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An Analysis of the New Trends in National Curriculum of Physics at the Secondary Level

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Abstract *This research study analyzes innovative trends in the National Curriculum of Physics at the Secondary level and compares the same curriculum with the curricula of three academically advanced countries namely Turkey, Malaysia and UK. The study aims to examine the policy objectives of the National Curriculum in Physics at the Secondary level and explores its strengths and weaknesses, ending in recommendations for the overcoming of these weaknesses. The study practiced mixed-methods designed. The primary data were collected through interviews held with key informants and opinionnaires fielded to subject teachers. Review of literature and reliable documents along with the curricula of three developed countries furnished Secondary data for the study. Qualitative and quantitative treatments were given for analysis of the data. The outcomes of the research study highlighted that objectives of curricula in Malaysia, Turkey and UK are more comprehensive than Pakistan. These curricula contain latest and novel concepts. The present curriculum likewise needs to instill the tendency for analytical and critical examination of facts at any circumstance in students. The existing examination system is, therefore, not appropriate as it measures only the lowest domain of learning i.e. rote learning. In order to discourage rote learning, textbooks of Physics at the Secondary level need revision to promote creativity.*

Key Words:

New Trends, National Curriculum, Secondary Level Physics

Introduction

According to Avotri et al (2000, p.36) in a fast, advancing and changing technological world, science has become the backbone of development. Fensham (2008, p.15) science education is necessary to equip young persons to take active part in solutions of the big socio-scientific issues of today. Khan (2007, pp.20-

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25) Physics is a global subject and plays pivotal role in the development of the world.

The study of Physics helps us in comprehending other subjects related to Geology, Geography, Agriculture, Chemistry, Biology and other Sciences that deal with environmental problems and issues. In nutshell, Physics is an integral part of the knowledge required by all the developed and developing societies.

Pakistan is lagging behind other developed countries in the fields of all sciences especially in the field of Physics. So, to face and meet the challenges of the modern times, it is very important to devise and design curricula in the light of modern needs and challenges, especially the curriculum of Physics that needs to be updated according to the demand of the modern times.

With the passage of time, the curricula need change and modification, so it increases the quality and utility of the subjects taught. Thus, there appears need for new positive steps and initiatives which are needed for a developed and healthy society. The curriculum in the subject of Physics has been changed and updated since the inception of Pakistan in 1947. Since then the Physics subject has gone through many changes in terms of subject material and textbooks at different levels. This was called modernization and updating of the curriculum of Physics.

In the past, no attention was given to the changes in the curriculum of Physics in the light of needs and demands. Research, in this area, is scarce and, to fill the gap, this study was attempted to go for a proper research in this area. The curriculum in the subject of Physics, at the Secondary level, provide a base for the Science Curriculum at the higher level. It must lead a coordinated learning activities which are the requirements of the students in reshaping their attitudes and value fixation in the scenario of 21st century. This initiative well helps societal development and add to technological and scientific world. It is, therefore, needed to analyze the new trends in national curriculum of Physics at the Secondary level. The analysis was based on literature review and views of the curriculum experts, teachers and learners. Additionally, the curriculum of Physics at the Secondary School level of three developed countries was compared and analyzed for identification of new trends in this area.

Objectives of the Study

The following objectives were framed for study:

1. To analyze the policy objectives of the National Curriculum in Physics at the Secondary level based on the objectives, content, methodology and evaluation.
2. To compare Pakistani curriculum with advanced countries of Turkey, Malaysia, and UK in terms of educational structure, objectives, content, teaching methodologies and assessment.

Research Questions

1. What the curriculum objectives are, as laid down by curriculum wing of Pakistan in the curriculum of Physics at Secondary school level?
2. What results the comparative analysis of Physics at the Secondary level provide?
3. What are the strengths and weaknesses of the curriculum in the subject of Physics at the Secondary level in Pakistan?

Review of the related Literature

Concept of Curriculum

The term curriculum is multidimensional in nature. There are several definitions of curriculum. The term curriculum has changing definitions and explanations in different times. Some of its well-known definitions are as under:

Kelly (1999, p.83) asserted that curriculum is negatively viewed as a "Syllabus which may restrict the planning of teachers to the limited boundaries of the content or the body of knowledge they wish to share or an available program for teaching".

Curriculum provides the proper shaping of society both in the present and future. It will be achieved only when the needs and demands of society are considered.

Wilson (2001) stated, "Curriculum embodies in its lap all the aspects of teaching and learning i.e. budget, faculty, programs related to evaluation and consequent students' achievements in the light of stated objectives framed for the curriculum."

McNeil (2006) expanded the role of curriculum and stated, "It is the most reliable and effective collecting tool, which pushes community, educational institutions, classroom proceedings, learners and their parents and shaping learners' identification, societal goals and lifelong gradual growth of the students".

Chen (2007) documented curriculum as a communicating progression established among teachers, learners, materials, and the environment. It mirrors cultural beliefs, societal and political values.

Majeed (2009) held the view that curriculum is multi-dimensional and provides holistic opportunities to students.

Silva (2009, p.630) stated, "Curriculum emphasizes for the coordination of previous information with new one, rather than chunks of information, is the essence of 21st-century skills".

Atankar et al (2013, p.1) documented, "Curriculum is the prearranged interface of learners with teaching material, physical facilities, materials, and testing practices for the evaluation and complete achievement of the objectives framed by education department."

In nutshell, Curriculum is multi facial by nature and bears several definitions. Curriculum in its broadest sense refers to all courses offered at a school explicitly and implicitly.

Curriculum Development in Pakistan.

Akhtar (2004) considered curriculum of a subject is the soul of a nation. The intellectual development of curriculum and of the state is the outcome of advanced curriculum.

Jumani (1999) stated that planning of curriculum is the task handled by the curriculum wing at national level in Pakistan under Act No X of 1976.

The Act of Parliament 1976 declared the Ministry of Education (MoE) for selection of experienced scholars to execute the functions:

- In the light of the given recommendations of the national educational policy, launching of schemes of studies, textbook transcripts; curricula, implementation of manuscripts and strategies for continuation of various classes of educational institutions.
- Manuscripts approval of textbooks published by other agencies prior to its implementation.
- Directives to an individual or agency in composing or edition along with amendment. They have the authority to delete a piece or the whole materials.

Siddique and Sultan (2008) stated that in Pakistan, the process of curriculum development is as follows: The Curriculum Wing (CW) Ministry of Education (MoE), Government of Pakistan tenders request the Provincial Centers for designing the draft for curriculum taught in various classes up to class XII. Provincial committees design curriculum plans which are then submitted to the CW. The CW shares and circulates these manuscripts to nominate subject specialists and experienced teachers in schools, colleges and other experts for their expert opinions. The National Curriculum Development Committee (NCDC) CW analyses the comments along with recommendations for approval to the Ministry of Education (MoE) i.e. Federal Secretary of Education.

At national level in Pakistan, a curriculum wing is established which supervises the development, designing, and approval of the textbook from primary to onward i.e. up to grade 12. Consequently, all provinces have also established such institutions like Directorate of Curriculum and Teacher Education, Abbottabad (DCTE) in Khyber Pakhtunkhwa for curriculum development. These provincial wings work in collaboration with the federal

curriculum wing Islamabad. Furthermore, the other related issues of textbooks like publishing, stocking, and marketing etc. are also being supervised by provincial textbook boards (PTBB) and BISEs have been made responsible for the conduction of the examination from grade 9 to grade 12. But after 18th amendment, the maintenance of curriculum standards has been transferred to provinces.

The development of curriculum began in late sixties at all levels. Local expertise was tasked to prepare science curriculum keeping in touch with foreign countries from class I to X. Phase wise revision was made in 1968, 1986, 1990 and 2002 respectively.

Policy Measures for Secondary Education in Pakistan

According to Tahir (2007), policy is a system of principles adopted or proposed by an organization or individual.

Trowler (2003) confirmed that, education policy is written for the desired actions which will ensure the chalked out objectives. A long lasting education system of a country is always established on durable educational policy.

Pandey (2005), The education system of subcontinent witnessed a bulk of changes through the implementation of educational policies known as terms of 1854-1884, 1882-1904, 1904-1919, 1919-1929 and the term of 1929- 1947.

Bhatti (1987), reported that the ways and guidelines regarding various stages for school curriculum for Primary and Secondary Education in light of 1947 Educational Conference of Pakistan Education Conference, explained different stages for school courses as followed:

Pre-Primary ranges from 3 to 6 years; primary starts from 6 to 11 years; and Secondary education begins with 14 and is up to 17 years. Pakistan Education Conference 1947, submitted fruitful suggestions for the uplift of education in the country. These recommendations included the ideological and cultural foundations side by side with democracy. Urdu was declared as the second vital and compulsory language along with the language of the state, but English was still given the status of compulsory language at school level. But each province as per their available potency and importance of provincial language decides their medium of education. These approvals were enough to mark guidelines and to establish Secondary education system for the state.

Wynbrandt (2009) asserted that new state met multidimensional problems such as non- availability of competent faculty to establish and activate schools, the adjustment of migrants, nanny situations with India, non-effective administrative organization in the country, civic espionage and the untimely death of the Quaid-e-Azam. Deficiency of physical, financial and human resources were also stumbling blocks in the establishment of quality Secondary education.

The marked targets were not achieved by the five years plans which followed the principles of those policies. The 1959 National Education Commission viewed Secondary education as a vital phase because it has universal recognition. The commission suggested the availability of elective subjects for the students to provide competent youth for higher education. The commission expressed concern over the lack of non-availability of skilled and trained teachers. The commission also proposed situations for the registration of commercial teachers training schools to solve the issue on sustainable basis. The recommendations of the policy paved futuristic ways to Secondary education.

According to Hassan (1998), in the first five-year plan, the curriculum at Secondary level was revised and then due to financial constrain allocation was cut down because of 1965 war between India and Pakistan.

Ali (2013), in 1970 the first official education policy was framed which established a stronger stress on innovative frame work for the country's education system.

Shami (2005) asserted that the decentralization of education was the focus of the Education Policy, 1970. It laid down the foundations for grade-I to grade-X along with the organizational structure of elementary schools (grade 1 - 8) and high schools (grade 9 - 10) the creation of directorates of schools at provincial level was suggested in order to help and enable district school authorities.

Hassan (1998), viewed that the major cause of poor education was the shifting of educational institutions from private ownership to government resulting in deterioration.

The National Education Policy recommended handing over the levels of IX and X to the high schools while the classes of XI and XII were assigned to intermediate colleges and higher secondary schools. For both humanities and science, mathematics was declared compulsory subject. Agro-tech was implemented in evening shifts to achieve the desired goals.

Shami (2005), the policy was just the decoration of the old policies and nothing new was introduced in the reshaped policy. There were only the claims of islamization and empowerment of private sector. The qualitative enhancement was focused at school level in the National Education Policy, 1992-2002.

Recommendations were forwarded to boost learning standards in the schools. Activity based learning was added to the stream of education. The methods of teachings were remodeled at the induction of information technologies. The weak political system shook the foundations of education and the dream of quality education remained a dream only.

New Trends in Physics Curriculum

Kober (1973, p.32) stated that the world has become the global village by the dint of science and technology. There are rapid changes in the fields of economy,

culture and environment due to the use of science. These applications have imprinted un-erasable changes in our lives. There has been observed a quick change in education to embrace the challenges of time and tide. Scientific development and scientific education bears the potentials to accept these challenges with open hands. There is a great need to digest and apply the principles of science for the best future.

Science Council of Canada (1984, p.9) stated that in the evolutionary global village, there is always the need of analysis and renovations in the Physics curriculum. The content and the number of topics need to be reduced for establishment of international curriculum.

Steiny (2001, p.106) asserted that the understanding of science and its basic principles qualifies learners for strong basis which in response has to build a new knowledge and solve the problems.

Linn & Hsi (2000, p.24) viewed that science is always deaf and blind without the rules and application in practical life.

Kendall & Marzano (2000, p.51) asserts that science should build up logical development of important knowledge, skills and detailed comprehension which Science learning at Secondary Science courses.

Ireson (2000, p.35) accepted that there is dire need of updation of Physics curriculum of Physics for high schools to inculcate latest modern Physics in it.

Ostermann and Moreira (2000, p.5) acknowledged the need of systematic concepts and approaches for the introduction of contemporary Physics at Secondary level. It relies on the exploration of the limits of classical Physics and the non-utilization of classical Physics references.

Research Methodology

This study was descriptive, which discovered new scopes of curriculum of Physics at Secondary school level. The study used scientific methodology which was based on problem statement along with key questions analysis and devising data collection tools for analysis. From Primary and Secondary means data were distributed personally through opinionnaire to Physics teachers of government high schools of Khyber Pakhtunkhwa and these were also received back personally. Structured interviews were held with curriculum experts for collection of primary data. With the support of tables and graphs data were analyzed and changed into percentages and under different categories the qualitative data were described and discussed. From the replies to the different items contained in opinionnaire handed over to the Physics teachers in government high schools of Khyber Pakhtunkhwa (Pakistan) quantitative data were obtained. The tools and results were made reliable through the use of statistical measure.

Research Design

According to Creswell (2003, p.211) research design means a procedure for collecting, analyzing and reporting a research.

Burns and Grove (2001), to obtain the intended results a well design study helps the researchers to plan and implement the study.

Sankhala (2007), marked that to achieve the desired results, there is a need of analytical scrutiny of the facts, persons and happenings.

The study practiced mixed-methods designed, which is, a method for logical combination of pertinent qualitative and quantitative data from various selected researches for the purpose of developing a studies in single conclusion that has greatest statistical authenticity. Creswell and Plano Clark (2011) mixed methods research originated in the social sciences and has recently expanded into other sciences.

The conclusion derived in this style is statistically stronger than the analysis of any single study due to increased number of subjects. Greater diversity among subjects or accumulated effects and results are observed through this pattern.

Creswell (2003, p.21) accumulated and favored mixed method study as it contains the collecting and investigation of both qualitative and quantitative data in a one sided study which focuses on the data collected concurrently or in sequential order are given weightage for the unification of the research. This research study was planned and intended to carry out the analysis of the National Physics Curriculum at SSC level in Pakistan (Khyber Pakhtunkhwa). To investigate the objectives of this study several approaches were employed by the researcher.

Research Instruments

The key tools of the research study included a close-ended opinionnaire for Physics teachers. Structured interviews were held with curriculum experts. The logic for choice of the research instruments of the research study is that the curriculum masters are the major source of data which was directly related with structured interview. Structured interview was selected to obtain data from maximum population. It was choice in light of the key questions and objectives.

a. Questionnaire for subject teachers (open ended and close ended)
b. Interview with curriculum experts and educationists (open ended and close ended)

For teachers a questioner was prepared on five Likert's point scale. It comprised of items i.e. part I consist of personal data whereas part II was associated to the attainment of objectives given by the Curriculum Wing (CW), MoE. Part three of the questionnaire was associated to the content and textbook.

The teaching methodology was linked to Part IV and the evaluation process is associated to Part V and within Part VI five open ended questions were asked.

Sample and Population of the Study

The population of this study constituted all the experts of C.W in Physics Academic/Research Officers of BISEs, Subject Experts of Khyber Pakhtunkhwa Textbook Board Peshawar, Subject Experts of Provincial Institute of Teachers Education, curriculum experts in universities and working teachers of Physics at the Secondary level.

For the selection of teachers and experts in the subject of Physics at the Secondary level purposive and convenient sampling techniques were used. Distribution of the experts is as under:

1. Curriculum experts working in universities and curriculum wing (10)
2. Director academics of BISEs, Khyber Pakhtunkhwa (08)
3. Curriculum experts in Khyber Pakhtunkhwa Textbook Board (05)
4. Curriculum experts working in Directorate of Curriculum and Teacher Education (DCTE), Abbottabad. (2)
5. Subject Specialist in Provincial Institute of Teacher Education (PITE), Khyber Pakhtunkhwa, Peshawar (5)
6. 280 teachers in the subject of Physics in 280 schools (one Physics teacher from each school) of Khyber Pakhtunkhwa province were selected randomly as sample of this study.

Data Collection and Analysis

The primary data were collected by an opinionnaire from the teachers and interview from curriculum experts / educationists while from the study of some documents and literature review the Secondary data were collected from which conclusion were drawn. The quantitative data were analyzed by using percentage and chi square test in tables and graphs and under different categories the qualitative data were placed and discussed.

Delimitation of the Study

On the basis of the scarcity of the resources and shortage of time the study was delimited to Physics curriculum of 9^{th} and 10^{th} Classes and the Physics teachers of Government School in the province of Khyber Pakhtunkhwa.

Distribution of Sample Teachers

Gender	Rural	Urban	Total

Male	10	15	25
Female	5	10	15

Responses of Teachers in Physics

The responses of 280 teachers in Physics at the Secondary level were obtained on five-point Likert's scale and converted into figures and percentages for discussion and results, which were further validated on the basis of Chi square tests.

Table 1. Present Curriculum of Physics Develops Interest, Motivation and Sense of Achievement in Students

Options	SA	A	UD	DA	SDA	Total	χ^2
Responses	33	52	92	67	36	280	41.38
Percentage	11.79	18.57	32.86	23.93	12.86	100%	
Fo	33	52	92	67	36	280	
Fe	56	56	56	56	56	280	
(fo – fe)	-23	-4	36	11	-20	0	
$(fo - fe)^2$	529	16	1256	121	400	2322	
$\frac{(fo-fe)^2}{fe}$	9.4	0.28	22.4	2.16	7.14	41.38	

N=280 P=0.05, DF=4, table value=9.488, calculated value=41.38

The data analysis in Table No:1 indicated that out of 280 respondents 33 (11.79%) 'Strongly agreed', 52 (18.57 %) 'Agreed', 92 (32.86%) stayed 'Undecided', 67 (23.93%) 'Disagreed' and 36 (12.86%) 'Strongly disagreed' to the given statement. Thus, the majority of 103 respondents (teachers) did not accept the given statement that the "Present curriculum of Physics develop interest, motivation and sense of achievement in the study of Physics". The calculated value of χ^2 (41.38) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers.

Table 2. Present Curriculum of Physics Develops the Ability to Describe and Explain Concepts, Principles, Systems, Processes and Applications Related to Physics

Options	SA	A	UD	DA	SDA	Total	χ^2
Responses	19	48	61	86	66	280	43.1

Percentage	6.79	17.14	21.79	30.71	23.57	100%	
Fo	19	48	61	86	66	280	
Fe	56	56	56	56	56	280	
(fo – fe)	-37	-8	5	30	10	0	
$(fo - fe)^2$	1369	16	25	900	100	3668	
$\frac{(fo-fe)^2}{fe}$	24.44	0.28	0.44	16.07	1.87		

N=280 P=0.05, DF=4, table value=9.488, calculated value=43.1

The data analysis in Table No: 2 indicated that out of 280 respondents 19 (6.79%) 'Strongly agreed', 48 (17.14 %) 'Agreed', 61 (21.79%) stayed 'Undecided', 86 (30.71%) 'Disagreed' and 66 (23.57%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (43.1) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. So, the mainstream of the responding teachers did not agree to take the given statement that "Present curriculum of Physics develop the ability to describe and explain concepts, principles, systems, processes and applications related to Physics" is rejected.

Table 3. Present Curriculum of Physics Develop the Thinking Process, Imagination, Ability to Solve Problems, Data Management, Investigating and Communication Skills

Options	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	χ^2
Responses	18	51	58	89	64	280	46.87
Percentage	6.43	18.21	20.71	36.07	18.57	100%	
Fo	18	51	58	89	64	280	
Fe	56	56	56	56	56	280	
(fo – fe)	-38	-5	2	33	8	0	
$(fo - fe)^2$	1444	25	4	1089	64	3514	
$\frac{(fo-fe)^2}{fe}$	25.78	0.44	0.07	19.44	1.14	1757	

N=280 P=0.05, DF=4, table value=9.488, calculated value=46.87

The data analysis in Table No: 3 indicated that out of 280 respondents 18 (6.43%) 'Strongly agreed', 51 (18.21 %) 'Agreed', 58 (20.71%) stayed 'Undecided', 89 (36.07%) 'Disagreed' and 64 (18.57%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (46.87) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. So, the maximum of the replying teachers did not admit the given statement that "Present curriculum

of Physics develop the thinking process, imagination, ability to solve problems, data management and investigating and communication skills" is rejected.

Table No. 4 Present Curriculum of Physics Develop an Attitude of Responsible Citizenship, Including Respect for the Environment and Commitment to the Wise Use of Resources

Options	SA	A	UD	DA	SDA	Total	χ^2
Responses	25	58	51	94	52	280	35.03
Percentage	8.93	20.71	18.21	33.57	18.57	100%	
Fo	25	58	51	94	52	280	
Fe	56	56	56	56	56	280	
(fo – fe)	-31	2	-5	38	-4	224	
$(fo - fe)^2$	961	4	25	1444	16	50176	
$\frac{(fo-fe)^2}{fe}$	8.5	0.03	0.44	25.78	0.28	25088	

N=280 P=0.05, DF=4, table value=9.488, calculated value=35.03

The data analysis in table No: 4 indicated that out of 280 respondents 25 (8.93%) 'Strongly agreed', 58 (20.71 %) 'Agreed', 51 (18.21%) stayed 'Undecided', 94 (33.57%) 'Disagreed' and 52 (18.57%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (35.03) is greater than the table's value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. So, the maximum of the replying teachers did not admit the given statement that "Present curriculum of Physics develop an attitude of responsible citizenship, including respect for the environment and commitment to the wise use of resources" is rejected.

Table No. 5 Present Curriculum of Physics Recognize the Usefulness and Limitations of Scientific Method and the Interaction between Science, Technology and Society.

Options	SA	A	UD	DA	SDA	Total	χ^2
Responses	14	72	42	87	65	280	58.28
Percentage	5	25.71	15	31.07	23.21	100%	
fo	14	72	42	87	65	280	
fe	56	56	56	56	56	280	
(fo – fe)	-42	16	-14	31	9	0	
$(fo - fe)^2$	1764	256	196	961	81	4474	
$\frac{(fo-fe)^2}{fe}$	31.56	4.57	3.55	17.16	1.44	2237	

N=280 P=0.05, DF=4, table value=9.488, calculated value=58.28

The data analysis in table No: 5 indicated that out of 280 respondents 14 (5%) 'Strongly agreed', 72 (25.71 %) 'Agreed', 42 (15%) stayed 'Undecided', 87 (31.07%) 'Disagreed' and 65 (23.21%) 'Strongly disagreed' to the given statement, thus, calculated value of χ^2 (58.28) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. So, the maximum of the replying teachers did not admit the given statement that "Present curriculum of Physics recognize the usefulness and limitations of scientific method and the interaction between science, technology and society" is rejected.

Table 6. The Policy of Objectives of Physics Curriculum are Well Clear

Options	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	χ^2
Responses	54	96	12	60	58	280	59.14
Percentage	19.29	34.29	4.29	21.43	20.70	100%	
fo	54	96	12	60	58	280	
fe	56	56	56	56	56	280	
(fo – fe)	-42	14	-16	30	14	0	
$(fo - fe)^2$	1764	196	256	900	196	3312	
$\frac{(fo-fe)^2}{fe}$	31.5	3.5	4.57	16.07	3.5	1658	

N=280 P=0.05, DF=4, table value=9.488, calculated value=59.14

The data analysis in table No: 6 indicated that out of 280 respondents 54 (19.29%) 'Strongly agreed', 96 (34.29 %) 'Agreed', 12 (4.29%) stayed 'Undecided', 60 (21.43%) 'Disagreed' and 58 (20.70%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (59.14) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. The maximum no. of the respondent acknowledged the statement that "The policy and objectives of Physics curriculum are well clear" is accepted.

Table 7. The Contents of Physics Help in Achieving the Objectives

Options	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	χ^2
Responses	24	59	47	98	52	280	39.8
Percentage	8.57	21.07	16.79	35	18.57	100%	
Fo	24	59	47	98	52	280	
fe	56	56	56	56	56	280	
(fo – fe)	-5	3	-46	8	-4	0	
$(fo - fe)^2$	25	9	2116	64	16	4006	
$\frac{(fo-fe)^2}{fe}$	0.44	0.16	37.78	1.14	0.28		

N=280 P=0.05, DF=4, table value=9.488, calculated value=39.8

The data analysis in table No: 7 indicated that out of 280 respondents 24 (8.57%) 'Strongly agreed', 59 (21.07 %) 'Agreed', 47 (16.79%) stayed 'Undecided', 98 (35%) 'Disagreed' and 52 (18.57%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (39.8) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. So, the maximum of the replying teachers did not admit the given statement that "The contents of Physics help in achieving the objectives" is rejected.

Table 8. The Teaching Practices Being Used for SS Level Physics Curriculum are Suitable with Respect to Requirements of the Students

Options	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	χ^2
Responses	06	37	3	173	61	280	346.08
Percentage	2.14	13.21	1.07	61.79	21.79	100%	
fo	06	37	3	173	61	280	
fe	56	56	56	56	56	280	
(fo – fe)	-50	-19	-53	117	5	0	
$(fo - fe)^2$	2500	361	2809	13689	25	19384	
$\frac{(fo-fe)^2}{fe}$	44.64	6.4	50.16	244.44	0.44		

N=280 P=0.05, DF=4, table value=9.488, calculated value=346.08

The data analysis in table No: 8 indicated that out of 280 respondents 06 (2.14%) 'Strongly agreed', 37 (13.21%) 'Agreed', 3 (1.07%) stayed 'Undecided', 173 (61.79%) 'Disagreed' and 61 (21.79%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (346.08) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the teachers. So, the maximum of the replying teachers did not admit the given statement that "the teaching practices being used for SS level Physics curriculum are suitable with respect to requirements of the students" is rejected.

Table 9. The Examination of Secondary School in Subject of Physics Curriculum is Based upon the Items which Test Rote Learning/ Memorization

Options	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	χ^2
Responses	103	111	2	51	13	280	124.90
Percentage	36.79	36.64	0.71	18.21	4.64	100%	
Fo	103	111	2	51	13	280	
Fe	56	56	56	56	56	280	
(fo – fe)	47	55	-54	-5	-43	0	
$(fo - fe)^2$	2209	3025	2916	25	1849	10024	
$\frac{(fo-fe)^2}{fe}$	39.44	54.01	52.07	0.44	33.01		

N=280 P=0.05, DF=4, table value=9.488, calculated value=124.90

The data analysis in table No: 9 indicated that out of 280 respondents 103 (36.79%) 'Strongly agreed', 111 (36.64%) 'Agreed', 2 (0.71%) stayed 'Undecided', 51 (18.21%) 'Disagreed' and 13 (4.64%) 'Strongly disagreed' to the given statement, thus, the calculated value of χ^2 (124.90) is greater than the table value of χ^2 (9.488) at P = (0.05), so the result is significant and it may be concluded that the opinion is different among the Teachers. The maximum number of the respondent acknowledged the statement that "The examination of Secondary school in subject of Physics curriculum is based upon the items which test Rote learning / memorization" is accepted.

Conclusions

Conclusions Based of Teachers' Responses:

The present curriculum of Physics is unexciting and mind-numbing. It lacks developing the domain of motivation and spirit. It does not accelerate the analytical skill of the learners. It is not in position to nurture the spirit of exploration and discovery. The present curriculum gives students basic understanding but it lacks the potentials to accomplish the major goal of producing model citizens. The Contents, Objectives, Standards, Benchmarks and Learning Outcomes of the current curriculum in the subject of Physics at Secondary level in Pakistan is well according to the mental level of the students but the designing of the book does not cater for the students' interest. Contents given in the book are helpful for the development of scientific and technological awareness. Contents were missing the links for the development of logical reasoning among the students. Organization of content was based upon the theory from simple to complex. Continuity between topics was there but it was not based upon integration between levels. Criteria for selection of activities were based upon curriculum objectives, understanding of concepts, which were based upon the acquisition of information from theories and principles. Pictures, Figures, and Graphs were insufficient to explain the related topics given in the textbook of Physics. The lecture method of teaching was not suitable for teaching of Physics they suggest that the activity base method of teaching was found most suitable for teaching of Physics. The Physics curriculum was based upon single text book and it required specific teaching methodology and Audio Video Aids which were not provided to teachers for teaching of Physics in the formal classrooms. Teaching methodologies being used in Secondary school in the subject of Physics were appropriate with respect to knowledge, readiness of the learner but majority of the respondents did not agree that teaching methodology being used were appropriate with respect to scientific thinking, problem solving skills and logical reasoning. Examination in Physics was not based upon the items which tested analysis, synthesis, evaluation and the scientific process,

scientific skills and scientific attitudes. The examinations at Secondary school level in Physics were based upon the items which tested achievement of the knowledge, comprehension, application and rote memorization. The students were not judged in academic year by a variety of evaluation methods such as assignments, presentation, quiz etc. and the internal system of testing Physics.

Conclusions on the Basis of Interviews with Experts

The experts expressed their full satisfaction with the objectives of Physics given by Curriculum Wing, Ministry of Education, Islamabad. However, majority of the experts held the view point that out of the given objectives of teaching of Physics at the Secondary level, the following three objectives were not achieved:

a. Present curriculum of Physics develops the overall development of concepts, systems and practical applications.
b. Practicing curriculum of Physics nourishes the skills of problem solving, investigation, dated tackling and strong vocational skills.
c. Available curriculum of Physics develops the sense of modal citizenship with special attention to environment and resources commitment.

Majority of the experts viewed that the objectives of curriculum, in Pakistan were not at par with those in developed countries like Malaysia, Turkey & UK. A sizeable majority suggested the inclusion of the following objectives in the curriculum of Physics in Pakistan.

a. To extend due weightage to pragmatic use of the concept in daily life.
b. To expedite creative and logical thinking of the students.
c. To boost critical and analytical situational evaluation.
d. To enhance the spirit of exploration and discovery among students.
e. To equip students with market oriented education of Physics.

A simple majority of experts viewed that the criteria of selection of content of Physics were not satisfactory as they overlapped horizontally and vertically. Majority of experts indicated that the criteria of selection of content organization of Physics at Secondary level in Pakistan were not satisfactory. Majority of respondents viewed that the existing methodologies regarding teaching of Physics were not appropriate as they were not activity based and students centered. Curriculum experts viewed that activities in textbook should be short, simple, low cost and according to the mental level of the students. The curriculum of technologically and advanced countries provided well designed studies of experimental and practical science which developed abilities and skills they were useful in everyday life. It stimulated interest in study and was more activity based and students centered. The experts agreed that the curriculum framework was based on the standards and benchmarks. The researcher concluded that majority of experts accepted the fact that teachers and students have been left with no other option than the prescribed textbook. An

overwhelming majority of curriculum experts analyzed the overall development of all skills of the learners. Moreover, the future curriculum should develop attitudes relevant to science such as concern for accuracy and precision, objectivity, integrity, enquiry and initiative. The future curriculum should also promote awareness that the study and practice of science were co-operative and cumulative activities.

Recommendations

It is recommended that representatives of teachers may be fully involved in the process. Contents of the curriculum of Physics at the Secondary School were found far behind to enable the faculty to promote logical reasoning and problem solving skills of the students. It is recommended to update Physics Curriculum and ensure the achievement of the desired objectives. Furthermore, subject matter may be updated to enhance interest, creativity and scientific altitude of the students. Proper and up to date Audio-Visual aids were not available to Physics teachers along with standardized Physics laboratories. Latest A.V. aids may be made available to Physics teachers to assure pleasant teaching-learning process. Interval assessment system and external evaluation system may be introduced to achieve the objectives. Reasonable weightage may be given to practical work along with projects throughout the academic session. The prescribed textbook by single author may be replaced with book of multi-authors to assure multidimensional learning of the students. The existing textbooks of Physics nurtures rote learning. Textbooks should ensure the overall conceptual grooming of the students. The Textbook Boards should also prepare teachers' guides for the textbook that will help Physics teachers. Physics curriculum should enhance the capacities of learners to produce true picture of the learned materials. Assessment in Physics must be aligned with international standards because assessment has a major impact on what is taught and learned. Teachers training institutions should design a course that is applicable in practical life. The training duration may be increased from one month to three months to achieve the desired goals of Physics. Seminars and conferences may also be organized to disseminate the findings of this research.

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