinterpreted they are mutually reinforcing because an individual who learns something valuable and useful for himself is at the same time a useful member of the community.

In the matter of teacher education, the workshop stressed the need for changes in teacher education programmes to reflect the emerging trends in teacher training curricula. The workshop also emphasized that even if teacher education programmes are modified to prepare teachers for greater involvement in national development, it is equally necessary to restructure curricula in the schools for the same purpose.

4. ANALYSIS AND COMPARATIVE STUDY OF CURRENT PROJECTS AND PLANS

A major shift in school curriculum is under-way in many countries of the region in response to the need to accelerate the pace of development through education, and also to make education more relevant to the learners and the society.

In the Republic of Korea and India, a multi-media approach is being developed for selected curriculum units related to national development. In order that the school curriculum can become more relevant to social and development needs, flexibility in curriculum development is being introduced. In the Republic of Korea, a modular approach has been suggested; and in India curriculum cells are being setup both at the centre and in the various states of the country so as to allow for continuous renovation of curricula. An experiment is under-way with multi-media instructional materials and particularly with satellite instructional television for the rural areas and backward sections of the community.

Sri Lanka, which had a highly academic-oriented curriculum, has brought about major changes and evolved curricula for the primary and lower secondary stages which are oriented towards national development. All pupils, from grades 1-IX age 6-14, will follow a common curriculum designed to provide broad general education which also includes the development of employable skills amongst the students so that they may serve the community in a much better way. The main aim of the new curriculum is to reduce the gap between education and the employment opportunities (including self-employment) available in the community. Pakistan and Indonesia have similar drives.

Already, major programmes have been developed in some countries of the region in an attempt to contribute to rural transformation by utilizing the resources in the community and

the school, with the teacher playing a key role in 'developing knowledge, skills and attitudes to help the community to overcome difficulties, and carry forward the task of development.

In Bangladesh, the Camellia Project has pursued a functional, action-oriented approach in mobilizing rural people. It develops and supports local institutions in order to involve local leaders and their constituents. Curricula for teachers are the outcome of action research in the villages and are based on the felt needs of the village. The farmer-members involvement and participation, accentuated through local rural leadership, gives it the potential for acceptance, service and survival.

In Morong, a lakeside town in the Philippines, development activities such as small-scale industries profitably engaged in by the people and the school children, the operation of a summer folk school to train out-of-school youth and adults in various useful trades, demonstrate the dynamic and mutually beneficial relationship between the school and the community.

In Nepal, the compulsory introduction of one year of National Development Service for all graduate students of the Tribhuvan University and all Nepalese who earn a Master's degree from any foreign university, is intended to give impetus to rural development as well as make the graduate students reality-oriented.

In Sri Lanka, the education component of employable skills is concerned with knowledge and skills-for productive activity. Since a forward thrust in agriculture is one of the main strategies that must be adopted for rural transformation, the identification of knowledge and skills needed by farmers and the generation of learning experiences to meet these knowledge and skill requirements must take priority in occupational skills education.

In Indonesia, various programmes have been launched in an effort to improve the living conditions of the people in the rural areas. These programmes focus on agriculture, health, nutrition and sanitation, as well as education. Most of these programmes are nationally financed and conducted.

In addition, the Indonesian Government, as a matter of principle, has encouraged local initiative to create projects for rural transformation: a certain amount of subsidy (approximately US\$ 500 in 1975) is given to each village every year, to support local initiatives for improving irrigation, sanitation and communication.

In some countries, work has been done in developing curricular units in health and nutrition. The attempts have largely been to develop a coordination of education with various other agencies concerned with health and nutrition, and to utilize the community workers and teachers through a training system in providing the knowledge and habits required for better health and nutrition.

In the Philippines, the Philippine Nutrition Programme which has established its priority project of *Operation Timbag* (Operation Weight) makes the teacher-coordinator play an important role as a community worker working hand-in-hand with the Barangay (village) network. Through this network, the teacher-coordinator is able to grasp the actual health/nutrition needs of the families in the community.

In Singapore, the thrust is one of a multi-media approach conducted jointly by the Ministries of Health, Education and Culture. Action-campaigns involving all three ministries are frequently mounted.

This is an area where many countries have broken away from the traditional concept of general education in schools and are moving towards functional basic education. Many school curricula have been changed in some countries to include units on specific skills which may be used later on by the pupils for either self-employment or employment in agriculture and industry. The approach taken is that of development of modular units and, in some cases, of multi-media training packages.

The new directions of educational development are directly linked to functional education programmes at the next level of education.

Activity-IV

Indicate the development-oriented innovation that impressed you the most from amongst the ones mentioned above. Give reasons for your choice.

5. EDUCATION AND PRODUCTIVE SKILL DEVELOPMENT IN ASIAN REGION

Concept and objectives of skill education.

As interpreted by the participants of a meeting convened under APEID, the term 'concept' used in the synthesis embraces three important elements, namely:

- i. how skill development is defined
- ii. on what basis it should be developed
- iii. on what principles the design should be based.

The objectives refer to a certain type and level of competence the learner is expected to achieve.

Concept of skill development

It is generally agreed that education in school and out-of-school cannot be purposeful, meaningful, productive, if it does not have close linkages with national developmental programmes. In this regard, educational programme for skill development in both formal and non-formal settings should be organized to support the achievement of the above objectives.

The following generalization shows some common elements of the concept of skill education by the participating countries

- i. Skill education as part of the general education programme is not meant to be a purely manual work. They should inculcate positive attitudes towards the world of work and dignity of labour.
- ii. Skill education programme should be related to other subject areas.
- iii. Skill education programmes should be based on the basic needs and problems of

individuals and society.

(It is prudent to design these programmes in consultation with community members.)

Objectives

The analysis of the objectives developed by the various countries indicates that most countries share common objectives while there are objectives specific to particular countries. They are as follows:

Common Objectives

- a) To acquaint learners with the world of work. This objective is important in the sense that it is meant to develop in the learners knowledge about varieties and characteristics of occupational areas in the society.

Knowledge on these various occupational areas shall place the learners in a better position to identify the kind of work which they would like to participate in upon completion of their education.

This objective could be categorized under the cognitive domain of the taxonomy of educational objectives.

- b) To provide learners with productive skills relevant to the needs of individuals and society.

This objective means- that skill education should provide opportunities for the learners to actually practice and perform the skilled learned in schools as well as in other forms of educational organization.

This objective could be categorized under psycho-motor domain in the taxonomy of educational objectives.

- c) To develop desire to be useful members of the society.

This objective implies that mastering skills relevant to the needs of the society as such is not enough without the desire/willingness of the individuals to really participate in the development of the society as useful members. To develop this desire within the individuals, the programmes should be structured to motivate the learners to develop their interest in practicing the skills for the welfare of the society.

- d) To inculcate positive attitudes and motivation toward the world of work, self-reliance, tolerance, cooperation, sympathy, and helpfulness.

This objectives also falls under the affective domain of educational objectives which constitute major components of the goals of skill development.

The nature of this objective strengthens the idea of making full education more educative, socially useful and productive.

Objectives Specific to Particular Countries

- a) Lead learners to increasingly participate in productive work as they proceed from one stage of education to another.

The idea implied in this objective is that, skill education should be imparted in sequential order to enable the learners to grasp, reproduce, and immediately apply the skills they have learned in real life situation. In this way learners may earn while they learn.

- b) Prepare learners for farther studies in technical and vocational education.
This is one of the objectives advocated by some countries of skill development as part of general education, particularly in the lower secondary school level.
The objective is especially useful for learners who are going to continue their studies in vocational and technical, schools instead of in academic schools.

5.1 Issues and Problems

Issues

- a) There are two schools of thought concerning the development of productive skills. One is for the purpose of immediate use, i.e. to enable the learner to employ his skills for everyday living and to enable him to participate in useful socialite activities. Another school of thought is to prepare the learners for further learning in vocational and technical institutions as well as for entering vocation after leaving the school. Those who advocate the first viewpoint regard the immediate use of skills developed as well as the service to the community as important. They believe that at this stage of education (general education level) specialization in a certain vocation should not be emphasized. It is only the basic skills that would be needed, and what is more important is the development of desirable attitudes towards work and good working habits which could be used in the present as well as future life of the learners.
The second school of thought, however, advocates that for most developing countries most student will leave the general schools either for further studies or for work. Under this condition it would be advisable that the education programmes for skill development be directed towards the students' needs. This does not mean that the skills learned cannot be of immediate use. With intensive training the learners should be in a position to do even better in providing service to the community. Participants of the meeting were of the opinion that each viewpoint has its own merit and there should be more research studies on the strengths and weaknesses of both practices.
- b) One view regards formal school as merely a learning agency, whereas the other regards formal school as a place for earning while learning under certain specific situations.
There is a general understanding that formal schools which are run by the government and other organisations are meant for bringing behavioural changes among learners.
However, certain schools which have well established small farms, workshops, etc. provide skill education to the learners and try to produce goods or services which are saleable. The goods so produced are sold among students, teaching community or in the neighbourhood. Money so received is paid for the inputs and major portion is

used for developmental activities and a very small portion is distributed among students as an incentive. In this way, needy students are helped by the institution and the activity itself would motivate them to participate more and more during leisure hours in order to earn more to help themselves and their families.

The above two practices as viewed by the participants are not in conflict with each other. If conditions permit, the second practice could be adopted to facilitate learning of the students. What one should be aware of is that the school should not be used as a place for profit making or for exploiting the students.

5.2 Problems and Suggested Solution

Although almost all developing countries agree that the training and socially useful productive work should be imparted to learners at all levels of education to prepare them for the world of work, in practice it is not fully recognized that skill education is to develop in the learners a positive attitude towards need-based activities in the community. Hence, it is felt that in most developing countries skill education has low priority.

It is realized that without sufficient social, administrative and financial support, it would be impossible to implement skill education properly. For this reason, two basic strategies need to be employed:

- a) To conduct research and development activities to develop models of efficient and effective skill education programmes as an integral part of general education, and
- b) To alert the government through inter-agency activities about the importance of skill education as a part of general education.

5.3 Approaches to Skill Education

All over the world both formal and non-formal approaches are being used. Formal approach, in this context, refers to an approach regular school system such as primary school, secondary school, vocational school, etc. Non-formal approach means an approach in implementing skill education for those who are not in regular school system.

i. Formal Approach

Each country has its own programmes of skills education which are being implemented through formal approach. This type of approach has a unique characteristic for each country depending on its condition and situation.

a) Programme

Although each country has its own specific social needs, it appears that home economics, agriculture, wood and metal work, technical skills, arts and crafts and services are the common programmes. However, instructional materials may vary, depending upon the specific needs of each country.

b) Nature of the Programme

Generally, skill education does not aim at developing manual skills only, but also at other forms of development, relating to cognitive and affective domains. The stress is, of course, given to skill development. In developing the skills some countries aim at direct production, but some train only in the basic skills.

c) Target Group

Countries, such as Indonesia and India, offer productive skills programmes in all grades. Other countries, such as Afghanistan offer these programmes only in grades 7 and 8, and Malaysia starts at the lower secondary level. Some aspects of home-economics such as cooking and dress making, for some are intended for girls, in some other countries are meant for both boys and girls.

d) Time

Although the time allocation for productive skill varies from country to country and from grade to grade, the range generally is from 2 to 8 periods a week.

e) Administration of the Programme

Every country which provides skill education for all children offers both compulsory and elective subjects in general and vocational schools.

Analysis of the approaches being used in the Asian region.

First Approach

Providing education in skills as a required subject for all students at the first level; and as required and elective at the second level of education.

Examples

India provides skill education related to food, shelter, clothing, health, culture, recreation, community work and social service. At the secondary level, the programme is similar, but greater emphasis is placed on practice. In Sri Lanka, children are taught simple manual skills such as floor cleaning, dish-washing, growing flowers and vegetables, and some other handicraft work at the primary stage. Secondary schools have elective courses in a number of practical subjects such as woodwork, metal work, electric wiring and mat Weaving. In the initial grades of secondary schools, pro-vocational studies programmes provide an opportunity for students to survey the jobs in the community and to practise skills using community facilities as training bases.

Second Approach

Second approach is similar to the first but differs in objectives of training. Programmes in the Socialist Republic of Viet Nam and Bangladesh and some in the Philippines and Thailand, can be cited as examples of this approach. In the Socialist Republic of Viet Nam, the young generation is trained to be new-type workers and masters of society. Training in manual work is designed to contribute to the cultural and economic development of the locality where the school is situated. Two types of courses are offered: compulsory courses on techniques and management of economy, and optional or elective courses which answer to the needs and conditions of individual schools. The activities are divided, by objectives, into four categories:

- i. meeting the needs of the school through productive work;
- ii. solving community development problems through productive work;

- iii. engaging in work of public utility;
- iv. using production based training in productive skills.

More complex work-skills are attempted at the second than at the first level of education.

In Bangladesh, work experience is provided at the primary level. Under the guidance of their teachers, the students organize their own cooperative societies and raise funds for some income-earning activities within the school system. These include: gardening, poultry-raising, book-binding, group farming and making simple furniture. At the secondary level, diversified courses are offered for imparting vocational training in such areas as agriculture, industrial fields, commerce, home-economics.

In the Philippines, the Bayanihan School Programme with its self-sustained school system (SSSS) and vocational development programme at Quinlogon Village, Palawan Island, provide skills training by integrating academic subjects with practical work and by organizing programmes for students to earn while they learn. Rice fields, vegetable plantations, rice mills, carpentry shops and cooperative stores are used as work-study bases.

In Thailand, several projects using work experience for developing skills are being conducted in many schools in the north east. These project cover chicken raising, food preservation, building-repair, mat weaving, growing peppers, growing mushrooms, pottery-making and handicraft.

Third Approach

Under this approach are offered three types of programmes, namely, core programmes, elective programmes and terminal programmes. This is practised in Indonesia, the aims being to develop attitude and general capabilities of the students to cope with practical problems and to equip them with functional skills required by the world of work. The agro programmes are taken by all students at all grade levels. The elective programmes are given to students in grades X and XI, whereas the terminal programmes are intended for students who do not plan to pursue further studies at a higher level.

Fourth Approach

This approach deals with providing skills training for developing personality and character as well as for preparing students for higher technical studies and for employment. This approach is used in Malaysia where skill education can be categorized into levels and areas as follows:

- a) Pre-vocational studies at lower secondary school level, the objective of which is to expose students to the skills they will need in their everyday life, and to create in them positive attitude towards, and interest in technical and vocational studies,
- b) Technical studies in upper secondary technical schools, wherein students study one or two technical subject from several offerings in the areas of engineering, agriculture and commerce. The objective is to prepare students for higher technical studies.
- c) Vocational studies in upper secondary vocational schools, which prepare students for engineering trades or agriculture, commerce or home science. The objective, here, is to equip learners with employable skills.

ii. Non-formal Approach

a) Programme of Study

Countries report that non-formal education is developed on the basis of the needs of the society. Since each country has its own way of life according to its own tradition and culture, the contents of the programmes cannot be the same for all countries. The areas of study organized for non-formal system are almost the same as those of the formal system. The difference is in the selection of specific aspects from the area of study to cover the specific needs of the society. For example, Afghanistan has developed programmes on agriculture (bee breeding, silkworm cultivation) and art and craft (ceramics, carpet and rug production); Sri Lanka has developed programmes on technical skills (electric wiring, musical instruments), art and craft (book-binding, printing and wood carving); India has developed programmes on agriculture, home-economics, metal and wood work, technical skills, and Indonesia has developed programmes on home economics, agriculture, wood and metal work, technical skills, and art and craft.

b) Nature of Study

Non-formal approach in skill education as mentioned above is directed to the people outside the regular school system. The emphasis would be on the training of productive skills, but the type of specific skills needed by each participating country are not the same. For some countries such as India, Viet Nam and Indonesia, there is a tendency to put emphasis on agriculture in line with the economic structure of the country.

c) Target Group

Unlike the formal education system where the target group consists of students of the same age and educational background, the participants in the non-formal productive skill training, consist of mostly those who are not in school. Therefore, they vary in age, educational background and possibly in socio-economic status. However, some countries organize their educational background. India classifies its programme into four categories, i.e. programme for illiterates, for primary level, for secondary level and for senior secondary level.

Activity-V

Develop two designs of skill education; one for the formal education programme, the other for the non-formal education programme for your own district.

6. EDUCATION AND RURAL DEVELOPMENT

Most Asian countries have a large concentration of rural population. While urbanization is increasing at an accelerating rate, the rural population remains numerically dominant and is expected to remain so even for the next few decades. Considering these realities, many countries in the Asian region, in their strategy to attain national development goals, are concentrating more and more on their efforts on development in rural areas. *By the way, what is your personal observation?*

It is widely accepted now that the concept of rural development and the role of education as a component of rural development were not given serious attention during the early post-war period in the world in general and in the Asian region in particular.

Rural development is now being interpreted as a strategy designed to improve the economic and social life of the rural poor. It involves extending the benefits of development to those who seek a livelihood in rural areas. The 'economic' dimension of rural development envisages economic uplift: the reduction of poverty so that rural poor get adequate food, clothing and shelter. The social dimension underlines the provision of health and educational services. It also aims at the development of the individual and rural society in a socio-psychological context. Educational and political considerations are two additional elements. In the former, facilities for Education and political considerations are two additional elements. In the former, facilities for education are provided for the educational growth of the rural people. In the latter, the political dimension of rural development will enable the rural poor to participate intelligently and freely on the basis of their own aspirations, indigenous culture and creativity in the political life of the community and in the programmes designed to shape their community, thereby contributing their share to the overall programme of national development.

Since rural development is intended to reduce poverty, programmes have been designed to increase production and to raise productivity. As agriculture is the main occupation in rural areas, it has received priority in such programmes. In view of increasing population and the limited production of edibles etc, through cultivable land, the main effort is to raise the productivity of land through the adoption of a variety of measures such as improved seeds, fertilizers, pesticides and methods of farming. Thus the improvement of agriculture and the provision of relevant services in that area form the first and most important elements in rural development.

(Reference: “*Preparing Teachers for Education in Rural Development*”, a handbook, APEID, UNESCO, Regional Office, Bangkok, 1977, pp.3-8)

Small-scale industries; particularly agro-based industries, are the focus of the second significant element. Farm mechanization, rural electrification and improved transport facilities have created opportunities for employment in such occupations.

Another important programme is the provision of efficient health services. Poverty leads to malnutrition and ill health. Ill health, in turn, results in a low production capacity.

Increased production does not, however, guarantee fair distribution. The forces working in a rural community are such that the advantages of the programme or rural development may not reach the rural poor for whom the programme is mainly intended. Agricultural production may increase, and still the rural poor may not get the food; health service may be provided, and still the poor may not benefit; educational facilities may be established, and yet the poor may not be able to send their children to these schools. In order that this does not continue, there is a growing recognition in Asian countries that sustained rural development is not merely enhancement in production, but a fundamental change in values, objectives and the very philosophy of development. This awareness has led to a growing emphasis on the human factor in development. New strategies of development, therefore, seek to develop human being in the collective sense, so as to re-ordinate them, make them self-reliant and able to participate in the political processes of the nation. All the elements of rural development imply extension of education and its transformation so that it serves as an important component of the aforesaid programmes.

To sum up, the innovative programmes of rural development in Asia attend to economic development in the social and cultural context— that is, including both economic and socio-psychological elements, which interact organically with each other. Thus development is conceived as a multivariate, qualitative and quantitative change which results in the growth of the individual, in a collective spirit among people, in creativity, in inventiveness, in the proliferation of a problem-solving approach to life, and ultimately in faith in the collective potential of the people, to state the problem in this manner is to specify, in some detail, the goals to which educational policies, programmes and activities are to be directed.

6.1 Education in and for Rural Development

It is desirable to distinguish between two sets of educational activities, differentiated by their main objectives and target groups, and categorized those as 'education in rural development' and 'education for rural development'.

i. Education in Rural Development

The focus of activities is on the curriculum of a school as a social agency for imparting knowledge, skills and verities through in-school and out-of-school activities and experiences. In most countries, curricula are changed to incorporate such elements in the educational programme.

Two approaches are being followed in relating school curriculum to education in rural development:

- a) the elements of rural development are neatly and thoroughly integrated into the school curriculum in such a way that education in rural development becomes the school curriculum;
- b) the usual academic curriculum is retained and activities related to rural development are assigned to extra-curricular affairs.

Rural development activities in the countries of the region are being entwined in the curricular, co-curricular and extra-curricular activities.

An examination of official documents of the countries in Asia reveals that the elements of rural development are sought through health and nutrition, education and employable skill programmes in the school curricula. Included also in their curricula are such topics as study of crops, replenishing forests, control of insect pests, creative work (Bangladesh), work experience -- vocationalization and social reconstruction (India), the developing applied skills, fisheries, farming, livestock raising (Indonesia), industrial area, agriculture science (Malaysia), compulsory pre-vocational and vocational- subjects (Nepal and Republic of Korea), participation in community projects, soil and water conservation, health, nutrition, food production, afforestation, population control (Philippines), developing skills relevant to productive opportunities in the rural sector, participation in the solution of rural problems, changing attitudes towards manual work, collective level, viewing change as necessary for the regeneration of rural society, and identification of the pressing problems of rural society (Sri Lanka).

Teachers working in rural schools are often ill-equipped for the tasks they are expected to carry out. One of the reasons for this is the uninterrupted migration of better qualified teachers to urban areas; another is the continued isolation of rural teachers from the cultural interaction characteristics of the urban environment. Considering these realities, attempts are being made by most countries in the region, through training programmes to keep the village teachers abreast of the latest innovations in education as well as in rural technology and to help build their professional consciousness in support of rural development.

Programmes have been devised in some countries to revitalize their village schools through contact with agriculture, health and cooperative-movement workers who are raising the quality and relevancy of the school curriculum through talks and exhibition. For the teachers such contacts have become an opportunity for in-service growth.

Apart from these contacts, the printed materials, which the community workers have been using, are found to be of great educational value for both in-and out-of-school programmes. Moreover, the community resources which can be identified through the involvement of the school in the community development programmes and in the revised curricula of such schools are being harnessed for the school programmes of work experience, development of employable skills and health/nutrition.

In some countries time use of mass media -- radio, television, newspapers -- as an instructional means of education has also been exploited for education in rural development. Satellite instructional television programmes to provide education and training in agricultural education, population education and science education are also being used in some countries.

Programmes for preparing teachers for education in rural areas can capitalize on such experiences.

ii. Education for Rural Development

The focus of the activities is on the development of rural communities. According to traditional concepts, education had little or no role in such programmes. It is now

recognized that education can be simply restricted to schooling or viewed as a time-bound process, but instead must be equated broadly with learning regardless of where, how and when that takes place. Under this new concept, education has been categorized as informal, formal and non-formal education. Whereas the process of informal education is relatively unorganized and unsystematic, the latter two categories of education, i.e. formal and non-formal education, are relatively organized activities. Education for rural development, i.e. education linked with programmes of rural development, is provided mainly through informal and non-formal modes, even though linkages are established with the formal education system.

In such programmes, there are four categories of people engaged in education in rural areas. They are:

- a) people involved in various agricultural and extension service type of activities, such as agricultural-extension workers, health-education service workers, cooperative-society organizers, family-planning workers,
- b) those including farmers and skilled craftsmen, concerned particularly with the education and training of out-of-school youth,
- c) workers engaged in all levels of adult education and community development including religious leaders,
- d) personnel working in the formal schools.

All categories of education and all kinds of educators have important contributions to make in rural development programmes and are, therefore, taken into account in evaluating and promoting education for rural development.

Self-management of the programmes of cooperation among different communities in exchanging experiences are two prominent approaches followed in some of the recent plans for rural development. Self-management involves communities participating, alongwith development agencies and such institutions as those for health, agriculture and industry, in planning and conducting surveys to identify the community needs and the resources, including human resources, available in those communities or in the developmental programmes for the communities. Such collaboration on the part of communities is one way to make them acutely conscious of their problems and of their power over processes for solving them, in addition to inculcating in them the skills equired in undertaking such surveys. The development of the programmes, likewise, helps them in learning new skills in cultivating an awareness of the need for acquiring other types of skills in order to tackle their problems. The implementation and evaluation of such programmes by the community provides them with ample practice in the use of skills and in further strengthening their competencies and enhancing their self-reliance.

In several countries, programmes for rural development also provide for cooperation among communities in order to exchange experiences and for the key personnel of less-successful communities to study and discuss the experiences of more-successful communities. In some of the recent programmes, facilities for mutual training are also

provided so that the quality and effectiveness of community action are improved. The strategies of this type also enable the communities and the personnel involved in the programmes of several development agencies to develop better understanding of each other. Also, this helps the communities in their utilizing the services of the development agencies established for them and in directing them so that their activities are utilized in accordance with the priorities and norms established by the communities.

Community leaders, the personnel of the development agencies and the policy makers, which have operated in a hierarchical set-up in the past (with the policy-makers at the top, the personnel of the development agencies at the intermediate level, and the communities at the bottom, as the recipients of advice and aid, and sub-servient to the dictates of the higher level), do not find it easy to perform new roles that the democratization of the community development processes demand. The success of such programmes is, therefore, hampered, unless efforts are made by the various cooperating groups to achieve better understanding of their new roles and relationships. The opportunities to reflect on the experiences and to develop the skills for performing the new roles are therefore now being increasingly provided.

The rural institutions, apart from their responsibility for educating children in rural development, are also directly involved in programmes for rural development. The question which is now being asked to several countries is whether the pre-service and in-service training programmes for teachers of such schools take into account the new roles that the teachers have to perform as members of inter-agency teams in collaboration with the communities. There are several approaches which have recently been either designed or used in order to improve the situation.

7. SELF-ASSESSMENT QUESTIONS

1. Write brief notes on the following seem-economic changes faced by the developing countries:
 - a) philosophy of consumerism
 - b) integrated rural development
 - c) unplanned urbanization
 - d) life-long education.
2. Briefly describe the major problems faced by rural areas and suggest their solutions in the context of Pakistan.
3. What are the essential elements to be covered in a realistic programme of rural development.
4. Compare the formal and non-formal approaches to skill education and find out their feasibility for adoption in Pakistan.

5. Write a brief note on each of the following programmes of productive skills prevalent in the Asian region:
 - a) School Cooperative Societies in Bangladesh
 - b) Manual work in Viet Nam
 - c) SSSS (Self-Sustained School System) of Philippines
 - d) Skill training programmes of Malaysia.
6. What is the difference between education, in, and for, rural development?
7. What communication skills are essential for teachers engaged in a programme of education for rural development? Explain with examples.
8. What are the essential aspects of the programme prepared by APEID to integrate education and work in the countries of the Asian region?
9. Tick True/False against the statements given below:

a) The Quaid-i-Azam's message to the First Education Conference, 1947 provides guidelines for us for preparing educational policies.	T/F
b) The 1972-80 policy is quite silent about skill education.	T/F
c) The vocational education can prove to be useful even if it is not need-based.	T/F
d) The Camellia Project (Bangladesh) has pursued a functional, action oriented approach in mobilizing rural people.	T/F
e) There are two types of approaches to skill education: informal and non-formal.	T/F

7.1 Answers to self-assessment Questions

For answers to questions 1 to 8, consult relevant portions of the unit.

Question No. 9:

- | | |
|------|------|
| a) T | b) F |
| c) F | d) T |
| e) F | |

4.0 Instructional Strategies

Traditional Teaching Learning

In traditional classrooms teachers "transmit" textbook facts to students who are expected to memorize these facts for examinations. The methods of lecture and recitation (teacher asks questions and student answers) are good ways of teaching the large number of students in their classrooms and preparing students to do well in examinations that check textbook contents. While it is important that teachers ensure students do well in examinations, it is also necessary that the education provided prepares students for life in a modern society, enhances students' chances of receiving higher education and employability and develop their social consciousness so that they become agents of positive social change.

There are many reasons for using instructional strategies other than lecture and recitation.

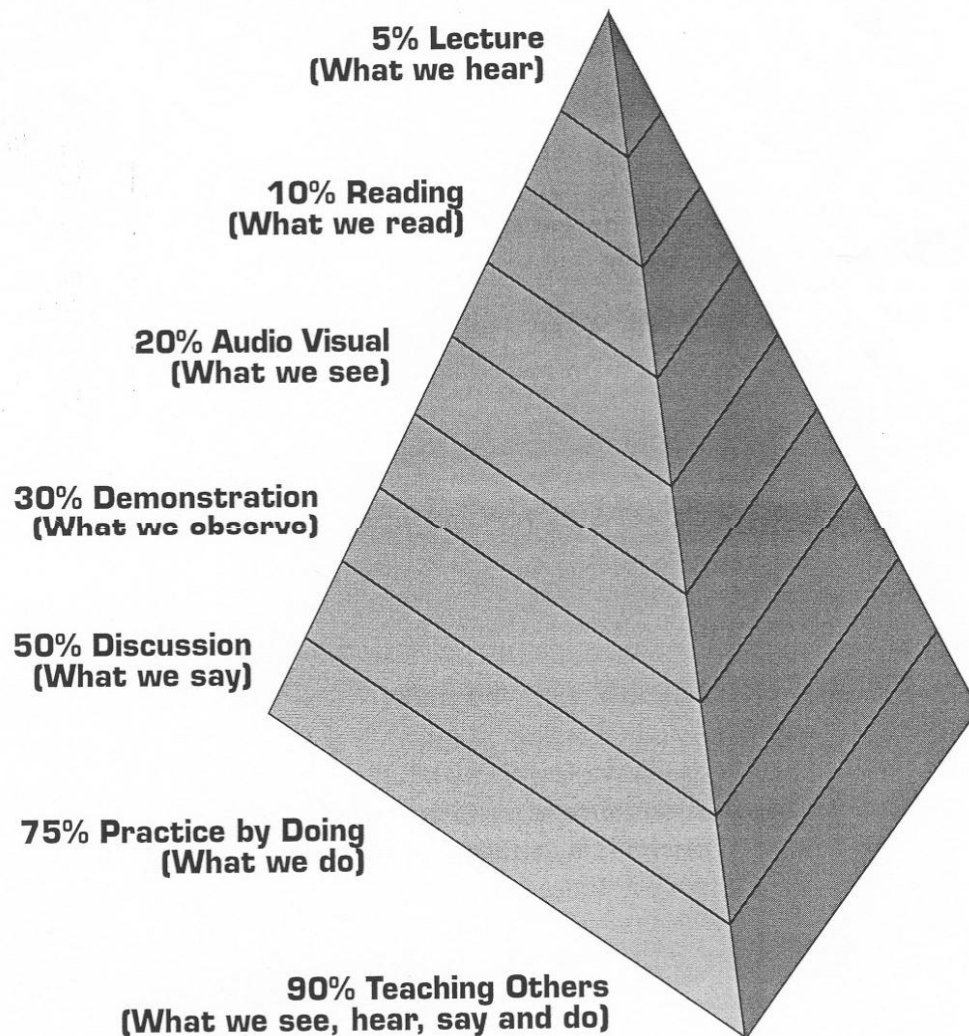
First, research shows that students learn very little (5%) when taught through the lecture method. However, as their active intellectual engagement in the learning process increases they retain more of their learning.

Second, living in the information age where knowledge is growing exponentially and facts are available at the click of a button students need to learn "how to learn".

Third, many instructional strategies, besides facilitating students' academic learning, also help in development of a number of skills and values and promote their psychological health preparing them for the various roles they will play in today's society, and

Finally in any class of students there will be a range of interests, abilities and learning styles. Varying the teaching strategies will address these differences allowing all children to learn.

Outcomes for traditional Learning Methodology vs. Outcomes for Actives / Experiential Learning Methodology



The Learning Pyramid

Annexure-II

CHAPTER WISE TIME ALLOCATION:

Chapter	Number of Periods	
	Teaching + Activities	Assessment
Chapter 1: Introduction to Biology	11	02
Chapter 2: Solving a Biological Problem	04	02
Chapter 3: Biodiversity	12	02
SECTION 1: STUDY OF LIFE & BIODIVERSITY		
Chapter 4: Cells and Tissues	29	04
Chapter 5: Cell Cycle	15	02
Chapter 6: Enzymes	11	02
Chapter 7: Bioenergetics	20	02
SECTION 2: CELL BIOLOGY		
Chapter 8: Nutrition	21	03
Chapter 9: Transport	36	04
Chapter 10: Gaseous Exchange	17	02
Chapter 11: Homeostasis	14	02
Chapter 12: Coordination	25	03
Chapter 13: Support and Movement	13	02
SECTION 3: LIFE PROCESS		
Chapter 14: Reproduction	28	03
Chapter 15: Inheritance	18	03
SECTION 4: COMMUNITY IN LIFE		
Chapter 16: Man and His Environment	18	02
SECTION 5: ECOLOGY		
Chapter 17: Biotechnology	14	02
Chapter 18: Pharmacology	10	02
SECTION 6: APPLICATION OF BIOLOGY		
Grand Total	316	44

Total Time Allocation for Biology IX-X = 360 Periods

Chapter 8:

Assessment and Evaluation

Being an integral part of the learning process, assessment and evaluation devices are an important chapter of the curriculum document. Assessment devices enable teachers not only to verify students' learning but also to diagnose the shortcomings in the learning process.

Continuous Assessment Devices

The continuous assessment should be a part of the classroom learning. Following may be the devices on which the said objectives can be achieved.

- **Lab completion**
- **Identification**
- **Objective enhancement-worksheets, quizzes, and tests**
- **Diagram completion**
- **Observation**
- **Review questions**
- **Classroom discussions**

The continuous assessment should be cumulative and comprehensive and cover all objectives as per the curriculum. Grading of students should be done through the use of assessment instruments that cover the expectations as defined by the objectives of the curriculum.

Evaluation Strategy

An external examination is recommended at the end of the course. This evaluation should measure all the domains of learning and through it the attainment of the objectives can be measured. The weightage of the different domains of learning is given below;

<u>Learning Domains for Measurement</u>	<u>Weightage In Evaluation</u>
• Knowledge, Comprehension, Analysis, Evaluation, Synthesis, Application:	85%
• Skills of Communication, Initiating and Planning, Designing Experiments and Interpreting Data:	05%
• Sensorimotor Skills (Performing Lab Work):	10%

For the final evaluation of the learning outcomes, following weightage is recommended for the contents of 6 sections:

Section	Weightage in Evaluation
• Section 1: Study of Life & Biodiversity (Chapter 1 - 3)	09%
• Section 2: Cell Biology (Chapters 4 - 7)	23%
• Section 3: Life Processes (Chapters 8 - 13)	40%
• Section 4: Continuity in Life (Chapter 14 & 15)	14%
• Section 5: Ecology (Chapter 16)	06%
• <u>Section 6: Application of Biology (Chapter 17 & 18)</u>	<u>08%</u>
Total	100

Suggestions for structuring Assessment and Evaluation Tools:

More Emphasis should be on;

- Assessing what is most highly valued
- Assessing rich, well-structured knowledge
- Assessing scientific understanding and reasoning
- Assessing to learn what students do understand
- Assessing achievement and opportunity to learn
- Students engaged in ongoing assessment of their work and that of others
- Teachers involved in the development of external assessments

Less Emphasis should be on;

- Assessing what is easily measured
- Assessing discrete knowledge
- Assessing scientific knowledge
- Assessing to learn what students do not know
- Assessing only achievement
- End of term assessments by teachers
- Development of external assessments by experts alone
- Assessment pattern is subject to the requirement, policies, and procedures of the Examination Boards.
- Question paper will be based on the curriculum not on a particular textbook.
- Questions involving unfamiliar contexts or daily-life experiences may be set to assess candidates' problem-solving and higher-order processing skills. In answering such questions, sufficient information will be given for candidates to understand the situation or context. Candidates are expected to apply their knowledge and skills included in the syllabus to solve the problems.
- In general, SI units and terminology will be used.

SCHEME OF STUDIES FOR SSC (CLASSES IX—X)

COMPULSORY SUBJECTS FOR ALL STUDENTS (500 marks)

1.	English (Compulsory)	2 papers	150 marks
2.	Urdu (Compulsory)	2 papers	150 marks
3.	Islamic Education/Ethics (for Non-Muslims)	2 paper	100 marks
4.	Pakistan Studies	2 paper	100 marks

OPTIONAL GROUPS (600 marks)

The students will choose one of the following (A), (B) and (C) Groups carrying 600 marks:

- a) Science Group:**
Physics, Chemistry, Mathematics, Biology/Computer Science/Technical Subject
- b) Humanities Group:**
General Science, General Mathematics, Two Social Science Subjects/One Social Science Subject and One Technical Subject
- c) Technical Group:**
General Science, General Mathematics, Two Technical Subjects

LIST OF SOCIAL SCIENCE SUBJECTS

1.	Computer Science	9.	Elements of Home Economics
2.	Islamic Studies	10.	Food and Nutrition
3.	Islamic History	11.	English Literature
4.	Economics	12.	Arabic
5.	Education	13.	Art and Model Drawing
6.	Civics	14.	Geography
7.	Clothing & Textile	15.	Commercial Geography
8.	Health & Physical Education		

LIST OF TECHNICAL SUBJECTS

1.	Electrical Wiring	5.	Computer Hardware(Orientation)
2.	Wood Working & Furniture Making	6.	Food Processing and Preservation
3.	Welding (ARC & GAS)	7.	Motor Winding
4.	Dress Making & Fashion Designing		

Note: The question paper will comprise three sections:

- Section-A 20% MCQs. It will be compulsory and collected after prescribed time.
- Section-B 50% short answers questions.
- Section-C 30% long/essay type questions.

SCHEME OF STUDIES FOR HSSC (CLASSES XI–XII)

COMPULSORY FOR ALL (500 marks)

1.	English (Compulsory)/ English (Advance)	2 papers	200 marks
2.	Urdu (Compulsory)/ Urdu Salees In lieu of Urdu (Compulsory)/ Pakistan Culture for Foreign Students Part – I and Pakistan Culture Paper-II	2 papers	200 marks
3.	Islamic Education/Civics (for Non-Muslims)	1 paper	50 marks
4.	Pakistan Studies	1 paper	50 marks

SCIENCE GROUP (600 marks)

The students will choose one of the following (A), (B) and (C) Groups carrying 600 marks:

a) Pre-Medical Group:

Physics, Chemistry, Biology

b) Pre-Engineering Group:

Physics, Chemistry, Mathematics

c) Science General Group:

1. Physics, Mathematics, Statistics
2. Mathematics, Economics, Statistics
3. Economics, Mathematics, Computer Science
4. Physics, Mathematics, Computer Science
5. Mathematics, Statistics, Computer Science

HUMANITIES GROUP (600 marks)

Select three subjects of 200 marks each from the following:

S. No.	Subject	S. No.	Subject
1.	Arabic/Persian/French/English (Elective)/Urdu (Elective)	10.	Sindhi (Elective)
2.	Economics	11.	Civics
3.	Fine Arts	12.	Education
4.	Philosophy	13.	Geography
5.	Psychology	14.	Sociology
6.	Statistics	15.	Mathematics
7.	History of Modern World/Islamic History / History of Muslim India / History of Pakistan	16.	Computer Science
8.	Islamic Studies	17.	Islamic Culture
9.	Health and Physical Education	18.	Library Science
		19.	Outlines of Home Economics

COMMERCE GROUP (600 marks)

HSSC – I

1.	Principles of Accounting	paper – I	100 marks
2.	Principles of Economics	paper – I	75 marks
3.	Principles of Commerce	paper – I	75 marks
4.	Business Mathematics	paper – I	50 marks

HSSC – II

1.	Principles of Accounting	paper – II	100 marks
2.	Commercial Geography	paper – II	75 marks
3.	Computer Studies/Typing/Banking	paper – II	75 marks
4.	Statistics	paper – II	50 marks

MEDICAL TECHNOLOGY GROUP (600 marks each)

1. Medical Lab Technology Group
2. Dental Hygiene Technology Group
3. Operation Theater Technology Group
4. Medical Imaging Technology Group
5. Physiotherapy Technology Group
6. Ophthalmic Technology Group

Annexure-VI

Table 6.3: Recommended allocation of marks in relation to standards, benchmarks and SLOs for Grades IX-X

Note: Table of specifications for Grades XI-XII can be developed on a similar pattern.

Reference	Benchmarks: language and skill focus (please see detailed benchmarks)	No. of SLOs	Weighting			
			Paper A		Paper B	
			Percentage	Marks	Percentage	Marks
CI, S1	Patterns of text organization	4	15%	11	-	-
	Reading comprehension strategies	7	30%	23	-	-
	Interpretation of visual organizers	5	15%	11	-	-
	Study skills	6	CA	CA	CA	CA
CI, S2	Interaction with literary texts	9	25%	19	-	-
C2, S1	Techniques for effective text organization, development and writer's craft	5	-		15%	11
	Descriptive, narrative, expository, persuasive, analytical writing	8	-		20%	15
	Interpersonal and transactional writing	8	-		20%	15
	Editing and revising	4*	CA	CA	CA	CA
C3, S1	Functions and co-functions*	1	FA	FA	FA	FA
	Group dynamics*	4	FA	FA	FA	FA
C4, S1	Pronunciation development*	4	PA	PA	PA	FA
C4, S2	Vocabulary enhancement	2	15%	11	-	-
C4, S3	Grammatical functions	9	-	-	25%	19
	Mechanics of punctuation	3	-	-	10%	7.5
	Sentence structure	4	-	-	10%	7.5
C5, S1	Attributes for peaceful co-existence	CA	CA	CA	CA	CA
	Valuing self and diversity	CA	CA	CA	CA	CA
	Approach contemporary issues as thinking individuals	CA	CA	CA	CA	CA
Total Marks			100%	75	100%	75

* The development of these skills in C3S 1 and C4S 1 will be tested on an ongoing basis over a period of two years of study through Formative Assessment and will, therefore, not be tested in the final examinations till such time conditions are available for testing of these skills.

CA = Classroom Activity.

PA = Formative Assessment.

Note: It has been clearly stated in the curriculum and guidelines for textbook writers that not more than 25% of the texts will be of a literary nature to encourage focus on using English as a tool for academic purposes and real-life communication.

**MATHEMATICS
For Class-X**

1. QUADRATIC EQUATIONS

- 8.1 Quadratic Equation Define quadratic equation.
- 8.2 Solution of Quadratic Equations
- 8.3 Quadratic Formula
- 8.4 Equations Reducible to Quadratic Form
- 8.5 Radical Equations

2. THEORY OF QUADRATIC EQUATIONS

- 9.1 Nature of the Roots of a Quadratic Equation
- 9.2 Cube Roots of Unity and their Properties
- 9.3 Roots and Coefficients of a Quadratic Equation
- 9.4 Symmetric Functions of Roots of a Quadratic Equation
- 9.5 Formation of Quadratic Equation
- 9.6 Synthetic Division
- 9.7 Simultaneous Equations

3. VARIATIONS

- 10.1 Ratio, Proportions and Variations
- 10.2 Theorems on Proportions
- 10.3 Joint Variation
- 10.4 K-Method

4. PARTIAL FRACTIONS

- 11.1 Proper, Improper and Rational Fraction
- 11.2 Resolution of Fraction into Partial Fractions

5. SETS AND FUNCTIONS

- 12.1 Sets
 - 12.1.1 Operations on Sets
 - 12.1.2 Properties of Union and Intersection
 - 12.1.3 Venn Diagram
 - 12.1.4 Ordered Pairs and Cartesian product
- 12.2 Binary relation
- 12.3 Function

6. BASIC STATISTICS

- 13.1 Frequency Distribution
- 13.2 Cumulative Frequency Distribution
- 13.3 Measures of Central Tendency
- 13.4 Measures of Dispersion

- 7. INTRODUCTION TO TRIGONOMETRY**
 - 16.1 Measurement of an Angle
 - 16.2 Sector of a Circle
 - 16.3 Trigonometric Ratios
 - 16.4 Trigonometric Identities
 - 16.5 Angle of Elevation and Depression.
- 8. PROJECTION OF A SIDE OF A TRIANGLE**
 - 24.1 Projection of a Side of a Triangle
- 9. CHORDS OF A CIRCLE**
 - 25.1 Chords of a Circle
- 10. TANGENT TO A CIRCLE**
 - 26.1 Tangent to a Circle
- 11. CHORDS AND ARCS**
 - 27.1 Chords and Arcs
- 12. ANGLE IN A SEGMENT OF A CIRCLE**
 - 28.1 Angle in a Segment of a Circle
- 13. PRACTICAL GEOMETRY - CIRCLES**
 - 30.1 Construction of Circle
 - 30.2 Circles attached to Polygons
 - 30.3 Tangent to the Circle

UNIT: 8

CULTURE AND CURRICULUM

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Reviewed By:
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INTRODUCTION

THE PEOPLE of every society are confronted by the problem of inducting the immature members into their culture, that is into the ways of the group. The individual at birth is a cultural barbarian, in that he has none of the habits, ideas, attitudes, and skills characterizing the adult members of society. These are acquired as he grows into full-fledged societal membership. In primitive societies the individual acquired these learnings informally from association with adults in their daily activities. A boy learnt the traditions of the group through its folk tales, festivals, and rituals. He learnt to hunt, to till the soil or to shape the tribal tools with his hands by sharing in these activities with his elders. Long before these things had been acquired, however, his conduct and modes of thinking had been influenced by the family patterns. In literate societies instruction in group ways becomes partly a specialized function. An institution the school charged with the responsibility for teaching certain things created. A sequence of potential experiences to prepare the new member in accordance with the cultural values is referred to as the curriculum.

The curriculum is always, in every society, a reflection of what the people think, feel, believe, and do. To understand the structure and function of the curriculum, it is necessary to understand what is meant by culture, what the essential elements of a culture are, and how are these organized and interrelated. The principal theme of this chapter is the concept of culture and the universal relationship between the curriculum and the culture of a society. The discussion is general and does not refer to any specific society.

OBJECTIVES

After going through this unit, the students would be able to:

1. define culture.
2. describe structure of culture.
3. describe cultural roots of curriculum
4. discuss the importance of different aspects of culture for curriculum development.

1. THE MEANING OF CULTURE

A culture is the fabric of ideas, ideals, beliefs, skills, tools, aesthetic objects, methods of thinking, customs and institutions into which each member of society is born. The way individuals make a living, the games they play, the stories they tell, the heroes they worship, the music they play, the way they care for their children, their family organization, their modes of transportation and communication-all of these and countless other items too numerous to mention (or, for that matter, for any single individual to know about) comprise the culture of a people. The culture is that part of his environment which man himself has made.

The term culture is to be distinguished from the concept of society. A society is a group of organized individuals who think of themselves as a distinct group. A society is not a mere aggregate of individuals, for in such a collection the individuals do not recognize themselves as members of a distinct social unit. To be a society a collection of persons must have something in common_a set of loyalties and sentiments, which induces the individual under certain circumstances to subordinate or even to sacrifice himself for the good of the group. Since these common elements are part of culture, it follows that without a culture there could be no society, and without a society there could be no culture. Yet the two are not identical. A society is composed of people. A culture consists of the things the people have learned to do, to believe, to value, to enjoy, and so on in the course of their history.

Thus culture will vary from society to society and within the same society over a given period of time. For it is obvious that what people do, believe, value, and like, varies from one society to another and within a given society if a long enough time span is allowed.

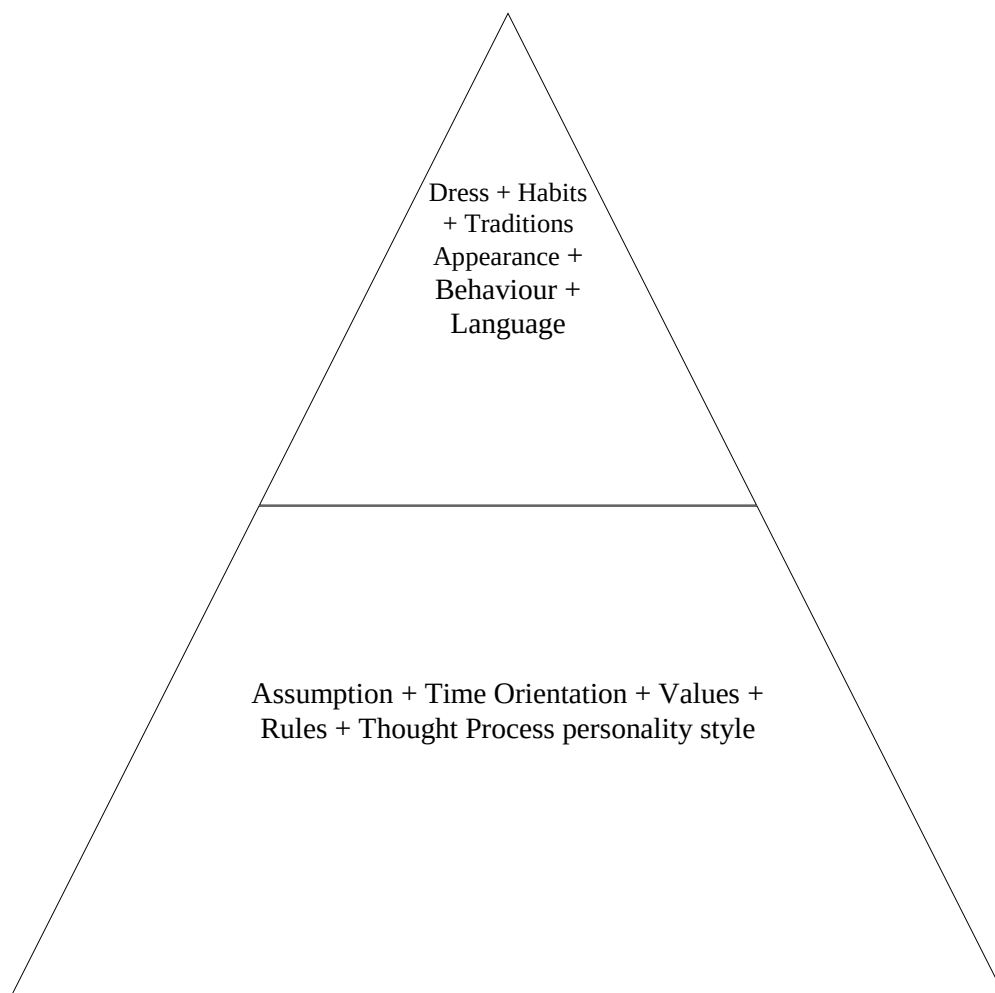
Moreover, what a particular individual believes and does and how he reacts to various stimuli depends upon the culture in which he grows up. If an occidental child were transplanted at birth to an oriental culture, he would grow up to assume the ways of behavior peculiar to that culture. He would become as oriental in his view, attitudes, skills, and habits of conduct as any individual whose ancestors were oriental from time immemorial. In like manner, an oriental child growing up in the culture of the western world would build ways of behaving and adjusting like those of the other members of western society. Perhaps it is not too much to say that the basic personality structure of the individual is shaped by the culture into which he is born and grows to maturity.

2. DEFINITION OF THE CURRICULUM

2.1 Definition of Culture

According to Linton, R. (1945): "A culture is a configuration of learned behavior whose component elements are shared and transmitted by the members of a particular society".

According to Robert Bierstadt (1974): "Culture is a complex whole that consist of all the ways we think and do and everything we have as members of society".



Cultural Iceberg Figure: 1

3. THE STRUCTURE OF A CULTURE

A culture may be analyzed in a number of ways, depending upon the purpose for which the analysis is made. For the purpose of understanding and reconstructing the curriculum, the analysis suggested by Ralph Linton in *The Study of Man* seems to be the most promising. With slight modifications it will be followed here.

The elements of a culture-that is, the things the people know, believe, do and so on-may be put into three categories.

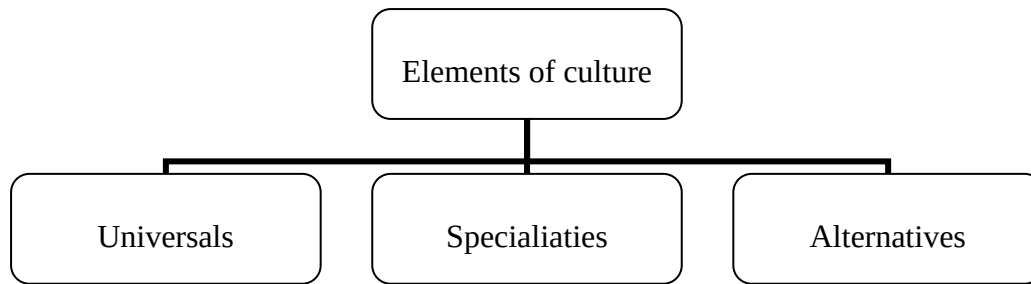


Figure: 2

i. Universals

First, there are those elements that are universally distributed among the adult population. Individuals throughout the society may, for example, eat the same food, wear the same style of clothes, use the same language, greet one another in the same way, require the same obedience and respect from their children. They may possess the same religious notion, cherish the same political and economic ideas, and accept the same rules of polite conduct. All such things as are generally accepted by the members of the society are called universals it should be understood, however, that universal element in one society may not appear at all in another.

ii. Specialities

Second, some elements of a culture are found among only a portion of the adult population. In every society there are some things that only a part of the people know about or can do. These are called specialties. They consist principally of vocational callings demanding technical knowledges and skills. There is some division of labor in every society. The women know how to do certain things that are not known by the men. The men are skilled in activities outside the sphere of women. Then there are finer divisions of labor. Men in some localities may make their living by tilling the soil, those of another locality by herding cattle. There are also those who tend the sick and appease the spirits. In industrial societies, especially those permeated by science and technology, division of labor is so advanced that the specialties contain a relatively large portion of the cultural elements.

In addition to specialties of an occupational nature, there are those that belong to groups of individuals who occupy various social positions. For example, in a society having a recognizable social elite, individuals of this privileged class will have points of view and ways of believing peculiar to themselves. In like manner the lower social strata will have ways of thinking and believing not found in the upper classes.

Although the specialties are not shared directly and intimately by all individuals, in a relatively simple society most of them are understood in a general way by everyone. An individual may not know how to prepare food, but he will know whether or not it has been properly done. He may not have the skill and knowledge possessed by the physician, but he will understand the function of the physician in society and the

importance of health. He will also know in a general way how a physician is supposed to behave and whether or not his practice departs significantly from what is generally expected. In a highly industrialized society, however, the meanings of specialties tends to be blurred in the public mind and restricted to those persons immediately engaged in them. Indeed, labor becomes so highly specialized and its products so complex and technical that not even the laborers themselves fully understand either the processes or the outcomes of production.

iii. Alternatives

Third, there are certain cultural elements that belong among neither the universals nor the specialties. These elements, like the specialties, are not generally distributed among the members of society. But unlike the specialties, they are not shared even by all the members of any of the various occupational groups, or, for that matter by all the members of any socially recognized group within the society. These elements consist of ways of thinking and doing that depart from commonly accepted ideas or practices. For example, a new way of making soap may be accepted only by a few individuals here. A new way of teaching, a new way of preparing food, or a new way of doing any one of a thousand other things may be accepted by only a few persons. These cultural elements are called alternatives. They embrace all the ways of obtaining results which depart from generally accepted techniques and procedures. In other words, the alternatives represent those elements of the culture about which the individual can exercise choice.

Alternatives may enter a culture by way of invention within the society or by diffusion from another culture. Cultures that are more unchanging over a period of years will, as a rule, have relatively few alternatives. The alternatives constitute the growing edge of the culture. As new ways of doing things emerge and come to be accepted, they are absorbed by either the universals or the specialties.

Cultural Analysis

There are basically two approaches to 'cultural analysis': the classificatory and the interpretative:

- a) The classificatory method would take us in the direction of check lists, tables and elaborate systems of classification.
- b) The interpretative method would be more concerned with looking at the culture as a whole.

Some anthropologists have attempted elaborate systems of classification of simple or 'less developed' societies by listing and categorizing such key characteristics as kinship systems, economic features, religious beliefs, and soon. The danger in this approach is of being so concerned with the wealth of detail that it becomes impossible to make any generalizations at all. On the other hand, it is also possible that anthropologists may misinterpret a society by relying on their dominant impressions and reaching conclusions too readily.

The educationist attempting to analyse his own society has some advantages over an anthropologist. He is unlikely to be so completely misled as some anthropologists appear to have been by native informants-but he will also suffer from the disadvantage of looking at his own society through his own ideology or belief system. He will tend to take some aspects of culture for granted which ought to be questioned; he may assume the value of certain practices which ought to be examined; the power of tradition is particularly strong, not least in the field of education.

Part of the answer would seem to be that anyone attempting cultural analysis has to learn to stand back from society and attempt to see it, to some extent, as 'an outsider'. The observer attempting to analyse can never be 'value-free', but he can at least learn to become aware of his own values, beliefs and prejudices.

Measurement or Interpretation

Some aspects of culture can be measured (for example, some of the most important economic features in advanced industrial societies), but observers should beware of the temptation to measure what is easily quantifiable and then being dominated by these measurements. Cultural analysis is more complicated than manpower planning and there is more to culture than work and training for work. Much of cultural analysis will be at the level of description, as Geertz (1975) (says man is an animal suspended in webs of significance he himself has spun culture to be those webs and the analysis of it to be, therefore, not an experimental science in search of law, but an interpretative one in search of meaning.

In attempting to see how the curriculum in a society is derived from the unique culture of that society, it will sometimes be necessary to be more specific than Geertz definition, and to ask detailed questions about knowledge, skills, values, and so on. But it will always be important to have at the back of one's mind that kind of interpretative view of culture. There will always be more to a culture than a list of its measurable features, and we will run the risk of oversimplification if we try to reduce a culture to tables and check-lists, although there may be times when tables and checklists will have a limited use therefore, an eclectic system of cultural analysis which will make use of what is measurable when it is relevant, but will look for major categories and parameters within which to operate both quantitatively and interpretatively is more appropriate.

At the simplest level, cultural analysis when applied to curriculum planning would ask:

- a) What kind of society already exists?
- b) In what ways is it developing?
- c) How do its members appear to want it to develop?
- d) What kind of values and principles will be involved in deciding on (c) and on the educational means of achieving (c)?

Cultural analysis also involves asking questions about the extent to which a school system already matches the needs of society, as well as the kinds of Curriculum change that will be necessary to achieve certain kinds of changes regarded as desirable.

In the process of cultural analysis it is always necessary to view culture as a historical as well as a contemporary process. An important aspect of analysis is not only to 'take a snapshot' of culture as it is now, but also to see how it has developed to that point. In educational analysis, it is also necessary to look out for culture lag and curriculum inertia: especially in rapidly changing societies there is a powerful tendency for schools to lag behind other aspects of social and cultural change, and for the curriculum to become increasingly irrelevant. This is not to fall into the trap of identifying 'educational needs' with 'technological advance' nor to equate education with vocational training: an adequate system of cultural analysis will demonstrate that education must be concerned with much more than technology and work; nevertheless, it is well established that in societies undergoing change, there is a tendency for curricula to become out of date unless conscious efforts are made to counter the natural conservatism of teachers and schools.

Another difficulty is, of course, that sometimes schools will be right to lag behind certain changes in society (if society has moved in a wrong direction then schools and teacher may be right to wish to return to a previous stage).

The essence of the cultural analysis approach is that of developing a method of matching the needs of individual children living in a specific society by means of a carefully planned curriculum. This selection from the culture is made by analyzing the kind of society that exists, and then 'mapping out' the kind of knowledge and the kinds of experience that are most appropriate. This process requires three kinds of classification: first, deciding on major parameters (the cultural invariants); second, outlining a method of analysis which can be used to describe any given society, making use of those major parameters (that is, moving from cultural invariants to cultural variables); third, a means of classifying the educationally desirable knowledge and experiences. In the past a great deal of discussion has taken place about the classification of knowledge but little attention has been paid to the task of describing accurately the kind of society that exists, and deriving from that analysis an account of the kinds of knowledge needed by the young at various stages of their intellectual development.

A diagrammatical outline of this approach, represented as a series of sequential stages, is set out in the following figure as a model and, therefore, as a simplified version of reality it could be used at any level of curriculum planning: it could be used, for example, by a committee; or at the level of school planning, by a curriculum committee to organise the curriculum into a timetable, or even by an individual teacher making his own choice of materials.

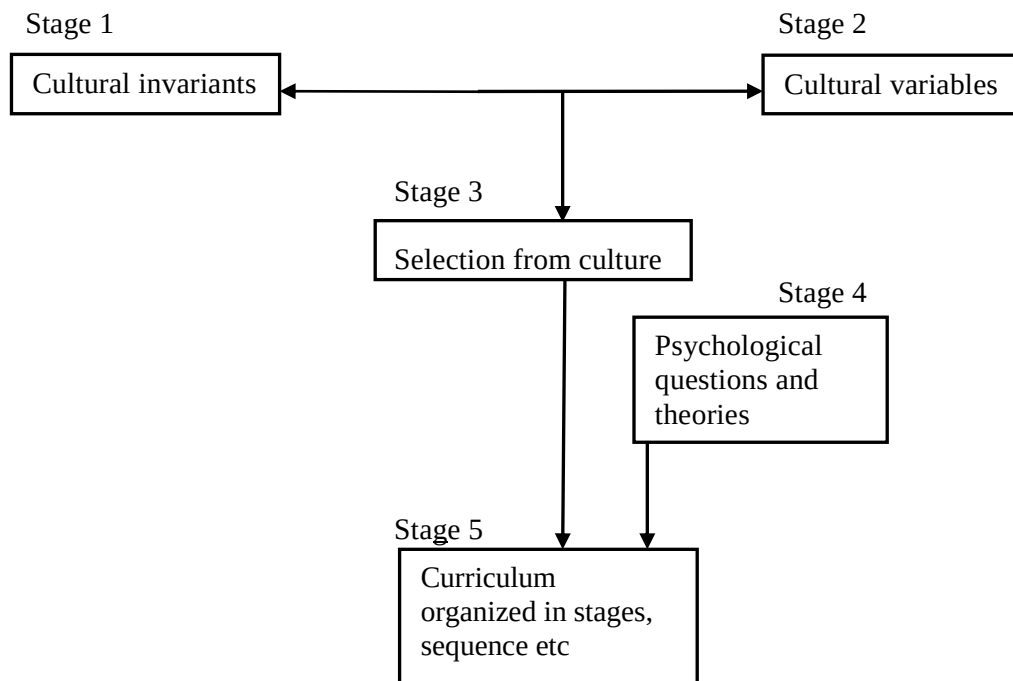


Figure: 3

Cultural Invariants

Some Anthropologists such as Ruth Benedict have emphasised the differences between societies; while others such as Clyde Kluckhohn and Dorothy Lee have stressed the essential similarities between all societies. Our purpose here is to begin by looking at the characteristics that all human beings appear to have in common (the human universals and cultural invariants) within the Kluckhohn and Lee tradition, and then to analyse how these are or should be related to educational processes.

In analyzing cultures and cultural invariants to educational processes, we should concentrate on eight major headings. These eight parameters are not exhaustive. It would be possible, for example, to say that all societies eat food, and then proceed to analyse societies according to diet. This might be interesting, but would not help us in the task of curriculum planning. Nor would it be helpful to classify societies according to family and kinship patterns. There are however, good anthropological and sociological reasons for sub-dividing the cultural system into the following eight structures of sub-systems:

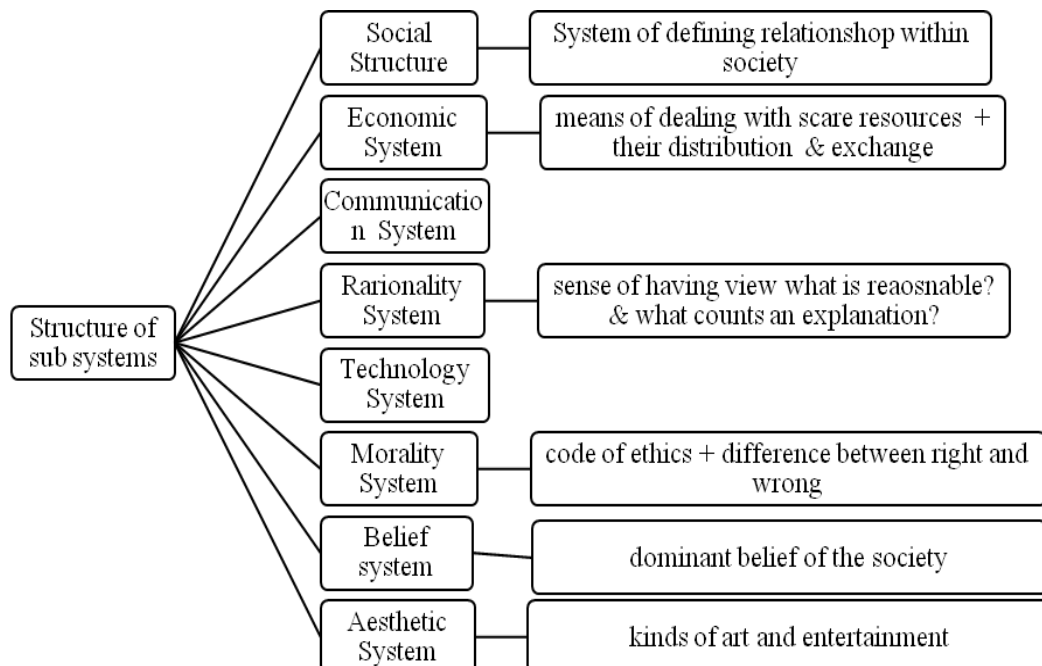


Figure: 4

A naive Marxist view would be that the technological and economic systems provide the base or substructure which determine all other aspects of the cultural system. Several Marxists, For example, Gramsci and Lukacs, as well as neo-Marxists such as Habermas and others of the Frankfurt school, have found this determinism difficult to accept. The assumption behind the following analysis is that all eight sub-systems of the cultural system interact and influence each other. In some cases, such as communication and technology, or social and economic, the interaction will be particularly powerful, but the dynamic is always a two-way interaction rather than a simple cause and effect determining relationship.

I will begin by describing and justifying each of the eight systems:

Social Structure/Social System

All societies have some kind of social structure, that is, some system of defining relationships within the society as a whole. Kinship, status, role, duty and obligation are the key social concepts which not only exist in every society, but which have to be passed on to the next generation.

In some societies, social structure is simple and taken for granted; in others, the social system is complex, open to debate and possibly to change. The social structure will be closely related to economic and technological factors; for example, when western European societies were largely rural and agricultural, the dominant fact in social relationship was the possession or non possession of land; but as trade and industry

developed, land became less important than capital, or the ownership of the means of production.

There are various ways of classifying society according to the dominant characteristics of its social structure. Social stratification is an important aspect of most social systems; in capitalist societies social class is very important.

Economic System

Every society has some means of dealing with the problem of scarce resources, their distribution and exchange. In some societies, the economic arrangements will be extremely simple, perhaps involving barter; in other societies the economic system will be highly complex. Marxist theory includes an 'evolutionary' sequence from primitive communism to feudalism and capitalism. Varieties of interpretation exist with which to analyse capitalist or post-capitalist social and economic systems. One important measurable feature is the amount of state-ownership existing within societies, which are basically capitalist, such as the USA and Western European democracies. Other important measures will include the percentage of a society's wealth and income which are owned by the 'top 1 per cent, 5 per cent or 10 per cent of the population.

There will also tend to be some direct relation of the economic system to the occupational structure, and therefore to the demand for certain kinds of skills and trained manpower.

When politicians and employers talk of the educational needs of society it is this kind of matching they have in mind. This factor must be put into a balanced perspective. Some would say that in a mainly capitalist society it is to be expected that the link between education and economy should be dominant one. That does not mean that educationists should accept that dominance. One of the purposes of cultural analysis is to emphasize other features.

Communication System

In all societies, human beings communicate with each other. One of the major differences between man and other animals is the existence of human language. Where communication is entirely by means of spoken language most, if not all, of the learning required is informal-even unconscious (children are unaware that they are learning a language, and parents unaware that they are teaching when they provide a speech model).

In many societies, speech is not the only form of communication: American Indians have elaborate sign languages and smoke signals, for example; other societies have developed various kinds of writing; it has often been pointed out by sociologists and social historians that the development of print has made enormous differences to the type of society which developed. Most societies have visual symbols of some importance too. Such non-speech forms of communication are acquired less automatically than speech, and usually some kind of teaching and learning process is involved. When we proceed to the task of distinguishing different societies according to the kinds of communication systems they have, we will need to employ such categories as 'varieties' of spoken

language and written language as well as identifying the relative importance of other symbols or signaling systems.

For purposes of educational analysis, the development of writing and of print is of very great significance. This is partly because print potentially makes specialized knowledge more available, but at the same time encourages the tendency for printed 'knowledge' to become highly specialized and therefore less available to the non-specialist reader. In democratic societies with supposedly 'open' systems of education, one of the major curricular problems is, to achieve a balance between general education and specialization; this is closely connected with the various media available for general and specialized communication.

Rationality System

All societies are rational in the sense of having a view about what is 'reasonable' and what counts as an explanation in terms of cause and effect. The particular kinds of explanation may differ, but attempts are always made to explain physical phenomena and human behaviour. Without some kind of rationality any kind of communication would be impossible: words and other signs must be used consistently to make comprehension and co-operation possible. Basic rules of meaning and logic are essential. The kind of explanation that is accepted as rational will, however, vary from one society to another or from one time to another within a given society so that whereas one group might explain a man being attracted to a woman in terms of 'love', another group might invoke Freudian theory, another magic or witchcraft. These explanations are seen by anthropologists as different expressions of rationality rather than as being right or wrong explanations.

A useful way of distinguishing and classifying societies may be to categorize them as being 'unified rationality' or 'sub-divided rationality'. Some societies manage to look at the whole of experience through one all-embracing world-view; others, for example thinking which is different from the religious and different from the poetic, and so on. Levi-Strauss (1966) has also classified societies as 'hot' or 'cold': 'hot' societies are characterized by scientific thinking, whereas 'cold' (primitive) societies are 'time-suppressing' and rely on myth rather than science and history to explain their universe.

Technology System

Man everywhere attempts if not to control the environment at least to lessen domination by it. Early man developed tools to build shelter from the climate and to kill animals for food; later to produce food by various kinds of agriculture. All human beings are 'technologists' in the sense of being tool-users, and make progress by passing on their developing technology, with improvements, to the next generation. Learning to use and to improve tools is always an important feature of cultural life.

In some societies technology is comparatively simple, so differences in access to the technology are almost non-existent. In modern industrial society, on the other hand, no one person could possibly be skilled in all aspects of technology, so specialization and

inequality of access to technological knowledge become problems. In such societies one difficulty is how to cope not only with the transmission of knowledge and skills, but also with the problem of 'allocating' or selecting different individuals for certain kinds of learning: these different learning processes will tend to be given different levels of value or prestige within the social structure. This is the classic division of labour problem described by Marx and Durkheim in their different ways.

It is possible to categorize a society according to the dominant system of technology: is it simple or complex? Is the society at the pre-industrial or post-industrial state of development? It is possible to measure some aspects of technological 'advance' by, for example, quoting the number of cars or television sets per thousand of the population. But no system of educational cultural analysis yet envisaged would require so much detail. Broader categories are quite sufficient. It is perhaps also important to state firmly at this stage in the analysis that no ethnocentric judgment is intended when talking about 'advance' or 'progress' from, for example, pre-industrial to post-industrial. There are advantages and disadvantages in both kinds of society, but the educational requirements will differ to some extent.

Morality System

Another characteristic that all human beings have in common is that they possess a sense of 'the moral'; all societies have some kind of code of ethics and distinguish between right and wrong behaviour. What is regarded as right or appropriate varies enormously, but nowhere are there human beings living in a community without a system of morals or ethics. Kluckhohn (1951), for example, suggests that this moral feeling, at least in the form of the existence of a conscience is at least partly biological or genetic. This view would be supported by the studies of Piaget and Kohlberg on the development of moral ideas and ethical behaviour including some cross-cultural studies.

In some societies the moral code is unitary and taken for granted; in other societies, value pluralism exists and the problem of socializing is much more difficult—total agreement will be lacking, yet some kind of rules of behaviour need to be transmitted. When moving from cultural invariants to cultural variables the main ways of categorizing morality systems would include analyzing the dominant system as, for example, religious or secular, and also questioning whether there is a single moral system as in pre-Reformation Europe where the Catholic Church provided a unified moral view, or a variety of competing views as with the moral pluralism in most twentieth century western industrialized societies.

Belief system

Closely connected with the morality system is a broader category: the dominant belief system of any society. In some cultures the moral code will be backed up by, and closely related to, religious dogma and perhaps divine revelation or myths about the origins of the community; in other societies these links have become weakened or the prevailing belief system will be entirely secular for example, having a belief in scientific explanations where 'man is the measure of all things'.

In the latter kind of society, the problem of educating the young and passing on a belief system is much more difficult. not least because the young will be encouraged to question and criticize rather than simply learn and accept.

In classifying societies according to their different kinds of belief system, the following terms would be useful: capitalist, socialist, democratic, totalitarian, liberal, conservative, and so on.

Aesthetic System

All human beings have aesthetic drives and needs. Every society produces some kind of art and entertainment for its members, even when they are living close to subsistence level. A society's art has standards of Form and substance, and is related to the values, technology and social structure of that society. One of the interesting features of human life is the enormous variety of aesthetic forms, but nowhere is a sense of the aesthetic absent.

Raymond Williams (1981) has discussed culture in relation to attempts to categorise societies according to aesthetic stages. Some account of the classification of aesthetic systems in terms of listing and categorizing what counts as 'Art' in any society, establishing boundaries between the Arts and examining the relationships between categories. A second useful area of study will include aesthetic morphology--that is, the analysis of form and style in each of the Arts, and the relations between them. Finally, it will be very important to analyse the relation between sub-divisions within the aesthetic system and the other seven systems; in that respect the complex relationship with all the other systems will be particularly important.

Cultural Roots of the Curriculum

If an observer looks at the curriculum of the school in any society, he will find, either stated or implied, a set of educational objectives, a body of subject matter, a list of exercises or activities to be performed, and a way of determining whether or not the objectives have been reached by the students. He will find also some kind of control which the teacher is required to exercise over the learners. These things comprising the curriculum are always, in every society, derived from the culture. The objectives stressed will be those that reflect the controlling ideas and sentiments contained in the universals. The subject matter will tend to be that which is believed to embrace the most significant ideas and most generally used knowledges and skills. The way in which the learners are controlled will reflect the prevailing methods of social control of the society at large. As the instrument of society for the education of the young, the curriculum will reflect the ideals, knowledges, and skills that are believed to be significant, or that are related to the common activities of the members of society. The Curriculum is, therefore, interwoven with the social fabric that sustains it.

In every society a distinction is made between the curriculum of common education and that of special education. Common education will be based upon the universal elements

of the culture and such aspects of the specialties as are of general concern. Special education will be based largely upon the dominant specialties of the culture. It will be designed to train the individual for a particular social or vocational position.

Common Education Based Upon Cultural Universals

Common education is concerned with the problem of maintaining the society as a closely knit and well-integrated unit. It is only natural, therefore, that the rules and knowledges by which the people as a whole regulate their conduct and anticipate the behaviour of one another should be its principal content. Not all the universals, however, will be contained in the common curriculum. It will ordinarily not incorporate such superficial elements as the method of greeting friends or the way to tie shoes. As a rule, these things are left to the individual to acquire informally and often unconsciously through participation in the common life of the people. Instead, the curriculum will tend to emphasize the more fundamental universals, or cultural core, such as the values, sentiments, knowledges, and skills that provide society with stability and vitality and individuals with the motivations and deep-lying controls of conduct.

The heart of the universals, as already pointed out, is the standards and knowledges by which the people decide what is right and wrong, good and evil, beautiful and ugly, true and false, appropriate and in-appropriate in all sorts of activities-political, economic, aesthetic, educational, or what not. These standards constitute the moral content of the society. Next to them in importance are the knowledges and skills that have to do with the control and improvement of the common activities of the people such as their political and economic education.

Special Education Related to the Specialties of the Culture

Returning now to special education, specialties of a culture are usually those ways of thinking and acting associated either with vocational groups or social classes, or both. Hence special education may follow the interests of either one or both of these special groups. In societies having a recognized social elite, it will be found that instruments of education will be set aside for training the immature members of the elite group in the special points of view and patterns of conduct of these privileged adults. The presence of exclusive private finishing schools is evidence of the existence of an elite class having particular outlooks, polite manners, and behavioral patterns which it wishes to maintain. Indeed, the existence of such classes has led in some nations to the creation of dual educational systems-one for the folk and another for the uppers. For this reason higher forms of education, including secondary as well as higher schools, have tended historically inclined countries, where a single educational ladder has been adopted, the curriculum of the upper rungs reflects a privileged origin.

Cultural change

Culture change is a term used in public policy making that emphasized the influence of cultural capital on individual and community behavior. It has been sometimes called repositioning of culture, which means the reconstruction of the cultural concept of a society.

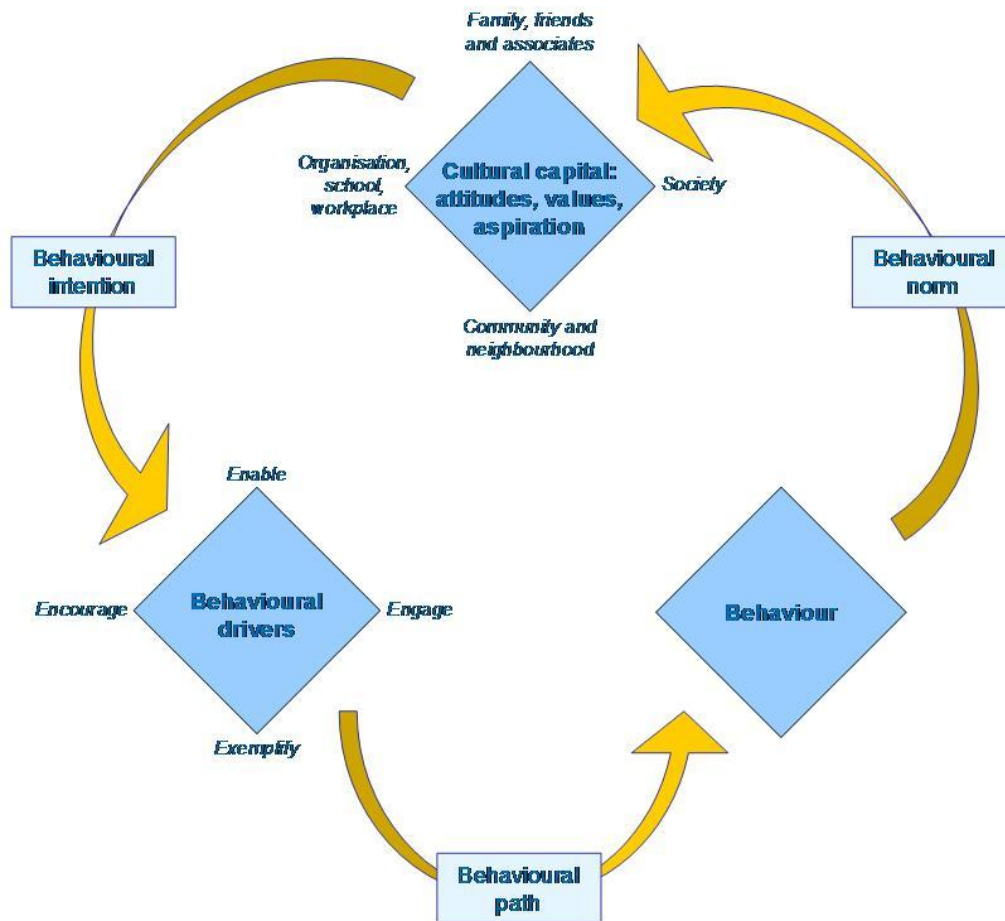


Figure: 5

Cultural change and the Curriculum

The discussion in the preceding section has developed the relation existing between a stable, well-integrated, and relatively static culture, on the one hand, and the curriculum that emerges within it, on the other. What happens to the curriculum when the culture is changing is just as important. (In modern society, it may be more important.) Since the curriculum is interwoven with the whole cultural fabric, it follows that as the culture undergoes serious modifications the curriculum will become an object of concern, especially among the more sensitive members of the teaching profession and of the society at large. The adequacy of the old curriculum for the new cultural circumstances will be searchingly questioned and changes in the curriculum proposed.

In societies experiencing little cultural change, the culture will be largely taken on unconsciously by the individual--although the school, where it exists, will emphasize certain elements of the culture by making them explicit through verbalization. On the other hand, in societies where fundamental associations are breaking down under the

impact of new social forces, fewer standards of conduct and elements of knowledge will be picked up informally, and these will tend to be inconsistent and conflicting. The problem of maintaining a stable, integrated culture in such society will, therefore, be quite different from the problem in a static social system. The demands made upon the school with regard to this problem will be correspondingly more taxing, and failure to meet them will be more fraught with social disaster.

Cultural change Related to Increase of Alternatives

Before proceeding further with the discussion of the curriculum problems that arise in a changing society, it will be well to take a brief look at the nature of cultural change. A culture not only consists of elements, but these elements are so interrelated and mutually adjusted that they form a configuration, or cultural pattern. They come into competition with elements comprising the universals and specialties, and their general acceptance requires a modification of the relationships among various aspects of the culture. When the number of alternatives is low as compared with the universals, the culture will have a high degree of stability. As alternatives increase relative to the universals, social change is increased; and the need for reintegration becomes more and more imperative if the culture is not to disintegrate.

Alternatives that emerge from time to time, or are borrowed from other cultures, have varying capacities for cultural disruption. Some alternatives, such as new types of ornaments, new techniques of decorating, or new kinds of wearing apparel, will have little effect upon the cultural pattern. The introduction of the wristwatch, for example, had no influence upon the basic structure of any society. Other innovations, such as changes in ways of making a living or the development of new Sources of energy, will seriously upset a culture and necessitate far-reaching readjustments. This is true because one of the basic aspects of the life of a people is the manner in which it secures the necessities of existence. The Superstructure of society is erected in large part upon the way people exploit the material world in the search for food, clothing, and shelter. Any change in the methods of such exploitation will, therefore, shake the whole cultural fabric and require large-scale social reconstruction.

Societal Problems Faced By Curriculum

Societal problems facing curriculum have broadened the cultural and philosophical dilemma. These may have indirect but powerful relevance with Curriculum.

There are number of societal problems faced by Curriculum. Some of them are as follows in key form:

- Authority
- Poverty
- In-equality
- Indoctrination
- Suppression of inquiry and expression

- Regionalism
- Provincialism
- Nationalism
- Prejudices
- Threat
- Control

Curriculum Problems Arising From Cultural Change

Turning to the curriculum, certain problems are always prominent in a period of cultural upset and reintegration. If the primitive societies had schools, the teaching profession would have been confronted by serious educational problems growing out of chains incidents such as introduction of new methods of farming. There have been a number of changes in human society. As property changed from communal to personal ownership and control, as the old pattern of family life began to disintegrate and the new pattern based on household ownership emerged, as the community became divided between those who owned land and those who did not, the teaching profession would have become uncertain as to what objectives should be sought through the educational system. The educational journals would have carried article after article on the need for clarifying the objectives of education. In faculty and committee meetings teachers would have disagreed upon what the schools should attempt to achieve. Some writers would have extolled the old virtues and ways of life. Others would have frowned upon the old ways, extolling the new ideals and the advantages to be gained from the new method of production and the way of life it entailed.

Teachers would not have known whether they should emphasize the sacredness of communal property, in keeping with the tradition of the tribe, or the virtues of private ownership and control. They would not have known whether the old joint family pattern of co-operation should be bolstered by giving it increased attention in the curriculum, or whether the household family-enterprise unit should be stressed instead. They would have been uncertain about these things because there was no consensus among the people with respect to them. The old consensus, upon which the traditional educational program was based, would have been so much in doubt that the mandate of the teaching profession would not have been clear.

Of course, the teaching profession might have contented itself by appealing to such abstractions as the development of a good citizen or the teaching of the fundamentals. But these would have been as much in question as anything else. Who would have been a good citizen to what traditions, ideals, beliefs, and patterns of conduct would have been loyal? What would have been the fundamentals? Of course, the native tongue and perhaps the modes of calculation might have been included. Beyond these what would have been basic in the behaviour of the people? What attitudes? What beliefs and loyalties?

The purpose there is not to paint a hopeless picture of the curriculum problems. There were, of course, always some elements of the old culture that remained and could have

been used as bases for judging the purposes and program of the school-some measure of family loyalty, allegiance to the tribe itself, and doubtless a great number of ideals. The import of the discussion is, first, that a period of cultural transformation will upset the curriculum and require that it be reconstructed with respect to purpose, content, method of instruction, and means of evaluation; and, second, that the teaching profession will experience a period of uncertainty as to the kind of educational program to build.

The primary educational task arises from the fact that in a period of transformation the common orientation of the people is disturbed. They are confused as to what to believe, what to strive for, what to defend. Consequently, they are often in conflict one with another. Depending upon the degree of disintegration. The capacity of the people to think, feel and act as a unit is reduced. They continue to live together, but communication among them breaks down: for as the community of ideas and habits dissolves, individuals no longer respond alike to the same situation. When this condition exists, the school must design a curriculum that will help to expand the common orientation in which each individual shares. The school curriculum alone cannot resolve the difficulty, but it can make a major contribution in this direction.

The task of curriculum building will be principally that of constructing the curriculum so that cultural elements, both new and old, will be mutually adjusted and a new cultural synthesis achieved. The task is to build a curriculum that will achieve a set of consistent ideas and values in which all members of society can share. A desirable curriculum is one that reflects a consistent cultural point of view and attempts to achieve a mutual adjustment of cultural elements in terms of a common orientation. An undesirable curriculum, on the other hand, is one that accentuates the maladjustment of cultural elements by stressing those traditional ideals, knowledges, sentiments, and skills no longer relevant to social realities.

The rise of science and technology has done far more to most of the cultures of the world than any other factor. The world culture is in a period of reconstruction because science and technology have revamped the means by which men exploit their environment. The consequences of these new means have been felt in industry, business, Political, religion, education, and morality.

To conclude, it can be said that culture and cultural changes influence every aspect of human life but then influence is channeled in proper direction through school and school curriculum.

UNIT-9

TYPES OF CURRICULUM

Written by:
Dr. Feroza Yasmin

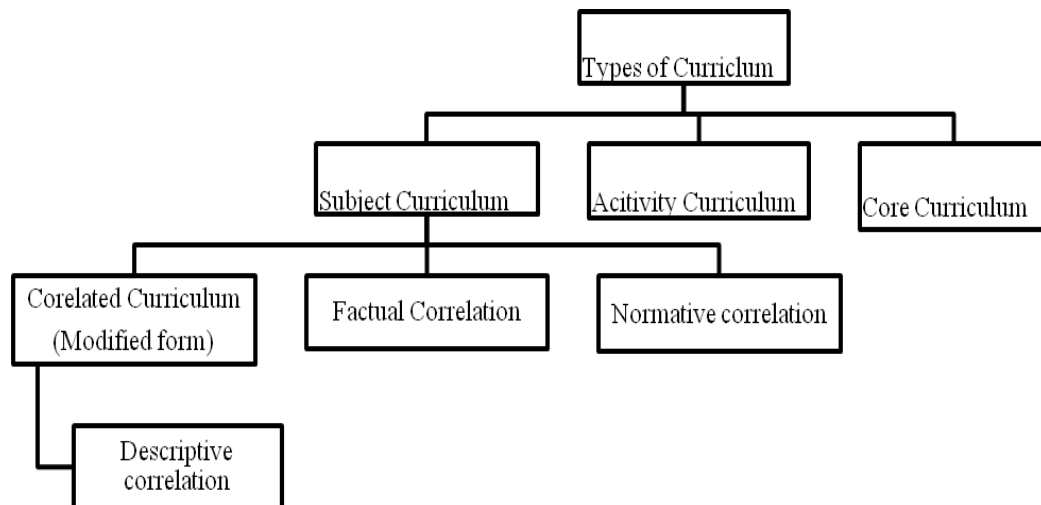
Reviewed By:
Dr. Afshan Huma

INTRODUCTION

Curriculum is the crux of the whole educational process. Without curriculum, we cannot conceive any educational Endeavour.

According to Stenhouse (1980)

“All educational ideas must find expression in curricula before we can tell whether they are day dreams or contributions to practice. Many educational ideas are not found wanting because they cannot be found at all.”

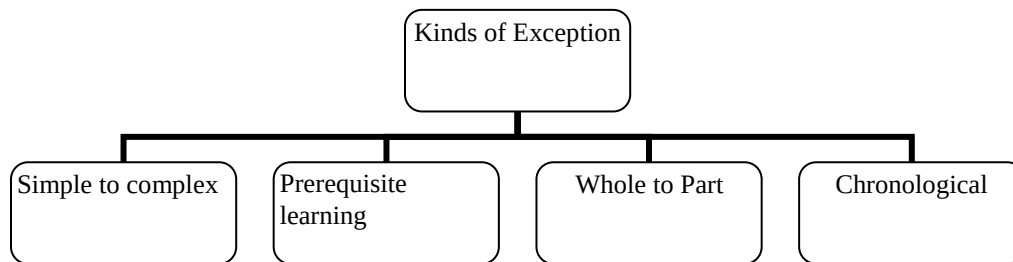


Curriculum can be classified into different types on the basis of its organizations. This unit contains discussion on these main types of curriculum: Subject Curriculum: Activity Curriculum: Core Curriculum.

1. SUBJECT CURRICULUM

The subject is the oldest and most widely accepted form of curriculum organization. Perhaps the earliest example of this organization is the Seven Liberal Arts, which were present in an incipient form in the school of ancient Greece and Rome, and which were offered in a more advanced stage of development in the monastery and cathedral school of the Middle Ages. The Seven Liberal Arts consisted of two divisions: the trivium which was comprised of grammar rhetoric and dialectic and the quadrivium. Which consisted of arithmetic geometry and music These subjects were very broad: grammar, for example, consisted not only of the kind of content found in modern grammar courses, but also of literature Studied Analytically-that is from the standpoint of versification, prosody, figures of speech, and vocal expression. Therefore, the Seven Liberal arts do not conform precisely to modern subject having the same titles.

In the modern period the trivium was further divided to include literature and history as distinct subject: and the quadrivium, to include algebra, trigonometry, geography, botany, zoology, physics, and chemistry. In the last half century the number of subjects offered in the public schools increased by leaps and bounds, so that by 1930 there were over three hundred distinct subjects of instruction. Despite this enormous multiplication of subjects the Seven Liberal Arts are still the nucleus of the subject curriculum.



2. SUBJECT CENTERED CURRICULUM

Definition

The subject centered curriculum is based on subject. All knowledge is transferred to student through the subjects. Subject matter taught should reflect basic areas that are essentials and agreed upon content for learner attainment.

Objectives of subject centered curriculum

- To transfer cultural heritage.
- To represent knowledge.
- To impart information.

2.1 Distinctive Characteristics of the Subject Curriculum

The subject curriculum is an organization of the content of education in to subjects of instruction. In its extreme form the subject are compartmentalize bodies of knowledge, taught in complete isolation from one another even from those to which they are related--as history may be taught completely divorced from geography, economics, and sociology. Its less extreme forms permit a certain degree of interrelation among the subject; in a correlated curriculum a subject is taught with reference to the contribution which the content of other subjects may make to the fullest understanding of it The two distinctive features of the subject curriculum are the following:

2.2 Classification and Organization of Subject Matter

The first distinctive feature is that the subject matter is classified and accordance with the divisions of labor in research. From a historical standpoint, the classification of knowledge is a function of the accumulation of knowledge. As men found out more and more about their world, the point was reached at which it become desirable to classify their learning in order to make reference to it more easily, to use it more effectively in

further study of their environment, and to explain to others the knowledge they had gained.

In the subject curriculum, the content is selected and ordered in such a way as to discipline the student in those classifications and arrangements of ideas that have proved most beneficial in locating and investigating new problems of specialized research. The knowledge is not classified and ordered with a view to increasing the practical intelligence and wisdom of the learner. In other words, the bearing of the subject matter upon questions of social policy and decision is ignored in the subject curriculum: Its chief characteristics both its selection and arrangement. Instead, the content is chosen and organized in accordance with the needs of the scientist or research specialist, who is interested in the subject for its own sake" and consequently orders facts and principles so as to render them most useful in conducting further research in the subject. But the most comprehensive purpose of this type of curriculum is to develop the capacity of any student to take on more and more of his culture under his own steam. By becoming disciplined in subjects such as mathematics, history, English, and science, the student acquires the ideas, facts, and skills by which to continue to grow in the wider society when his school days are over.

It is sometimes thought that a subject consists of one kind of content. But this is an erroneous belief. A subject is very complex. It is made up of many different kinds of content, each kind leading to its own particular outcome of learning. For example, English consists of the principles of grammar and rhetoric, the various selections of literature, words to be spelled, and materials involved in the development of skills in written and oral expression. Similarly the complexity of all other subjects could be shown.

From this analysis it is clear that specialization is relative. At the college level, a subject is usually broken down into its component parts: one finds specialized subject in literature, speech, journalism, rhetoric, and so on. And at the more advanced levels of the college and university each of these specialized subjects is further divided into courses for intensive study.

3. EMPHASIS ON TECHNIQUES OF EXPLANATION

The second distinctive characteristic of the subject curriculum is that this curriculum emphasizes expository discourse and techniques of explanation. Exposition is a form of discourse in which ideas are stated and elaborated so that may be understood. The main ideas are ordered and explored, and, when convenient, illustrated. While the reasons for the truth or falsity of ideas are give, sometimes in great detail, student experimentation except for formal laboratory work is seldom set forth.

At least four kinds of exposition are found in the subject curriculum. The first is that which proceeds from the simple to the complex. The simple is defined as that which contains few elements or subordinate parts, as a one-celled animal is simpler than a many-celled animal or as hydrogen and oxygen are simpler than chemical compounds.

Chemistry and biology courses are frequently organized on this principle; and the organization of many other courses, such as grammar and foreign languages, is influenced by it in more or less degree.

The second is an expository order based upon prerequisite learnings. This principle is followed particularly in subjects consisting largely of laws and principles, such as physics, grammar and geometry. Geometry is organized on the supposition that the theorems bear a particular logical relation to one another and are best learned in that relation.

The third form of exposition is that which proceeds from the whole to the part. Geography frequently begins with the globe, with the idea that the earth is a sphere, because this conception serves to interpret many geographic observations, such as differences in time and seasons.

The fourth kind of exposition is chronological. Facts and ideas are arranged in a time sequence so that presentation of later events is preceded by discussion of earlier one. This is the organization followed in history courses-and frequently in literature courses, literary selections-being arranged in time sequence.

Teaching procedures and techniques are largely based upon language activities-lectures, discussions questions and answers, written exercises, oral reports term papers and the like. Most of the activities tend to emphasize the meaning of terms in their relation or other terms. Hence the subject curriculum tends not to use such activities as painting, cartooning, modeling, designing, constructing, and the like, for these are seldom suited to the purposes of instruction. However attention can be given to the development of critical thinking. Statements can be examined to ascertain their meaning their logical grounding, and their factual support. Moreover, problems that fall within the subject can be formulated and studied. Despite these possibilities, however, the processes of mere absorption and memorization have been stressed in the subject curriculum. That language activities are emphasized in the subject curriculum is further evidenced by the methods conventionally used to evaluate progress in the subjects. These methods commonly ask for facts, principles, and other evidences of understanding and mastery of content, rather than for evidence of growth in habits of effective thinking and skill in social processes.

4. ESSENTIAL CHARACTERISTICS

The following paragraphs describe the characteristics essential to, but not distinctive of, the subject curriculum.

4.1 Required and Elective Subjects

The first of the essential characteristics of the subject curriculum is that subjects may be required of all students, required only for certain specified groups, elected by certain groups, elected by certain individuals, or elected by anyone. It is common practice to have courses in certain subjects required of all students. Other courses are required only

of those in a particular program of study, such as the college preparatory sequence or the commercial sequence.

Similarly, certain courses are designed as electives to be chosen by anyone, while other courses are designed only for those following a certain sequence of courses.

Some pattern of required and elective courses is an essential characteristic of the subject curriculum. However, such a pattern is not distinctive of the subject organization; for the core curriculum also requires certain common areas of experience (although they may not be called courses), and it may have elective areas beyond these required ones.

4.2 Constant Subjects as Defining "General Education"

Constant subjects constitute the greater part of the "common learning" or "general education" program. The program of general education is determined in the subject curriculum by making some subjects constant in all programs of study. These constants do not, of course, constitute all of the common experience areas.

4.3 Experiences Not Identical

A third essential characteristic of the subject curriculum is that: Requirement of subjects does not mean identical experiences for all students. It is unfair to accuse the subject organization of attempting to provide identical experiences for everyone studying a required subject. Teachers of a subject curriculum are not untrained in educational psychology. They know about individual differences and understand the necessity of taking these into account in the teaching process. Thus, while the ends of the instruction are still couched in terms of subject matter, the instruction is not planned with either the desire or the hope that all students will leave the courses having had the same experience. In fact, if we assume good explanatory methods--and in judging the theory of the subject curriculum we have no right to assume less--every effort is made to bring the more able students to a better understanding of the facts and principles of the subject than the less able ones could possibly reach.

4.4 Planning Programs and Courses in Advance

Required and elective subjects are determined in advance. In order to plan course offerings, it is necessary to determine in advance which courses to offer, the number of sections of each, the people who are to teach them, and the people who are to enroll in them. It is also necessary to decide the grade level at which each course is to be offered and to select the students who are to be required to take or are free to elect each course at each level. There are, for instance, certain required courses for juniors in the college preparatory program. These same students are free to elect certain other courses as juniors, and they know in advance which courses will be required and which ones will be electives when they are seniors. This is an essential characteristic of the subject curriculum. Again it is not distinctive, for the same general planning also characterizes the core curriculum.

4.5 Provision for Individual Interest and Abilities

A fifth essential characteristic of the subject curriculum is that elective courses, differentiated assignments, and special programs care for individual differences in interest and ability. Adjustment of instruction to the interest and abilities of students is made in the subject curriculum partly by elective subjects and partly by differentiation of assignments within subjects. If a boy is interested in farming, he may take courses in agriculture; if a girl is interested in becoming a nurse, she may take courses such as biology and chemistry, which bear upon her special interest.

Within a subject the teacher may adjust instruction to differences in student interest and abilities by differentiation of assignments. One individual may satisfy his particular interest, for example, by preparing and making reports to the class on topics of interest to him, or he may do special projects along the lines of his interest. Variations in ability may be provided for by differentiated assignments in which the faster learners participate in more as well as different activities.

4.6 Social Direction

The sixth essential characteristic of the subject curriculum is that this curriculum may or may not be given deliberate social direction. It is now generally recognized that it is impossible to teach in a social vacuum. No teacher can carry on the instructional process without moving in some social direction. The first choice of direction is made in the determination of educational goals. If these goals reflect lack of concern for the pressing problems of society and for the democratic resolution of these problems, there is still no neutrality with respect to the social consequences of education. This is true because whatever goals are chosen, whatever values and knowledge are taught, they are either for or against the status quo or some special interest group within the society. Were a teacher to succeed in his efforts to be neutral. The effects of his success would be to strengthen the status quo. To take no side is, in effect, to throw one's weight to the side of those currently in power.

It is really not necessary that the subject curriculum be planned without regard to questions of social direction. Whether it is so planned or not depends upon the social sensitivity of those who do the planning and teaching. There is no good reason to suppose that the content of history, English, or even mathematics could not be selected and taught in such a way as to help students to rebuild social values as well as to learn fundamental ideas, beliefs, aspirations, skills, and methods of thinking. In this event, however, questions of "what should be" must be emphasized no less than the accumulation of factual knowledge or the development of skills. It should be noted that such distribution of emphasis is infrequent in the subject curriculum.

4.7 Trained Teachers

Teachers should be thoroughly trained and disciplined in at least one subject. Attention is directed to the dual aspect of this requirement. Teachers should possess mastery of at least one field of knowledge. They should also have adequate training in educational methods peculiarly suited to the presentation of this field. The history teacher will know

history and will know how to teach history so that children will learn and remember the facts and understandings comprising the goals of instruction.

The teacher should also know the logic of the subject he is to teach. He should be able to recognize statements such as definitions and other analytic statements which are true without reference to particular facts. He should know the difference between descriptive and normative generalizations as well as the difference between the methods of verification and justification appropriate to them. He should know the levels of knowledge in his subject--that is, he should be able to explain a statement by showing its derivation from other statements. He should know the difference between logical validity and truth and be able to recognize and deal with formal as well as material fallacies. All of these things the teacher should know in the context of his subject. For no matter how much factual knowledge he may possess, the teacher will be handicapped unless he can maneuver logically in the domain of his subject. In order to acquire logical knowledge of his subject, the teacher will need to study logic, philosophy of science, theory of knowledge, and analytic philosophy. Usually some formal work in these studies will be necessary. But in any event, courses in pedagogical method and curriculum development should emphasize the uses of such knowledge.

4.8 One Classroom for Each Teacher

Each teacher will have one well-equipped schoolroom. Teachers have found that they can instruct in a subject better if they have a room especially designed and equipped for the optimum development of that subject. The history teacher will be able to teach history more effectively in a room where he has on hand the maps, charts, pictures, and most essential books ready for the job. Similarly, the physics teacher should have a laboratory equipped and arranged to facilitate his own methods of teaching physics. Ideally, the chemistry teacher should have a separate laboratory designed for the requirements of his subject.

4.9 Transportation for Field Trips

Arrangements should be made for the transportation of classes to centers where the subjects can be enriched and vitalized. The most effective subject-matter teachers have long sought the very best instructional experiences they could devise in the teaching of their subjects. If effective pursuance of the subject requires that the hygiene class go to a hospital, the botany class to the woods, the zoology section to a lake, the art group to a museum, and the English class to the office of local newspaper, there is no doubt at all that transportation should be readily available for these trips. One caution comes readily to mind. It would be an error to assume that two groups of children who happened to take a trip to the same place had thus benefited from the same educational experience. No two children can possibly have identical experiences; but beyond this consideration, the purposes for which the experience is designed will determine in large measure the values to be gained from it. A trip taken for the purpose of developing better understating of a subject would have different values from those gained through a trip to the same place designed to facilitate the solution of a group or individual problem.

4.10 Length of Class Periods

A fourth requirement for best operation of the subject curriculum is that the length of class periods be conducive to maximum progress in the subject. A subject organization is no more bound by its own administrative devices than is any other type of organization. Spelling, for example, has been taught largely by techniques of memorization, and experimentation with these methods has long indicated that the class period should be fifteen to twenty minutes in length. As a consequence, a short period is the general practice when spelling is taught as a subject. On the other hand, many schools have found that the learnings in certain of the science courses can be developed more efficiently in unbroken time intervals as long as ninety minutes, and such periods are fairly common.

The question of the total amount of time to be spent in any one subject during a week, month, or year, or in the entire curriculum is answered by taking into account the relative value of the subject. Considerations of teaching method shortened the periods for spelling and lengthened those for the sciences. But if spelling instruction is getting less consideration in the total curriculum sequence while science is getting more, it is because other factors besides the effects of the length of class period on achievement have been taken into account.

4.11 Providing for Common Needs

As a fifth requirement, special arrangements should be made for meeting common needs. In many schools some attention is now given to student needs which do not fit easily into the plan of any of the subjects. Personal and vocational guidance has been devised to care for some of these needs. Health examinations, student government, and social clubs have also been provided. The administrative devices created to meet these needs are numerous. Home-room periods, assembly programs, new courses, reallocation of time in existing courses, and varied types of out-of-school committees are only a few of the diverse administrative plans used to provide for these common needs. Regardless of the scheme employed, it is generally felt that these needs must be met and that the subjects as they are constituted cannot care for them.

5. THE SUBJECT CURRICULUM PROBLEMS, PRACTICES, AND CRITICISMS

Problems of the Subject Curriculum

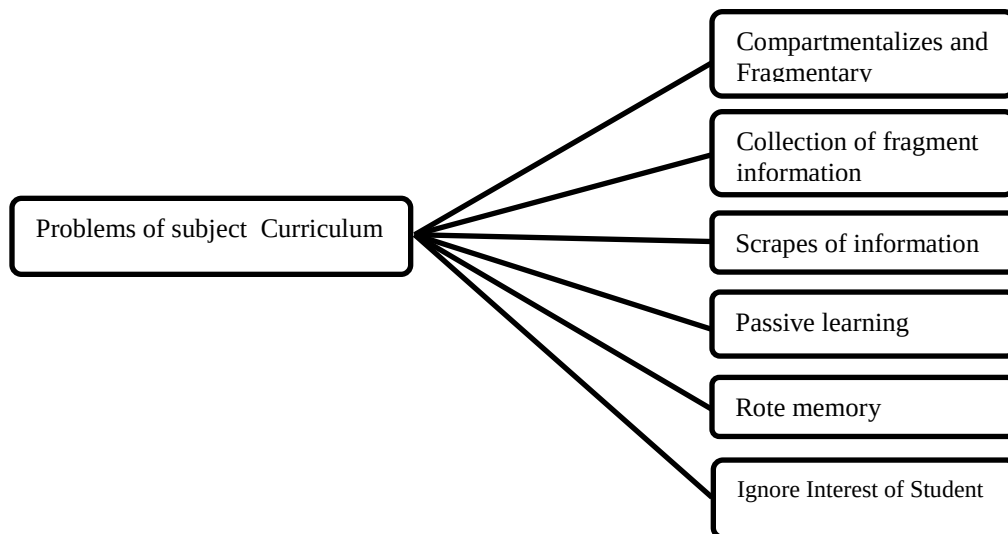
The first problem of the subject curriculum pointed out by experts is that it is compartmentalizes and fragmentary. The advocates as well as the opponents of the subject curriculum have not been slow to point out that with the rapid increase in knowledge during the last century, the subject curriculum has resulted in an instructional program so divided that all unity has been lost. While this organization may function as smoothly as a machine, teachers seem to possess neither a total picture of what is going on nor knowledge of what it all means. Each teacher is a specialist, taking pride only in the knowledge of his own subject and disclaiming discipline in, or responsibility for,

anything outside of his own little garden of subject matter, which he cultivates "for its own sake." In the words of Whitehead:

There is only one subject matter for education, and that is life in all its manifestations. Instead of this single unity, we offer children-Algebra, from which nothing follows: Geometry, from which nothing follows: Science, from which nothing follows; History, from which nothing follows: a Couple of Languages, never mastered: and lastly, most dreary of all, Literature, represented by plays of Shakespeare, with philological notes and short analyses of plot and character to be in substance committed to memory. Can such a list be said represent Life as it is known in the midst of the living of it The best that can be said of it is, that it is a rapid table of contents which a deity might run over in his mind while he was thinking of creating of creating a world and had not yet determined how to put it together.

Furthermore, the subject curriculum consists not of a body of knowledge unified by a dynamic purpose, but rather of a collection of fragments of information selected to give the learner an orderly coverage of the various aspects of the different subjects. A course in physics, for example, is but a patch of the total body of physical knowledge, and a course in grammar is but a shred of the theory of language structure. In the subject curriculum, therefore, the learner acquires scraps of information, which in his mind have little or no association with any of the great divisions of human knowledge save the ones from which the scraps have been gleaned.

Because of the fragmentary and compartmentalized character of the subject curriculum, it is unlikely that the fullest development of the intellectual aspects of personality can be attained with this organization.



Criticism on Subject centre

Neglect of the Learner's Interests and Activities

Opponents of the subject curriculum charge that it ignores the interests and activities of the learner. Since instruction in a subject curriculum must necessarily be directed to the mastery of the subjects as such, only those individuals who are either interested in academic attainment or who seek social approval through marks and promotions show much interest in the learning exercises emphasized by the subject curriculum. Psychological investigations indicate that situations most conducive to growth are those that involve the making of choices and policies of concern to the learner. The inability of the strict subject curriculum to make use of such situations largely divorces it from the concerns of those enrolled. As a result, it incorporates inefficient methods of teaching and learning, depending for the most part upon repetition and memoriter drilling. It is interesting to note, in this connection, an observation made by James Harvey Robison, who can hardly be accused of lack of respect for research and intellectual discipline.

Both the textbooks and, manuals used in formal teaching and the various popular presentations of scientific facts written for adults tend, almost without exception to classify knowledge under generally accepted headings. They have a specious logic and orderliness which appeals to the academic mind. They, therefore, suit the teachers fairly well, but unhappily do not inspire the learners.

Moreover, it is now generally known that many things are learned at the same time. While an individual is learning facts, principles, or skills, he is also learning to like or to dislike the subject, the people about him, the school, and so on. These extra learnings are usually referred to as "concomitant outcomes". In the subject curriculum these learnings all too frequently turn out to be undesirable for when the learner can see little or no meaning in the mastery of content, save as a means of escaping failure and the resulting public disapproval, all sorts of undesirable attitude are likely to be built in to his character.

i. Inefficient Arrangement of Content

The subject curriculum has been criticized as an inefficient arrangement of content for learning and use. The subjects are logically ordered. But there is no good reason to suppose that such an arrangement of subject matter is conducive to learning; nor is there reason to suppose that the order of teaching determines the way in which the content will shape up and function in the experience of the learner. It has long been recognized that the order in which learning occurs is different from the order given the content of learning when it is arranged for communication. The order of discovery is different from the order of telling about the discovery. How things are found out, or worked out, is ordinarily referred to as the psychological order. How these things are systematically arranged for communication constitutes the logical organization. Almost a half century ago Dewey called attention to the importance of this distinction for the organization of instruction. The fact is that the organization of ideas--or for that matter of anything else--depends upon the purpose. Since the purposes of the learner are seldom the purposes implied by the subject curriculum, the

organization is of necessity often alien to the centers of interest about which the experiences of the learner crystallize.

ii. Neglect of Social Problems

The subject curriculum is charged with being divorced from current and persistent social problems. This is one of the most trenchant criticisms of the school in recent years, and the subject organization has earned a good share of the indictment. It is asserted that because the subject organization consists of an exposition of what has been done in the past and commits the student to a mastery of this knowledge, it necessarily ignores current social issues and conflicts. It is further claimed that discipline in the resolution of these is a major responsibility of the schools. The products of the subject curriculum know more about the crusades than they know about the management of modern industry; more about the structure of the earthworm than about their own bodies and the status of public provisions for their health; more about the exploits of Napoleon than about the nature and workings of their own economic and political systems; more about what and commitments of the American people are or should be.

This social isolation is almost inherent in the subject curriculum. It arises out of the fact that the content is taught as a self-contained system. This means that the facts and principles are taught apart from any use they might have in dealing with the **confusion and conflicts of today and that** their significance must be found in their function in the system of which they are a part, rather than in the activities of the community.

iii. Failure to Develop Habits of Effective Thinking

The subject curriculum is also criticized by people who say that the subject curriculum fails to develop habits of effective thinking. This curriculum places emphasis upon mastery of the conclusions of thought rather than upon mastery of the processes by which the conclusions were derived and confirmed. Therefore some critics claim that the subject curriculum is largely responsible for the uncritical tendencies and gullible attitudes of the academic mind and of the people generally. Moreover, the fact that the content of subjects is presented in an expository form has usually meant that the individual learns by repetition and memorization. The subject curriculum is, therefore, in danger of placing relatively little importance upon reflection especially such reflection as is involved in the critical examination of a conclusion or proposition in the light of its supporting evidence. Nor does an expository presentation attach importance to discipline in the thinking processes by which conclusions are reached and validated. The usual assumption is that anyone who has mastered the facts and principles can think effectively. However the assimilated evidence of investigations repudiates this assumption and supports the position.

Modification of the Subject Curriculum

Partly in response to criticisms, partly in response to the general feeling of dissatisfaction with the part of both the teaching profession and the public and partly as the result of new psychological and educational conceptions, serious efforts have been made to improve the subject curriculum. These efforts have taken various forms, depending upon the

diagnosis of the difficulty, and have resulted in at least two modifications of the subject curriculum--namely, the correlated curriculum and the broad-fields curriculum.

The Correlated Curriculum

The correlated curriculum is a subject curriculum in which two or more subjects are articulated and relationships between or among them are made a part of instruction without destroying the subject boundaries. The idea of correlating courses originated in the last century from the psychological and educational conceptions of Herbert. His views laid great stress upon concentration, by which he meant complete absorption in an idea or object of thought, and correlation, by which he meant the reinforcement of the idea by related and supporting conceptions. These conceptions emphasized interest, meaning, and relation, which led his follower to the notion of concentration and correlation of studies in their view concentration was interpreted as the grouping of subject around a central stuffy and correlation was interpreted as the support of the topic subject by related studies.

For example, history and geography may be taught so as to reinforce each other, or courses in science and mathematics may be conducted in such a way that the mathematics becomes a useful tool in science, and the scientific data and problems become material for study in mathematics courses. Again history may be made to contribute to the understanding and enjoyment of literature, conversely, the study of literature may be made to contribute to the understanding of historical events and personages. In elementary social studies, stories of early Mediterranean peoples--Hebrews, Greeks, Romans--may be studies in connection with the geography of Egypt and the Nile Valley may be accompanied by a study of the early history of the Egyptians.

Three kinds of Correlation

There are three kinds of correlation, depending upon the kinds of subject matter involved factual, descriptive, and normative. **Factual correlation** is illustrated in the articulation of history and literature when the historical facts concerning the writing of a piece of literature or the past events upon which an historical novel is based are studied with a view to enriching the enjoyment of the reader. Another illustration is found in the subjects of history and geography when the facts of geography are studied as the setting of an historical event. For example, the geographic facts about the origin and growth of a city may be helpful in understanding the forces determining the location of cities as well as the direction of the flow of nation's wealth.

Descriptive correlation is illustrated in the use of generalizations common to two or more subjects. Psychology can be correlated with history, or with any of the social studies, by employing psychological principles to explain social events. Conflicts between nations, for instance, are sometimes explained on the principle of frustration and aggression; that is to say, on the theory that a people who are frustrated over a period of time will, under certain conditions, become aggressive and take up arms against other nations. In this way, courses in psychology may be made to contribute significantly to courses in the social sciences. In addition, such subjects as physics and chemistry biology

and psychology, mathematics and sciences can be articulated at the level of descriptive principles as well-as through factual relationships. Carried to its logical conclusion, however, correlation through descriptive principles among closely related subjects such as chemistry and physics, or economics and sociology, will result in a fusion course, a form of the broad field type of subject organization. The ultimate basis of the unity of subjects is the similarity or identity of their fundamental principles common to two or more courses, if used as the nucleus about which the factual content is organized, will result in broad, unified courses such as general science.

Normative correlation is attained in much the same way as descriptive correlation, the chief difference being that the principles are social moral rather than descriptive. For instance, American history and literature may correlated at some points through the social--moral principles constituting the theory of democracy. Such general ideas as equality and freedom--conceptions essential to the understanding of American--history are equally needed in comprehending and appreciating such American writers as Emerson, Thoreau, and Whitman.

The extent of correlation between subjects depends upon the inherent relations of the subjects convenience, and the knowledge and wisdom of the teachers. If correlation is not planned for however it occurs only occasionally and incidentally. In order to encourage the articulation of courses, they are often scheduled so that related subjects can be taught by the same teacher or by co- operating teachers. Thus, history and literature courses covering the same cultural period are some-times provided in the same semester. Moreover, it is necessary that teachers work out definite plans for securing the maximum amount of correlation if a correlated curriculum is to be established and maintained. Sometimes special committees are appointed to plan for desirable correlations among the subjects.

Activity Curriculum

History

Although the fundamental conceptions of an activity curriculum have a long history, some of them extending back to Rousseau and others as far back as Plato, the formulation of an activity curriculum is a comparatively recent achievement. Curriculum of this type emerged in a few experimental schools around the end of the last century. The title "activity curriculum," however, did not come into general use before the 1920's, although Dewey had used the expression "activity program," in the sense here implied, as early as 1897 in a talk to the parents and teachers of his laboratory school in Chicago.

Introduction

Active Learning is, in short, anything that students do in a classroom other than merely passively listening to an instructor's lecture. This includes everything from listening practices which help the students to absorb what they hear, to short writing exercises in which students react to lecture material, to complex group exercises in which students apply course material to real life situations and/or to new problems.

Definition

According to Tanner and Tanner

"Activity curriculum is an attempt to treat learning as an active process. Activity curriculum discards the boundaries and the curriculum was centered largely on areas of child interest. The objective of curriculum was child growth through experience."

According to Beans

"The major premise of activity movements was that learner ought to be active rather than passive participants in learning".

1. Rise of the Activity Curriculum

With the possible exception of the Tuskegee Institute, the first school in America to be set up and operated with an activity curriculum was the Laboratory School, established at the University of Chicago in 1896 as a co-operative venture of parents, teachers, and educators under the direction of John and Alice Dewey.

The Dewey laboratory school

The curriculum of this school was based upon four human impulses: the social impulse, which is shown in the child's desire to share his experiences with the people around him; the constructive impulse, which is manifested at first in play, in rhythmic movement, in make-believe, and then in more advanced form in the shaping of raw materials into useful objects; the impulse to investigate and experiment, to find out things, as revealed in the tendency of the child to do things just to see what will happen: and the expressive or artistic impulse, which seems to be a refinement and further expression of the communicative and constructive interests.

These fundamental impulses are "uninvested capital" as Dewey put it and the child's growth and development wait upon their use. The curriculum of the Dewey School was designed to utilize in the education of the young these basic impulses toward "saying, making, finding out, and creating." It took the form of certain occupational categories, not of school subjects. In Dewey's language:

The core of school activity was to be found in occupations, rather than in what are conventionally termed studies. Study in the sense of inquiry and its outcome in gathering and retention of information was to be an outgrowth of the pursuit of certain continuing or consecutive "occupational activities."

The occupations included in the curriculum were cooking, sewing, and carpentry. These should be sharply distinguished from trade and vocational training. They were conceived as embracing man's fundamental relations to his world- as including the activities involved in getting food, in securing shelter and clothing, and in providing the conditions within which the higher interests and values of life may be developed and maintained. As such they required intellectual activities as well as manual manipulations. On the one hand, these occupations gave opportunity for shaping materials, for working with the

hands; on the other, they required planning, contriving, and experimenting. In addition, they were not studied merely in this contemporary setting but also in the different cultural phases of man's history from primitive times to the present. They were thus enriched and deepened, suffused with the values of social life.

Meriam's Laboratory School

In 1904 J.L. Meriam began the development of a new curriculum in the University Elementary School at the University of Missouri. There was complete absence of conventional subjects in this curriculum. In their place were created four categories of activities--observation, play, stories, and handwork--based upon five principles:

1. The curriculum should provide for meeting the immediate needs of the pupils primarily; only secondarily should it provide for the preparation of pupils for later needs.
2. The curriculum should be expressed in terms of concrete everyday activities of pupils and adults rather than in terms of generalization such as found in traditional subjects.
3. The curriculum should provide for great individual differences in order to meet varying tastes and abilities of the pupils.
4. The curriculum should be so organized that the various topics may easily be interchanged not only within any grade during the year, but from grade to grade.
5. The curriculum should provide for an acquaintance with both work and leisure.

This curriculum, like the curriculum of the Dewey School, makes the skills of the Three R's means of enriching the activities of children rather than ends toward which the activities are directed. Arithmetic is interesting to the children because it facilitates and enriches the games; the games are not played as in traditional school, in order to develop the skills. A further similarity between the two schools is the fact that Meriam attempted also to make the school a part of the life of the community, to remove the heavy insulation which the extreme subject curriculum presumably had created between the conventional school and the life of the people.

Collings' Experimental School

The Dewey and Meriam schools were the forerunners of the activity curriculum. During the second decade of the 20th century many schools, mostly private one, experimented with new curriculum organizations, which followed more or less the theory and practice of these earlier educational ventures. It was not until the 1920's, however, that the activity movement reached the public schools. Partly because of the impetus given the movement by the growing number of private and university schools, partly because of the appearance of a clear and stimulating rationale of this new curriculum organization by William Heard Kilpatrick in his brochure entitled *The Project Methods*, which appeared in 1918, the number of schools experimenting with some form of activity curriculum increased by leaps and bounds. However, the first significant development in this direction was Ellsworth Collings' experiment with a project curriculum. This experiment was carried on in the rural schools of McDonald County, Missouri, beginning in 1917, a year before Kilpatrick's brochure was published.

The major divisions of the curriculum of Collings' experimental school--closely similar to those of the Meriam school--were: play, Excursion, Story, and Hand. These categories of activities led to the development of an instructional program believed to be based upon child interests and abilities. The curriculum of the school, in bold outline, was described by Collings in the following way:

1. Play projects represent those experiences in which the purpose is to engage in such group activities as games, folk dancing, dramatization, or social parties.
2. Excursion projects involve purposeful study of problems connected with environments and activities of people.
3. Story projects include purposes to enjoy the story in its various forms- oral, song, picture, phonograph, or piano.
4. Hand projects represent purposes to express ideas in concrete form to make a rabbit trap, to prepare cocoa for the school luncheon, or to grow cantaloupes.

Distinctive Characteristics

Three features of the activity curriculum distinguish it from both the subject and the core curriculums.

Children's Interests, Content and Structure

The primary principle of the activity curriculum is that the interests and purposes of children determine the educational program. What is taught, when it is taught, and the order in which it is learned go back to what is required for the realization of children's purposes.

It is important at this point to indicate that this most basic principle of the activity program refers to the felt interests and felt needs of children--the matters with which children themselves find compelling concern--and does not refer to "interest" in the sense of doing something "in the best interests of children". Nor does it refer to adult conceptions of what children should be interested in or what children need. For an adult to determine that a child needs, for example, "to feel secure and happy in the school environment", and then to claim that this is a felt need of the child, is a habit of thought that has led to many misconceptions of the theory of an activity curriculum. The content and the structure of an activity curriculum are determined primarily on the basis of the interests that children would call their own.

According to the theory of the activity curriculum, children are always actively engaged in doing something. Interests do not have to be created de novo. Some interests are always present. It is the task of the teacher to discover these and to build educative activities upon them. From these activities new interests arise, which in turn will lead to further activities and so on through the entire career of the child. This fact gave rise to the notion, frequently expressed, that the activity curriculum is characterized by "activity leading to further activity".

The principle that the educational program is to be shaped by the interests and purposes of those to be educated gives a special place to subject matter in the educative process.

This principle implies that subject matter is a means of fulfilling the purposes and aspirations of the individual or social group. It denies the traditional notion that interests and purposes of children are merely aids in learning the subject matter that adults set out to be learned. In its view, subject matter is useful in shaping and directing activities in response to the impulses and purposes of the individual. Knowledge thus originates in actions devoted to the realization of purposes. Children do not set out to acquire learning as such, but to do things. In the course of doing things, they have need of subject matter, and as a result of manipulating content and materials in doing these things they learn.

Common Interests and "Common Learning"

A second distinctive characteristic of the activity curriculum is that "common learning" results from the pursuance of common interests. Since child interest is the first delimiting factor in determining what to teach, general education, or commonness of education, is possible only to the extent that children have like interests. Curriculum workers have long been conscious of wide differences in the experiential backgrounds of children, even of those found within a single classroom, and of the resulting differences in interests. They have been no less aware of strains of common backgrounds and common interests—witness the almost universal popularity of certain kinds of toys at certain age levels. If the number of such shared interests is sufficiently large, the activity curriculum can provide for common learnings.

On the other hand, this curriculum lacks common learning's to the extent that children lack mutual interests or choose widely different paths in the pursuance of those interests which are shared. Thus, the activity curriculum may or may not have a common learnings program; and the answer to whether such a program is possible or probable depends upon the results of much more conclusive research than is presently available regarding children's interests. Experimental studies of children and their interests have given little tangible evidence concerning how widespread or consuming these more prevalent interests are at different age levels. Location of these common elements and investigation into their nature thus continues to be a major concern of those advocating an activity curriculum.

Since the common elements of both subject and core organizations are rather definite planned in advance, the activity curriculum holds a somewhat fortuitous position with respect to general or common education. The activity organization is also unique in the source from which the common learnings are derived. Instead of coming from organized fields of knowledge, as in a subject organization or from problems of social living, as in the core curriculum, the source is the experiences required by the interests and purposes of children. The extent of the commonness depends upon the extent to which these experiences are shared in common by the children.

Preparation-But No Strict Planning in Advance

The third distinctive characteristic is that the activity curriculum is not planned in advance. Since child interests provide the starting point for instructional planning, it follows that the activity curriculum cannot be pre-planned. To predetermine the activities

would be to assume that all groups of children will find these activities most in keeping with their interests. The errors of adult divination of child interests are too well known for anyone to have confidence in such pre-planning. Children who live in one section of the country are likely to have different interests from those who live in another section. Children who live in underprivileged homes are prone to have different interests from those who live in well-to-do neighborhoods.

While the teacher cannot plan the curriculum in the sense of determining in advance what the children are to do, he is responsible for several major tasks for which planning is necessary. He must work with individuals and groups of individuals to discover their interests; he must guide them in evaluating these interests and in making selections from among those which are considered. Then he must help the individual or group to plan and to carry out the activities required in the pursuit of these interests. Finally, he must guide the individual or group in assessing what they have accomplished. All of these responsibilities require that the teacher make plans for his own activities in the classroom. He must decide how he can best help the children plan what they will do, how they will do it, and how they will evaluate the results of their activities. Such planning requires not only consideration of teacher behavior, of the relative value of possible interests, and of the materials with which children might work, but also keen insight into child growth and development and into group structures and dynamics.

For these reasons those who work in schools where there are activity curriculums want as much information as possible about where the classroom work may lead. Materials and equipment must be available, and possible ways of seeking out the interests of individuals and the group must be explored. As a consequence, those teachers working in an activity curriculum are forever seeking more information about child growth and development. Especially do they need results of investigations that attempt to locate dominant centers of interest at various age levels. Consequently categories of interests based on research studies and practical experience are often included in descriptions of activity programs.

Essential Characteristics

In each pure-type curriculum there are but a few characteristics that are not shared at all by either of the two other types. The three characteristics just described provide the uniqueness of the activity of the activity curriculum. However, built around these central pillars is a structure of further characteristics every bit as essential to the type but not restricted to it.

Co-operative Planning by Students and Teachers

For the activity curriculum, the first of these characteristics is that activities are planned co-operatively by students and the teacher. The theory of the activity curriculum embraces the notion of a group--of which the teacher is a co-operating member--choosing its own area for work, defining the problems to be met, planning the activities, carrying out the work, and finally, evaluating the experiences. This notion is justified on the grounds that both pupil interest and desirable pupil growth demand that children take part in the planning of curriculum projects. Children will, then, see plans take shape for the

realization of their purposes and will at the same time develop the ability to do the kinds of problem solving and investigation required to meet their needs. Children are thus engaged not solely for the knowledge gained but also for the satisfactions, methods, and disciplines resulting from participation in the planning process.

Implied in the notion of co-operative planning is the idea that objectives also are to be determined co-operatively. If this were not so, and if the objectives were determined instead by teachers, pupil purposes would be honored only in theory.

Ambiguity with Respect to Social Direction

The second essential characteristic of the curriculum is that the curriculum may or may not have deliberate social direction. It has already been pointed out that no educational program is socially neutral. It is impossible to educate in a social vacuum or to maintain any complete neutrality of social position while educating. If education changes behavior-and teaching efforts are futile to the extent that they stop short of behavior changes-then these changes, or the lack of them, are sure to show in the attitudes, beliefs, and actions taken in the matters of social concern. Decision, conscious or unconscious, to ignore matters of social concern by not dealing with these in the curriculum, or to study them in the vain hope that pupils can sit high on an impartial judgment seat, is not only ostrich like but in effect tends to throw the influence of the group toward the maintenance of the status quo-another way of lending support to individuals and social groups currently in power. The real question here, as in the subject matter curriculum, is not whether an activity program has a social direction: rather, it is a question of whether this direction is deliberately considered and consistent one.

The first basis for the selection of curriculum content is the interests of children. These interests have been conditioned by the radio, television, motion pictures, comic books, newspapers, homes, the church, the school, and countless other mind-forming agencies. It would be wishful thinking to expect to find a consistent social orientation reflected in the interests acquired by any elementary school class. All these interests will undoubtedly reflect aspects of living in twentieth century America. But contemporary society is not characterized by a single environment or a single set of value standards. It is instead compounded of many environments and conflicting values and the interests of children will reflect these differences.

Children often have more interests than they can follow at once, and sometimes their interests are not worthy of the children's efforts to follow them. Hence a second basis for the selection of content is a criterion for choosing among expressed interests. This is a critical point, for the writings of some theorists on the activity curriculum set forth a value framework for use by teachers in helping children to select worth-while interests. Furthermore, some of these frameworks are characterized by a consistent social orientation.

This indecisiveness or ambiguity with respect to social orientation is not a distinctive characteristic of the activity curriculum. It is shared by the subject curriculum, where

loyalty to a field of knowledge rather than to the interests of children rises as a barrier to curriculum planning for social reconstruction.

Problem Solving the Dominant Method

The third essential characteristic of the activity curriculum is that problem-solving is the dominant methods. When a group or an individual decides to do something, it not infrequently happens that difficulties are encountered. The task of overcoming a difficulty or barrier constitutes a problem. In the activity curriculum, the teaching-learning process consists largely of problem-solving. This is true because in the pursuit of interests and purposes various difficulties will arise, and pupils and teacher will be challenged to find ways of overcoming these obstacles.

In the activity curriculum the learning process is not short-circuited by simply telling children what they want to know or doing for what they ought to do. While "telling" is used from time to time, it is not the whole of the teaching process and is to be used sparingly and at such times as will best facilitate problem-solving activities. The major values of this curriculum are not to be found in the answers to problems, although these are not unimportant but in the leanings inherent in the activities of problem-solving by which purposes are realized.

From the fact that problem-solving is at the heart of the teaching-learning process, it follows that subject matter is studied as a means of solving problems and not as an end in itself. It is thus unfair to contend that an activity is carried on without subject matter. Actually, subject matter from almost every filed of knowledge is used in the activity curriculum, because the interests of children lead to problems requiring a great diversity of content.

Little Need for Extra-curricular Features

As a fourth essential characteristic, children's individual needs and interests are met within the program of the activity curriculum. In a preceding chapter it was pointed out that the subject curriculum does not readily lend itself to the encouragement of certain interests of children. Hence, special classes and out-of-class activities are often necessary to care for children's individual needs. In marked contrast, an activity curriculum probably has less need for extracurricular features and other special arrangements than does any other curriculum organization. By the very nature of this curriculum, children's interests are not only recognized but are a primary basis of the curriculum itself.

The school recognizes a responsibility to help the child who wants to pursue an interest beyond the domain of a particular project. Every attempt is made to allow this interest full development within the curriculum. A small group may be helped to start a camera club or model airplane club as additional activities. However, it is altogether likely that the scope of various projects will allow free play of these interests within the curriculum. Similarly, a handicapped child, or one markedly retarded in some skill, may require special arrangements for his care; but the extreme flexibility of an activity program will provide, without recourse to special arrangements, help for many of these marked

deviates. Within any chosen activity there are many opportunities for the lay of individual interests and for the care of individual needs.

Special Subjects for Special Needs

The fifth essential characteristic of the activity curriculum is that special subjects provide for specialized interests. Even in the early elementary school program children's interests and felt needs sometimes fall into areas best characterized by subject matter boundaries. While the individual is motivated to learn the skills of reading, arithmetic, writing, spelling and speaking by the need to engage in certain activities, activity programs have found need for a time set aside for further development of these skills. Further work may be informally and flexibly scheduled. It should be problem--motivated, and be quite unlike the usual "drill period" in reading, spelling, or arithmetic.

Personnel, Physical Features, and Administrative Arrangements Required for Optimum Operation

These features of an activity curriculum are of a different order from the distinctive and essential characteristics considered above. They are discussed in order to point up a few of the practical implications of previously mentioned characteristics, and to give a better view of what the activity curriculum requires to run smoothly.

Training of Teachers

Teacher should have a broad general education with specialized training in child and adolescent development, guidance and project methods of teaching. A teacher in an activity curriculum may well have deeper interest and more specialization in one field of knowledge than in others, but there is little need for extensive training in the segmented branches of organized subject matter. Much more vital is broad training in a number of general areas. There should be no great gaps in fields where children's interests might lead.

Another type of training should take teachers into specific interest areas that children are currently exploring in activity programs. In these areas teachers gain familiarity not only with the area and its possibilities but with project methods as well.

It is also essential that teachers in activity programs have a better understanding of child and adolescent development than has resulted from the usual teacher training curriculums. It is truly said that students in colleges of agriculture spend more time studying the characteristics of animals and plants than prospective teachers spend attempting to understand human behavior. To work in close co-operation with children on problems arising from their interests, and to do this in such a manner that maximum growth will ensue, will require thorough understanding of child growth and development. Since work in an activity curriculum is more often carried on in groups than with individuals, much of this psychological training should be concerned with the structure and dynamics of group processes.

Also, the teacher in an activity curriculum must have thorough grounding in those aspects of the philosophical and sociological foundations of education that will insure wise

guidance in teacher-pupil selection and planning of activities. The democratic value system and its sociological and psychological justification must be mastered. The guidance skills, in which such a teacher will also be trained, will be subservient to this value orientation.

Physical Features of the School

A second requirement for operation of an activity curriculum is that building, grounds, and classrooms be large and flexible enough to permit as many activities as possible. We must remember that the physical features designed to house an activity curriculum cannot be planned for a group of preconceived educational experiences. The activities to be carried on within the school's domain will be as varied as children's interests. Experiences with problem solving methods in an activity curriculum and knowledge of children's interests will offer many clues as to building requirements. Every attempt must be made to provide flexibility of use. The rooms will have to be large-probably at least half again as large as the usual classrooms. Furniture must be lightweight and movable. Build- in facilities tend to freeze the room's uses. Plans for space and equipment must be worked out with an eye to the need for construction activities on widely varied individual and group projects. Corridors and general purpose rooms (auditorium, gymnasium, etc.) will be built to facilitate children's purposes. These will be well lighted and will have ample facilities for displays and decorations devised by the children.

Equipment and Materials in the Classroom

The third requirement is that equipment and materials are such as will satisfy the interests of children. An activity classroom would not look like a carpenter's shop, a library, an art studio, a committee room, a science laboratory, or anything else commonly seen; yet it would look something like a combination of all these-and more. An approximate idea of the materials and equipment to be found in an activity classroom may be formed by imagining a combination of many children's playrooms fitted out in the ways children would desire.

It is unlikely that the entire class group would be using the same types of materials at any one time while some children were using books and reference, materials others would be constructing; still others would be at work on the art aspects of the project and yet another group would be gathering the materials needed for a display. Incidentally this brief picture of an activity room at work may have implications for the teaching of skills. Children would have to learn to read, for instance, in the face of many factors hitherto thought to be distracting. The point here is that a picture of an activity program is not one of uniformity of either materials or activities.

Core Curriculum

AS IN THE CASE of the activity curriculum, the meaning of the core curriculum has been confused by a multiplicity of definitions. The true nature of the core curriculum demands clarification. It is the purpose of this chapter to set forth a clear-cut conception of the core curriculum. It should be borne in mind that a perfect exemplification of this conception may not be found anywhere. Yet that fact does not negate the need for

clarification at the theoretical level; for only as the core curriculum is clear in theory can the curriculum thus conceived be developed in practice.

Before turning to a discussion of the features of a core curriculum, attention is invited to a consideration of some of the roots of this new pattern of curriculum organization.

Definition

The core curriculum is the set of common courses required of all undergraduates and considered the necessary general education for student, irrespective of their choice in major.

Reference: <http://www.college.columbia.edu>

1. Beginnings of the Core Curriculum

The core curriculum grew from two widely different emphases in educational thought, a fact which accounts in part for the confusion about its theoretical meaning and for variations in its practical patterns. The first of these emphases was reaction against the piecemeal learnings accumulated from separate subjects. The organization of subject matter into a unifying core of studies was believed to be a way of enriching the content with greater meaning by making the interrelations of subject matter more evident. This line of development led to core curriculums based upon the unification of subjects as the core of the educational program.

The second emphasis was a change in the conception of the social role of public education. It became clear that as society became more and more fragmented and divided by the forces released by science and technology, the educational program must emphasize the clarification and maintenance of common values and common social perspectives. Thus a different core curriculum emerged, one which sought to give imperative social needs the central place in the curriculum. From this orientation grew such patterns as the social functions and social problems cores. The widely differing intent of these two core curriculums explains the fact that they have little in common other than name.

Early Core Programs

While certain aspects of the unified-core-of-studies idea of a core curriculum-such as the unification of subjects-are new, its essential principle was anticipated in the Herbartian notion of concentration. This notion took the practical form of one or more subjects as the center or core. In a paper read before the National "Department of Superintendence in 1896, there is found the following definition of the core curriculum which foreshadows some current conceptions of it.

Complete unification is the blending of all subjects and branches of study into one whole, and the teaching of the same in successive groups of lessons or sections. When this union is affected by making one group or branch of study in the course the center or core, and subordinating all other subjects to it, the process is properly called the concentration of studies.

At that time there were two well-known plans for the development of a curriculum in accordance with this definition, the Ziller Plan and the Parker Plan. Ziller was the founder of the radical school of Herbartians at the University of Leipzig. His scheme made the cultural studies-Biblical and profane history and literature-the center, or core, about which all other subjects were organized. These central studies were developed in a sequence determined by the culture-epoch theory. The subordinate subjects depended for their development upon connection with the central subjects, since they had no independent principle to determine their respective roles in the program. The natural sciences, mathematics, language arts, and fine arts were subordinated to or dissolved into history and literature, and the whole scheme developed in a sequence based upon the theory that the child traverses in his own development the periods through which the race has gone in its evolution. Fairy stories formed the chief material during the first year. In the second year Robinson Crusoe became the center. The nucleus of the third year was primitive history, the Bible, and literature. History began with myths, legends, heroic tales, then merged into biography, and finally ended in history proper.

Colonel Francis W. Parker's scheme of concentration employed the natural sciences as the core of the program. The subjects comprising the core were mineralogy, geology, geography, astronomy, meteorology, biology, zoology, anthropology, and history. The unification of these subjects was accomplished through their logical and philosophical relations, their unity being based upon the unity of nature. Not the least significant feature of Colonel Parker's plan was the assimilation of reading, spelling, writing, grammar, and arithmetic to the natural science core so that these subjects, which he considered as form rather than content, would no longer exist in the program as formal and isolated studies.

While the theoretical underpinning of this way of organizing the curriculum has changed from time to time, the general pattern persists. But, as will be noted in the next chapter, this idea of the core curriculum is only a radical modification of the subject curriculum.

Later Core Developments

Core curriculums involving the unification of the subjects are still the most prevalent in practice. In recent years, however, a new conception of the core curriculum has emerged from diagnoses of society. In the late 1920's, at the height of the controversy between those advocating the activity curriculum and those promoting the subject curriculum, a conception took shape which visualized the school as an instrument for deliberate social reconstruction and reintegration.

Distinctive Characteristics

Two features of core curriculum distinguish it from all other forms of curriculum organization.

Emphasis on a Core of Social Values

The core curriculum emphasizes social values. The universal elements of a culture give the society its stability and unity. The core of the universals consists of the basic values or rules by which the people govern, or ought to govern, their activities. By these rules

they decide what is good or bad, desirable or undesirable. In a period of profound social change such as that now witnessed in the society of the United States, these values begin to erode, and new ones emerge to complete with the old ones in the control of conduct. In such a period, the value system must be reconstructed and reintegrated if the culture is to survive. The values that have been taken for granted for decades or even centuries must then become the objects of study and reconstruction; and they must be deliberately applied in their reconstructed form, to various spheres of social activity.

The values that make up the stable and vital aspects of the universals constitute the heart of the core curriculum. In short, the core of the curriculum consists in large part of the socio-moral rules comprising the core of the culture. In the society of the United States, these rules are chiefly those that constitute the democratic value system. The core curriculum, therefore, places considerable emphasis upon the deliberate study of the moral content of the culture -especially as this content bears upon the resolution of the social issues that divide the people and thereby prevent effective social action.

Structure Fixed by Social Problems

The second distinctive feature of the core curriculum is that the structure of the core curriculum is fixed by broad social problems or by themes of social living. Just as the structure of the subject curriculum is shaped by the requirements of explanation and research and that of the activity curriculum by the interests of children, so the structure of the core curriculum is determined by the way in which social issues are grouped. The core curriculum in its pure form is a refinement and simplification of the basic elements of the culture that all members of the society share. These elements consists of normative rules, descriptive principles, facts, and, in addition, methods of thinking, points of view, and so on.

In the core curriculum these elements are organized into neither subject nor interest categories. Instead, they are organized into social categories based upon the major areas of social activities. In some instances, these social categories are conceived in terms of social processes-such as "The protection and conservation of life, property, and natural resources"-in which all members of society are involved. In other instances they are formulated in terms of the "needs" of individuals for social adjustment in a variety of circumstances, such as those arising in the areas of personal living, face-to-face relationships, social-civic relationships, and economic relationships.

Essential Characteristics

Each pure-type curriculum is set apart from others by a few distinctive characteristics. Those of the core curriculum have been indicated in the preceding section. In addition to these characteristics, there are other features just as essential to the type, but not restricted to it. The core curriculum has four essential features.

Common Learnings

The core areas are required of all students. The core curriculum consists of common learnings. These learnings are believed to be essential for all members of the society,

regardless of ability, social status, or vocational plans. Thus the idea that the brilliant, the dull, the maladjusted, or the otherwise exceptional individuals should not take part in the core program is due to a misinterpretation of this curriculum. It is designed to provide all youth with common social orientation and to foster social reintegration. Those who are so atypical that they must be segregated because they cannot profit from the usual instruction will still be instructed in the core areas within the limits allowed by their extreme variations of ability. The core curriculum provides instruction in communal living, and neither the normal nor atypical individual should be exempt from its requirements.

Co-operative Planning of Activities

A second essential characteristic of the core curriculum is that activities are cooperatively planned by teacher and pupils. While the theory of the core curriculum holds that all individuals enter the core areas and learn to share a common regard for matters of social welfare, it insists with equal vigor that the unique value of the individual be recognized and honored in the pursuit of common problems and common goals. For this reason the core curriculum makes provisions for teacher-pupil planning. The idea that children should have a large share in the location, selection, and definition of problems to be studied, as well as in planning the activities by which the problems may be solved, has long been accepted as a sound principle of teaching. Only by such participation do children become proficient in all phases of problem solving. Also, it is only in this way that children accept the problems as their own responsibilities.

The role of the teacher in the teacher-pupil planning of the core curriculum involves more than membership in the planning group. The teacher's role is a combination of the best conceptions of group leader and bearer of expert knowledge. As a group leader the teacher assists the group in every possible manner to reach their goals. As a bearer of expert knowledge and the moral authority of the larger society, the teacher insists upon clarification of the goal seeking and value orientation by processes of critical thought and by reference to the imperatives of a democratic society.

Provision for Special Needs

The third essential characteristic is that provisions for special needs and interests are made as these arise. The core curriculum is a more flexible organization than the subject curriculum. It is, therefore, more responsive to the interest of individuals. By the same token, the structure of the core curriculum is not based primarily upon the interests of individuals, as is the activity curriculum, and thus needs more special arrangements to care for these interests.

Even in the first grade there will be need for some specialization. Perhaps some children will want to learn to play musical instruments; others may want to express themselves in art mediums in ways that cannot be readily admitted in the core areas. The study of radio in the later grades of the core programs, for example, may not adequately meet the needs of the boy who wants to have his own transmitting and receiving apparatus and to become a licensed "ham" operator. Each area of the core program is fraught with possibilities for the

stimulation of specialized interests, but provision for further development of these specialties is to be found, for the most part, in courses outside the core program.

Skills Taught When Needed

The fourth of the essential characteristics of the core curriculum is that skills are taught as they are needed. According to the theory of the core curriculum, learning to read, write, spell, use arithmetic, work with others, think effectively, or perform adequately a host of other skills should be motivated by a feeling of need on the part of the individual. Reading, for example, would begin when children want to read or when they see that they must learn to read in order to do the things they wish to do. This generalization with respect to the teaching of skills applies equally to all grade levels. A child would not learn to spell osmosis, to read railroad timetables, to use a dictionary, or to compute the area of a rectangle, until the problems with which he is concerned call for the use of these skills. The core program, however, provides the problems and experiences that create the need for various skills. Motivated by this demonstrated need, time would be allocated for the individual to pursue these skills both in the core program and in special periods set aside for that purpose. While the skills will be developed, for the most part, in special classes, their significance and utilization are found in the core areas of the curriculum.

Personnel, Physical Features, and Administrative Arrangements Required for Optimum Operation

The characteristics of a core curriculum have been described. The task of the remainder of this chapter is to indicate some of the more important requirements for effective operation of this curriculum.

Training of Teachers

Teacher should have a broad general education and specialized training in the social foundations, of education child and adolescent psychology, the structure and dynamics of social groups, guidance, and problems-methods of teaching. The wide range of problems that must be treated in the core curriculum makes a broad general education indispensable. Yet a general education which is limited to factual information and descriptive principles, such as physical and chemical laws and social generalizations, will not prepare the teacher for the tasks encountered in a core curriculum. This becomes clear when it is recognized that most of the social issues embraced by the core curriculum involve deeplying cleavages about moral beliefs. These beliefs are fundamental elements of the personal structures of individuals involved in a social issue. The resolution of such an issue, therefore, requires that their personalities be partly reconstructed. The function of the teacher in a core program-since the heart of this program consists of social-issues is to facilitate this process of personal reconstruction. In order to do this the teacher must, of course, have adequate factual information and a thorough knowledge of laws and generalizations. These competencies, however, are not sufficient. In addition, he must be thoroughly disciplined in the sociomoral content of the culture; he must be familiar with the perspectives and strategies of the major social groups; and he must be thoroughly disciplined in methods of thinking appropriate to such socio-moral problems as those that characterize politics, economics, and education.

Physical Features of the School

As a second requirement for optimum operation, buildings, grounds, and classrooms should be large and flexible enough to permit pursuance of wide latitude of group activities. Buildings and classrooms to house a core curriculum would follow the general pattern of those required for an activity curriculum. In both the activity and the core curriculum, breadth and diversity of activities is the rule. The rooms must lend themselves to whatever problem is studied. Furniture should be strong, light, and easily movable. There should be few built-in features, since these tend to limit the flexibility of a room.

A single blackboard across one end of the room is probably ample. A large workbench and a sink-type lavatory are almost essential. Floor space must be much more ample than in the conventional classroom, for the core curriculum requires workrooms or laboratories for problem solving, and the size and arrangements of these rooms must broaden rather than restrict the possibilities for learning.

The same general principles apply to the building as a whole. It, too, must encourage the varied program envisioned by the core curriculum. Corridors should be large and well lighted and should provide ample space to be decorated by student groups or to display student work and other objects of general interest. General purpose rooms should be centrally located and otherwise easily accessible. It should be possible to pass outdoors from every room with minimum of disturbance to the work of other rooms, for the core program uses the classroom only as central headquarters and workshop.

The grounds of the school should also be large enough to lend themselves to the varied requirements of a core curriculum. In addition to the usual play area and foundation planting, there should be space for flower, vegetable, and rock gardens and a well-planned area for parking bicycles. When youth is given a part in such planning and improvement, the school building, rooms and grounds become valuable instructional materials as well as places to work and play.

Equipment and Materials

The third requirement for operating a core curriculum is that equipment and materials are adequate for and in keeping with the probable scope of the group projects. The only general rule that should govern the purchase of equipment and materials for a core curriculum is one of functional utility. The core program needs those supplies required by the problems arising within the framework of areas set out by the core curriculum. The demands of the core program in this respect are nearly as diversified as are those of an activity organization. In both programs pupil's purposes play a large part in the determination of the immediate problems for study.

Since problem solving is the dominant method, there will be little occasion for textbooks in the sense of a copy of the same book for each child. Several copies of the most valuable reference books may be required in order that several children can use them for different purposes at the same time. Problem solving places a heavy burden upon the room

and school libraries. These must be stocked with books covering a wide variety of topics and useful at various grade levels. Many school systems have avoided the expense of an extensive library in each school through the creation of a centrally located curriculum library, where materials for use in each major area of the core program are collected for distribution as requested. This same arrangement facilitates the handling of visual aids, professional literature for teachers, and infrequently used tools and materials of instruction.

The equipment required for problem solving is also more extensive and diversified than that necessary for learning in the conventional subjects. In problem solving, the nature of the problem determines the materials needed for its solution. Many of these, such as "how to make the local community a more beautiful place in which to live", are problems for which some of the data must be collected from numerous sources before they can be studied. Thus the supplies and the equipment of a core program are as diversified as the requirements of its problems; and these, in turn, are limited only by the bounds of the major concerns of men.

With problem solving as the dominant method in the specialized areas, the equipment and materials needed in the specialized courses will also be diverse. The rooms adapted to these purposes will take on the form of well-equipped laboratories for solving problems in specialized areas. For example, art work would find a good place in the core program, while individual explorations and development of competencies in the field of art would be achieved in the specialized courses. The room equipped for this purpose would need not only the usual clay, paints, easels and all that the art teacher might use as the materials of instruction, but would also have balsam wood, airplane "dope", and other materials with which a child could design and build model airplanes and other objects of his desire.

General Purpose or Activity Rooms

As a fourth requirement of a core program, the building should have several general purpose or activity rooms. It is patent that any structure, whether it is a home, office building, store, or school, should be planned in terms of the activities to be carried on there. The building housing a core curriculum needs three types of classrooms. In addition to the previously mentioned core program and specialized classrooms, several activity rooms are needed. These would be useful as places to work on large construction projects as storage space for bulky materials, and as additional space for jobs too big, noisy, or messy for the classroom.

Transportation Facilities

Requirement number five is that ample transportation facilities be available. It is just as true in a core curriculum as it is in an activity program that problem solving will lead the group beyond the school building and into the neighborhood and community. The data and basic learnings for the solution of social problems will require many trips to different parts of a community and to surrounding areas.

Since it is impossible for students to plan a trip for any definite purposes before the analysis of the problem has progressed to the point where they see the need of going, it will be almost as difficult to schedule the use of buses in advance as it is an activity curriculum. Needless to say, these trips will be planned as far in advance as foresight will allow.

Large and Flexible Time Blocks

As a sixth requirement for optimum operation of a core curriculum, time blocks must be large and flexible. Current descriptions of core programs make much of the double or triple-length periods generally employed to facilitate instruction. This feature is often listed as a distinctive characteristic of the core curriculum. A moment's reflection will indicate that any type of curriculum organization can alter the allotment and distribution of instructional time to its own ends. In fact, it has long been a rather common practice in the subject curriculum of elementary schools to have short periods for spelling and longer, even double-length, periods for shop courses, where much time is needed to get ready for work and to clean up at the close of the period. Thus, the extra-long periods of the core curriculum are not peculiar to this type of curriculum although they constitute a desirable condition for its proper operation.

Pupil planning and the other varied activities of the core areas require long unbroken time intervals for optimum progress. Such panning and activities would scarcely get started before the usual fifty minute periods were over. On the other hand, the varied nature of the activities protects the child from long periods of work on tedious or minute tasks. When he reaches a point of diminishing returns on this type of job during any one period, he can shift to other activities.

Flexible Grouping of Children

The seventh requirement of a core program is that grouping of children by age or grade is flexible. In many schools where the instructional program is organized according to the basic pattern of a core program, children are grouped for instructional purposes by age rather than by achievement. In other words, continuous or automatic promotion is likely to be the rule in core organizations.

However, the theory underlying the core curriculum is not at all clear upon this point. There is an apparent conflict between the required nature of the common learnings and the provision for flexibility. The core program requires that all youth enter the core areas. The presumption is that there are certain learnings all should have—certain abilities, understandings, attitudes, and skills required by all citizens. Now, if this is true, it would seem that the child who did not have the experiences essential to the acquisition of these leanings (because of illness, mental retardation, emotional instability, or some other reason) would remain at an appropriate level in the core program until these minimum learnings could be assured. On the other hand, advocates of the core curriculum are insistent that the child be adjusted to his group in terms of age, physical and social maturity, and the like. Moreover, great care is taken to provide for individual differences in the course of problem solving. Under such a plan it would seem that a child would move along with the group most compatible to him.

Flexibility in Administrative Arrangements

Another condition of effective operation of a core curriculum is that all administrative arrangements be as flexible as possible. Perhaps one reason for the entrenchment of a subject organization is its relative ease of administration as compared with that of either the activity or the core curriculum. When teachers determine precisely what will be taught and when and how the teaching will take place, problems of budgeting and scheduling can be planned in considerable detail well in advance. However, when children have a major share in the location, selection, and sequence of problems for study, the administrator is forced to make budgetary estimates on the basis of past experience rather than actual data.

Public Relations Program

As a further requirement of a core curriculum, the public relations program of the school must be continuous and effective. As long as both content and teaching method remain relatively stable for a number of years, public relations with respect to the instructional program are likely to present no major problems. Each subject has its well established precedent. Parents and members of the community in general have had the same kind of experience in the public schools and have usually come to accept the conventional subjects and methods as the established public school program.

The School as a Community Center

In an effectively operating core program, the school is a community center. Instruction centered in the common concerns of people can be very realistic if both the school program and the school building and grounds are an integral part of the vital activities of the community. Not only must the core program develop in close harmony with diverse community groups, but also these groups will want to use and continue the investigation undertaken by the students. In a core program the concerns of the school are the same as those of adult members of the community. What is more natural under these conditions than for the school to provide the facilities for students and adults to study these problems together? Moreover-when a school is freed from the idea that work is by definition unpleasant, and when having fun is considered a worth-while expenditure of time-both adults and students will want to use the school for a hobby center, a place to talk with their neighbors, and a location for games and dancing, as well as for its more serious use as a place to work on social problems.

Self Assessment Questions

1. If you were to advocate change from a subject to a core organization, what would be the major points you would develop to indicate superiority of core theory?
2. What would you consider to be the one or two most outstanding weaknesses of core theory? Are they shared by the theory of a subject organization?
3. Select a recent courses of study from you library and try to indicate the points at which it is true to core principles and the points of departure from core theory.

4. Compare and contrast the role of student interests in the subject, activity, and core curriculum theories. What do you think should be the role of student interests in curriculum planning?
5. The core curriculum is sometimes criticized on the grounds that children have no business trying to solve the knotty social problems which have defied adult attempts. In what sense is this criticism justified? Can you defend the core curriculum against such a charge?
6. Compare and contrast several definitions of the core curriculum found in recent books concerned with the secondary school curriculum.

Suggested Reading

1. Justification for a curriculum centered about social problems is ably presented in Harold Rugg's *Culture and Education in America* and in George Counts' *The Social Foundations of Education*.
2. An earlier statement of the meaning of the core curriculum is found in L. T. Hopkins *Integration: Its meaning and Application*. More recent attempts to define the core curriculum are to be found in J. Paul Leonard's *Developing the Secondary School Curriculum* (Revised Edition); Harold Alpert's *Reorganizing the High School Curriculum* (Revised Edition); *Curriculum Planning*, by J. Galen Saylor and William M. Alexander; and *Developing the Core Curriculum*, by Roland Faunce and Nelson Bossing.
1.
 - a) Innovation is a complex activity which begins from the conception of a new idea (a problem) to a solution of the problem having immediate economic utility, whereas Invention is a creation of a novel product or process or a concept for purposes of satisfying a need;
 - b) Scientific discovery involves observation of Unknown phenomena or vent, the acquisition of new knowledge through the use of scientific processes
 - c) Science was taught in an authoritarian manner as a 'dogma' of facts, principles and laws to be memorized and handed back during the examinations. Excitement of discovery and critical thinking so characteristics of science were missing in science teaching. There was considerable reliance on chalk-talk method for teaching science and very little emphasis on the laboratory activities and that too without the use of low cost inexpensive instructional materials.
2.
 - a)
 - i. the technical entrepreneur.
 - ii. technical needs to be fulfilled.
 - iii. funding.
 - iv. confluence of technology.
 - b) Yes

- i. The technical entrepreneur should involve a full time team effort and should be able by virtue of his personality or his talents to attract a group of knowledgeable, dedicated and enthusiastic followers
 - ii. A built-in feedback mechanism for its appropriate diffusion into the system would also be necessary.
- 3.
 - a) Science is considered as systematic and organized body of knowledge of facts, laws, principles- and theories.
 - b) Science is not only regarded as systematic knowledge but also a method or process or way of acquiring new knowledge. Thus science from modern point of view is both a product and process.
 - c) Traditional viewpoint is prevalent in Pakistan today because:
 - i teaching method is emphasizing only teaching of facts, principles and laws and no effort is made to understand the process of science i.e. way of discovering - the truth, and
 - ii our examination questions intend to test the knowledge component rather than understanding and comprehension of science.
- 4.
 - a)
 - i Teachers often assume that material covered is material understood.
 - ii. Students are passive listeners and they must follow the teacher blindly.
 - iii Teacher, by virtue of his experience and training etc. claims to know all the answers to all the questions children may ask in the classroom.
 - b)
 - i. Students are considered as active listeners with a good bit of intelligence.
 - ii. Teaching-learning is considered as a two-way process between teacher and the pupil, not necessarily directed by teacher.
 - iii. Teacher does not claim to know all the answers to all the questions likely to be asked by students.
 - iv. Questions are usually encouraged in the classroom because more questions means more understanding and more' understanding means more learning.
- 5. I would personally like to prefer discovery approach of science teaching because it is not only the correct and modern approach but-it also facilitates learning of concepts ideas and critical way of thinking - the real spirit of science.

Answers to Self-assessment Questions-2

1. Physics

- i The entire physics program including textbooks, teachers' guides, students manual, laboratory manuals and simple inquiry-directed activities in the form of kits were developed and tested before its implementation.
- ii A built-in teacher training program was also arranged to train corps of teachings committed to the new philosophy-of physics.
- iii More emphasis was given to experiments of discovery type.

2. Chemistry

- i The chemistry' program tried to develop an understanding of fundamental and unifying concepts of chemistry.
- ii Open-ended inquiry-directed experiments closely integrated with the course work.
- iii Experimental nature of chemistry was emphasized rather than its theoretical nature.

3. Biology

- i Three sets of parallel materials, i.e. yellow version based on cellular approach, blue-version of molecular approach and green-version, on ecological-approach were developed.
- ii Most of the emphasis has been on inquiry approach of teaching biology integrating textbooks with labs teacher guides and student workbooks, forms and film slides etc.
- iii There is also a special material for low achievers.

4. Mathematics

- i Emphasis has been on understanding mathematical skills rather than on memorization of well known postulates and theories."
- ii Exploration of hypotheses underlying mathematics.
- iii Fostering research in' the teaching of school mathematics.

- 5. i. Emphasis on enquiry.
- ii More emphasis on practical component of science.
- iii There is a whole range of learning package i.e. textbooks, workbooks,' experimental books, charts; films, filmstrips, film slides,' transparencies, science kits.
- iv Strong in-service teacher training program.
- v Built-in evaluation/tests.

Answers to Self-assessment Questions-3

(Modernization of Mathematics and Science Syllabi in Pakistan)

1. Strengths are as under

- i University scientists of repute were involved in the project.
- ii A substantial funding was available from the Federal Ministry of Education.
- iii Effectiveness of the material produced was micro-tested on limited scale in selected classroom situation.
- iv

2. Choose any three weaknesses given below

- i A sufficient desire to change, modify or reform science curriculum was missing-as a starting point for reforms.
- ii A visionary pioneer with motivation, knowledge and skills to do the job was not available in the scheme of things.
- iii Instead of full-time project team, a part-time adhoc based committee's approach was followed to introduce the reforms.

- iv Few products were not put to rigorous testing and evaluation.
- v No built-in feedback system for its appropriate diffusion into the school system was conceived by the planners.

3. Instructional Characteristics

- i Science as an inquiry should be introduced from class I-XII as a whole.
- ii Emphasis should be on open-ended inquiry-type/discovery type activities and experiments linked with appropriate theory.
- iii Specially tailored in-service training should be provided to teachers before launching the programs. The program should be based on concepts, competencies, skills and attitudes to provide specially needed spark and commitment among science teachers.

Organizational Characteristics

- i. A carefully selected full time competent staff is an absolutely critical input for future reforms in Pakistan.
- ii. A permanent institution having built-in infrastructure for research in science education is essential for long range development in science education in Pakistan (Example: IPSET).
- iii. Establishment of sub-centre for dissemination, trial feedback and in-service training of teachers are essential. (Example: Regional Centers of Science Education in Provinces (SECs).
- iv. All aspects of the curriculum, such as design, development writing, laboratory work, apparatus, testing and evaluation, in-service training, school trials and feedback etc. should be organized and conducted by permanent institution such as IPSET Science Education Centers (SECs) and curriculum research and development centers.