An Analysis of Physics Curriculum at International Level in Sindh

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Abstract: The scientific knowledge can be developed through balanced curriculum, better educational facilities and well-trained teachers. It is necessary that science education program is well-planned and systematic. In Pakistan this can be only done when improved curriculum will be provided to the science teachers and students. The physics curriculum which is being taught in the entire province of Sindh is not fulfilling the needs of teachers and learners. The study addressed the following objectives to determine the worth of Physics curriculum at intermediate level, to analyze curriculum with special reference to objective, content, methodology and evaluation. The study critically reviewed the subject matter of Physics to point out the strengths and weaknesses at intermediate level. Survey research with cross-sectional research design was adopted. The population of the study was consisted of all the teachers and principals working in the government colleges of Sindh. The study concluded that teachers are not well trained. Activity-based curriculum should be developed. The curriculum should develop the practical approach in the students. Loaded curriculum should be avoided. Teachers would be effectively trained before implementation of curriculum.

Key words: Physics curriculum · Contents · Systematic · Cross-sectional · Ideological

INTRODUCTION

The word education has been derived from the Lain words Educate Aristotle defined Education as “A process necessary for the creation of a sound mind in a sound body.” Education is the process through which knowledge is transmitted from an individual or section of society to another individual or section of society. An educational system having a static curriculum and obsolete teaching materials do not produce students equipped with critical thinking. Developing a curriculum and writing a textbook is a technical work. The content, language, organizational presentation requires detailed planning. Science education is a creative activity. It helps in application of these concepts to control the environment of men’s benefits and an enterprise.

The scientific knowledge can be developed in the students by providing them balance curriculum, better educational facilities and well-trained teachers. This can be only done when improved curriculum will be provided to the science teachers and students. To meet the challenges in the new era, there is definite need to update our Physics curriculum. It is very obvious that without the effective curriculum the students can not get benefits and their concepts remain vague. The college teachers hesitate to adopt scientific method. The academic standards of our science students are poor. The study addressed the following objectives to determine the worth of Physics curriculum at intermediate level, to analyze curriculum with special reference to objective, content, methodology and evaluation. To critically review the subject matter of Physics to point out the strengths and weaknesses at intermediate level.

The Physics curriculum is not fulfilling the needs of teachers and learners. Teachers and learners are facing difficulties in explaining and understanding the topics and theories. It shows the weakness of the content. The rational behind the research is to analyze the curriculum of Physics at intermediate level in order to find out the deficiencies of curriculum. To elaborate the background further, the researcher interviewed some Physics teachers and students. Teachers stated that the existing curriculum of Physics has not been modified since long. The students were of the opinion that the content of the course is not updated and do not fulfill the needs.

LITERATURE REVIEW

According to the Education Policy (1998-2010) [1]. Education is a process through which a nation generally develops its self. Education determines the destiny of a nation. It provides mental, physical, ideological and moral training to the individuals of the nation. The term applied science is sometimes used to refer the utility of scientific
knowledge that concentrates on the development of technology. The discoveries of scientists also help to shape our views about our selves and our place in the universe. UNESCO’s report stated that the following aspects of the content of "science for all" may be considered as fundamental. It should:

- Be perceived by the learners as relevant to their actual needs or as having social worth due to its economic or community value. i.e. it should lead to experiences and practical uses that are meaningful to the learners.
- Improve the living conditions of the learners or increases their productivity and contribute to the well-being of the community and to national development goals.
- Be based on daily life experiences of the learner needs, relate to the resources of their real world and must have obvious application in their work, leisure or homes.
- Enable learners to acquire and master useful and employable skills and to use intelligently these skills.
- Consider cultural and social traditions and seek to complement these and not clash with them unnecessarily.
- Make the learner recognize and appreciate the importance of science and technology in national development.
- Include natural phenomena which will arouse one’s curiosity and desire to investigate and produce excitement in the learners.
- Enable the learner to utilize wisely the resources in their environments and to live harmoniously with nature and society.

Hilda Taba [2] gave the most comprehensive definition of the curriculum, “a curriculum usually contains a statement of aims and specific objectives. It indicated some selection and organization of content. Curriculum is the construction of knowledge and experience systematically developed under the auspices of the school to enable the learner to increase his, her control of knowledge and experience [3]. Wilson [4] described curriculum as, “any thing and everything that teaches a lesson, planed or otherwise”. Zais [5] stated objectives content and methodology as important elements of curriculum program. Ali and J.S. Rana [6] stated the state of affairs prevailing at intermediate level.

Content may be regarded as valid when it is authentic and accurate. Thus the use of validity criterion is particularly important for practicing teachers who implement syllabuses developed by those externals to the school such as state educational authorities.

According to Balsara [7] content should be made interesting to the learners for effective learning through activities and experiments. The subject matter must satisfy the needs of learners. The content should be according to the cognitive level of the learners. The concepts should be logically ordered, from simple to complex. According to Print, M. [8] content is presented to learners over a period of time in varying arrangements or order. The order is which those parts are presented to learner is called sequencing. The evaluation is the integral and essential part of the curriculum planning and development. It is the continuous activity. Evaluation is the systematic process of collection and analyzing data in order to make decisions [9].

**METHODOLOGY**

The over all strategy of the present study was survey. This population of the study consisted of all the teachers and principals working in government colleges of Sindh. The total number of government colleges are 238 and number of male and female teachers is about 5612 (Directorate of colleges, 2009). The population was large and heterogeneous. It was not possible to carry out a census. Consequently, a stratified random sampling design was adopted. The principals of classification related to the control, sex and district-wise location of the colleges were followed. Total sample size was 60 teachers, 21 principals and 10 experts drawn from 238 colleges. A tailor-made questionnaire comprised of thirty items was developed. The data was analyzed statistically.

**Analysis of Findings:** Item-wise analysis of each item of the questionnaire through chi square. The null hypothesis (Ho) to be tested in each case is: There will no significant differences in the views of college principal and science teachers regarding the physics curriculum in Sindh, in respect of each item of the questionnaire.

The following points should be kept in view while reading the report.

1. Formula of chi square ($x^2$):  $x^2 = \frac{\Sigma (fo - fe)^2}{fe}$
2. Level of significance (a) = 0.05
3. Degree of freedom (df) = $K - 1 = 3 - 1 = 2$
4. Critical value of $x^2$ = 5.99

**Item:** Examples for sustaining the interest of the students.
Referring the table of $x^2$ we found that the tabulated value of $x^2 = 5.99$ with $df = 2$ at $\alpha = 0.05$ is smaller than the calculated value of $x^2 = 12.1$. Hence, Ho is rejected and it is concluded that there is significance difference in views regarding the examples of the books. From the inspection of the table it is clear that most of the college teacher believe that the examples for sustaining the interest of the students are not good.

**Item**: The font size of text books.

Referring the table of $x^2$ we found that the tabulated value of $x^2 = 5.99$ with $df = 2$ at $\alpha = 0.05$ is smaller than the calculated value of $x^2 = 28.3$. Hence, Ho is rejected and it is concluded that there is significance difference in view regarding the font size of text book. From inspection of the table it is clear that most of the college teacher believe that the font size of text books is good.

**Item**: The printing quality of text book.

Referring the table of $x^2$ we found that the tabulated value of $x^2 = 5.99$ with $df = 2$ at $\alpha = 0.05$ is smaller than the calculated value of $x^2 = 34.3$. Hence, Ho is rejected and it is concluded that there is significance difference in view regarding the printing quality of text book. From inspection of the table it is clear that most of the college teacher believe that the printing quality of text books is good.

**Item**: The present Curriculum is up to date.

Referring the table of $x^2$ we found that the tabulated value of $x^2 = 5.99$ with $df = 2$ at $\alpha = 0.05$ is smaller than the calculated value of $x^2 = 15.7$. Hence, Ho is rejected and it is concluded that there is significance difference in view regarding the curriculum. From inspection of the table it is clear that most of the college teacher believe that the present Curriculum is not up to date.

**Item**: Teachers are trained.

Referring the table of $x^2$ we found that the tabulated value of $x^2 = 5.99$ with $df = 2$ at $\alpha = 0.05$ is smaller than the calculated value of $x^2 = 19.3$. Hence, Ho is rejected and it is concluded that there is significance difference in view regarding the teacher training.

From the inspection of the table it is clear that most of the college teacher believe that the teachers are not trained.

**Item**: The present curriculum built the scientific foundation of students for their future needs.

Referring the table of $x^2$ we found that the tabulated value of $x^2 = 5.99$ with $df = 2$ at $\alpha = 0.05$ is smaller than the calculated value of $x^2 = 22.5$. Hence, Ho is rejected and it is concluded that there is significance difference in view regarding the present curriculum. From the inspection of the table it is clear that most of the college teacher believe that the present curriculum does not built the scientific foundation of students for their future needs.

The following cumulative conclusions were drawn:

- Majority of physics teachers were not trained according to the changing world of knowledge, so In-Service training should be arranged.
- Most of teaches were agreed to develop the activity based curriculum of physics because the students could take more interest.
- Examination system should focus on the aspect of learning rather than trend of getting marks.
- Maximum participation of the teachers be ensured in the curriculum development process.
- The quality of printing, size of the book and price were not appropriate.
- Most of teachers agree that mostly students face difficulty to understand the concepts. Therefore, practical application should be focused.
- Most of teachers agreed that number of solved examples should be increased, which create the interest in students.
- Majority of teachers wanted that the title pages of book and picture quality should be attractive.
- The content helped in understanding the basic concepts of physics, although their effectiveness for developing critical thinking was uncertain.
- Students face difficulty in practical work.

**RECOMMENDATIONS**

- The academically expert and professionally competent science teachers (specifically Physics) may be appointed in the educational institutions.
- In-service teachers training may be arranged according to the future needs.
• Experienced teachers may be involved in the curriculum development process of science (Physics) education.

• Loaded curriculum may be avoided; curriculum may be selected according to the available academic time period.

• Sufficient audio-visual aids may be provided to teachers in order to enhance the effectiveness of the process.

• Teacher manual may be provided at the time of the introduction of new book.

• The selection of content for intermediate level may be based upon the interest and needs for development of scientific skills and attitudes of students.

• Monitoring and evaluation is based upon scientific principles.

• Evaluation of the teaching process may be introduced.

• The teacher should give preference to practical work.

• Text book is helpful in achieving the objectives of national curriculum.

• Text book should be written through team work and detailed planning.

• The price of the text book is kept within a reasonable range.

• The teacher should use audio-visual aids in the teaching learning process.

REFERENCES


