Global Scientific JOURNALS

GSJ: Volume 8, Issue 3, March 2020, Online: ISSN 2320-9186

www.globalscientificjournal.com

General Certificate (A-Level) and Higher Secondary Certificate Education System with Special Reference to Physics: A Comparative Study

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Abstract

The purpose of the study was to compare the basic sciences at GCE (A-Level and HSC Level with special reference to objectives, contents, teaching methodologies and evaluation. The scope was limited to GCE A-Level and HSC level institutes, teachers, students and principals. The population was comprised of experts, teachers and students of Physics from both systems of education. A sample of forty experts 20 from each system, 225 teachers, 750 students from 50 institutions offering HSC and 25 institutions offering A-level was drawn. Data were collected and analyzed. It was found that A-Level system of education in urban Sindh was due to effective learning models, flexible science of studies extensive knowledge based education a symbol of status for the family and local, international demand of that qualification. The experts of both the systems opined that the objectives of Physics were well defined and clear but opinion of the teachers of both the systems differed significantly. According to the teachers of HSC program the objectives of Physics were not well defined and clear whereas the teachers of A-Level expressed that objectives of physics were well defined and clear. Majority of the teachers of HSC system were found dissatisfied with the present scheme of studies being offered at higher secondary level whereas majority of the teachers of A-Level expressed their satisfaction on the scheme of studies of A-Level. According to the teachers of HSC programme, objectives of Physics were not well defined and clear. Curriculum would be over hauled and modified according to the needs and requirements of 21st century. Science education plays a pivotal role in the development of a country, therefore the education system would be same in all respect to bring it at par with the needs of international level.

Keywords: A-level, higher secondary certificate, education system; science subjects

Introduction

Educational Practitioners and policy makers make comparison of educational systems of two countries for a number of reasons: (a) to appraise the relative standing of their own education outcomes as an index to global economic competitiveness: (b) to learn from other nations policies and educational practices in order to upgrade their own: and (c) to discern their own vitality and infirmity in relation to other nations in order to diagnose the areas of improvement. Comparing systems of education can yield educators with ideas for resuscitating components.

Education is very strenuous to pin to a specific denotation, because the notion may be perceived from various angles. Adesina (1985) noted that education is always associated to variables, such as impetus of the learner, the aim and objective of the teacher as well as the technological problems of the society. He, therefore, stated educational as: the instrument for the consolidation of the individual effectually in to society so that the individual can attain self cognizance, flourish National responsiveness, foster unanimity and struggle for social, political, scientific, economic, cultural, and technological process. Education according to Nyerera (1982) is the channeling of accumulated sagacity and knowledge of the society from one generation to the next and also to prepare the young for their succeeding associateship of the society in which they find themselves. At this stage, we can define Education as an activity through which an individual becomes synthesized in to his society, becomes a promoter of his societal culture, benefactor to the development of his society and becomes a grown up to stand on his own.

The aim of education reform demands change in curriculum through which the development of one can be made intellectually and socially to the person's fullest potential. Quality and content are essentials for meaningful education. The quality and content of education is determined by examining critically the curriculum, teaching methods, assessment paper tools and judging the evaluation system.

Pakistan's education system faces enduring dilemma in access, quality and opportunities at all level. In spite, of all recent developments in education sector such as the rapid growth of private schooling and an expansion of higher education opportunities, systematic reform remains stubbornly intangible. Economic and societal developments in Pakistan undergo severe constraints due to the inability of successive governments to reform the system. An inability of taking concrete steps now may boost the problems in the days to come, due to a burgeoning youth population and intensified competitive pressures from other developing countries that are devoting more attention to education.

During the last two decades or so, there has been an increasing trend, observed towards doing A Level in Pakistan. This can be noted by the establishment of numerous A-Level colleges eloping up all over the country. The strengths and weaknesses of both the systems of education are being discussed in public forums. In such circumstances there was a dire need of an analytical study of British System of education and other states education program to ascertain the effectiveness and the shortcomings of science curriculum objectives, assessment paper tools, teaching methods and examination systems of both these programs of Education. It is therefore, seems appropriate to analyze education system of GCE A-Level and HSC Level in Sciences. Due to the constrain of time and available resources to the researcher,the study was delimited to the subject of Physics. Since last few decades communities and political parties have been focusing on one system of education in the country in 2013, general election few political parties included this issue in their manifesto. The researcher has taken the initiative to settle down issue on scientific lines. The comparative study of two major systems of education would help to achieve all concrete conclusions.

We lay stress in this paper the need for education system reform in Pakistan and eloquent why a window of opportunities exists at this time for all stake holders, such as government, civil society and donors to initiate reform. We put forward, however, some key messages. One, that reform must tackle all sectors of education systems. Two, reform in the domain of academics in existing education systems must be systematic i.e. with well defined goals, focus on a minimal set of areas such as curriculum, teaching methods, evaluation and examination system and address them all together.

The science curriculum at any standing is an assertion about the components of natural science we opt to teach picked out from a colossal set of attainability. Learning of science develops scientific aptitude and attitude in an individual. Yadav (1992) viewed that the principle of learning science base upon psychology i.e. learning by doing and learning by observing. Khan (2004) suggested that for the production of rational mind and to develop desirable operational skills in learners, science must be perceived from a broaden perspective.

There is an epidemic concern about the fallout of science education at school and college levels:in Pakistan.For example the industrialists demand top of the line scientists; engineers and technicians to encounter fortuitously in technology; intensive international markets.Whatever career relatively better at school once it desists to be mandatory. This leads to fewer applications for science degrees and curtail supply of science graduate. Sir Gareth Roberts in 2002 summarized the seal of this problem. He identified some of its root causes and noted that the lack of choosing to study science related subjects as reported by students of their unpleasant impatience of science education. The dearth of enthusiastic and experienced science teachers, and young people's misconception about science related careers. We believe that the best way forth is to provide the highest grade of science education for all students. If that education is sufficiently alluring and challenging, palpable high achievement will become more widespread and will become apparent through students perseverance, lateral thinking and creating the young people to motivate increasingly to follow science related careers.

Realizing the rapid growth in the Science and technology in the new era there felt a dire need to upgrade science curriculum at all levels, particularly at the higher secondary level. The study addressed the following objectives to explore the views of stakeholders (science experts, physics teachers and science students) about the worth of physics curriculum at intermediate level: to carryout comprehensive analysis of physics curriculum: to identify strengths and weaknesses in existing syllabi of physics for both the systems of education.

The national educational policy (1992) laid stress greatly upon the revision of science curriculum, at all schooling levels. It stated that science curriculum should be revised and made compatible with the demand of growing knowledge. It is obvious that in spite of several curricular reforms in science education, the academic standard of students, particularly at intermediate level has not improved considerably.Therefore, it is important to investigate the cause of failure in science subjects at college level and simultaneously

provide a solid and coherent base for science teaching practices. Ali and Rana (2005) commented on the state of affairs prevailing at intermediate level. According to them lack of guidance programs, untrained teachers, shortage of academic staff members, burden of periods, in-adequate science laboratories, a lack of motivation among students, lack of co-ordination of teachers and parents. While the examination system enhances rote learning, goals/objectives of science subjects are not taken into account during evaluation.

Review literature of HSC education system indicates the deteriorating standard of HSC system. Some views of reports are chosen for reference. Abbas in his article "Cheating by consent' writes that examination time is cheating time. The syllabus and factual reading materials are innocuous, the system of assessment and evaluation are so subjective and thoughtless and the quality of teachers and the text books are so abysmally low standard, causing naturally students to use unfair means in the examination. The examination has lost its standards. Aziz and Rana (2005) in their article 'Re-appraisal of the examinations system' condemns the evaluation system that is being practiced by HSC Board. He writes 'the checking of answer scripts is so shocking that a bright student may have the chance to lose his marks and a looser may get good marks, particularly in the descriptive subjects. Every teacher is given twenty answer booklets to check within two hours of direction'. Obviously it seems almost impossible for an honest copy checker to check one booklet in six minutes if he reads every word. Even the checker is required to prepare the list of copies and to do some other related work during this period of time. Habibullah, a renowned scholar has shared his thoughts on the private sector in education. Street colleges have adopted western names and they charge exorbitant amount in the favor of college fees. Their fees are found even higher than the average income of ordinary persons. Second such school offer education only in the faculty of science and commerce. Other subjects like language, Philosophy, psychology, sociology and many other courses of social sciences do not exist in such schools. As a result the flame of credibility is dampened and efficiency and leadership in lost in the scramble. Existing curriculum is Sapping the physical, economical social, moral and cultural baseline of our life the whole system should be re-constructed and readjusted to meet our conditions. He believed that the curriculum should be based on child psychology, cultural and social needs. Only then the country could meet its present and future challenges.

Objectives of the Study

The main objectives of the study are:

1. To critically review the policy objectives of basic science (physics) curriculum at GCE (A-Level) and HSC level.
2. To compare basic sciences (physics) at GCE A-level and HSC level with special reference to objectives, contents, teaching methodology, evaluation.
3. To undertake the comparative review of examination systems of GCE A-level and HSC level in physics.

4. To suggest measures for the improvement of GCE A-level and HSC level science education program.

Hypotheses of the Study

Ho1: There is no significant difference between both systems of education on the necessity of need assessment for curriculum development.

Ho2: There is no significant difference between both systems of education on definition and clarity of objectives of physics.

Ho3: There is no significant difference between both systems that present physics curricular contents are according to the international standards.

Ho4: There is no significant difference between both systems of education on the absence of help in rote learning in the examination.

Ho5: There is no significant difference between both systems in the suitability of lecture method for teaching physics.

Ho6: There is no significant difference between both systems in the proper use of new instructional technology to teach physics.

Ho7: There is no significant difference between both systems on the focus of the examination system on cramming of knowledge.

Ho8: There is no significant difference between both systems in the focus of the examination system on understanding.

Ho9: There is no significant difference between both systems on the evaluation systems at GCE A-level and HSC level.

Ho10: There is no significant difference between both systems on formulating mark schemes in different questions settings in physics.

Research Methods

For this study, researchers used descriptive survey method in order to investigate differences between both systems in Sindh, Pakistan.

Sampling

The stratified random sampling method was used for the collection of data. The sample included 40 science experts (17 female, 23 male respectively) 225 teachers (95 female, 130 male) students 750 from both the systems of education. Selected participants were from GCE A-level and HSC level systems of education in Karachi Sindh.

Research Instrument

The study used three questionnaires for science experts, teachers and students from GCE A

level and HSC level systems of education. One questionnaire was for science students, one for science teachers and one for science experts from both the systems of education.

Analysis of Data

Mean, standard deviation, t-test and chi-square test were used to compare views and perceptions of participants regarding differences in the education systems of GCE A level and HSC level with special reference to physics.

Reliability and Validity of Instrument

The researcher developed three questionnaires for all three respondents items in all the questionnaires were almost the same and related to the objectives, syllabus contents, teaching methods and evaluation systems. The statement of the items in the questionnaire was made very clear. In order to validate questionnaire, the researcher sought the expert judgment from different colleges of GCE A-level and HSC level. Science experts critically reviewed the questionnaires and checked for language and contents for all items in the questionnaires. The researcher discussed the items with the experts. Based on the suggestions and advice of these exports, the items were improved and refined in language, structure and contents.

The researcher selected randomly six colleges imparting GCE A-level and HSC level of education from Karachi and Hyderabad from each college, the science experts, science students and physics teachers were chosen for the collection of data. The total respondents for pilot test were 6 science experts, 18 physics teachers and almost 90 science students. All questionnaires were administered to the relevant respondents. The purpose was to see whether respondents understand an item in the same way as intended. The language and structure of some of the items were modified and improved after being observed the responses of these respondents.

To test the reliability of the questionnaires, spit half method was used. For this purpose, the items in the questionnaires were divided into two equal halves, the even and odd numbered items. Score acquired by each respondent during the pilot testing on both the parts were determined. This was done by assigning a numeric code to each of the response Strongly Agree 5 to Strongly Disagree 1. The score of each respondent on each item was calculated, then summed up to get his total scores on the even and odd numbered items. The two scores of all the individuals were then analyzed statistically using SPSS version 20 to find the correlation between the two halves. Pearson correlation formulated that is given below was used to find correlation.

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

After calculating the correlation between the odd and even numbered items the coefficient

of reliability for the whole questionnaire was calculated by applying the spearman-Brown prophecy formula.

$$\text{Reliability} = \frac{2x\ r\ \text{half-test}}{1+\ r\ \text{half-test}}$$

Results and Discussion

The main purpose of the study was to compare the HSC level and GCE A level curricula teaching methods, examination and evaluation systems with reference to physics. Following is the result of the data based on the questionnaire. T-test and two way chi-square were used to analyze the data.

Table 1 The objectives of physics are well defined and clear

Program	N	Mean	SD	SE	t-value
Experts HSC	20	3.42	1.43	0.40	0.932
Experts A-level	20	3.83	1.32		

* Significant at $p < 0.05$ df = 38 Table value at 0.05 = 2.02

Table 1 reflects that mean values of curriculum experts from both the systems of education, are 3.40 and 3.80 with standard deviations 1.40 and 1.31 respectively. The 't' value between two groups comes out to be 0.932 it is non significant at 0.05 level of significance. Hence the hypothesis that 'there is no significant difference between both the systems of education on definition and clarity of objectives of physics is accepted.

Table 2 The objectives of physics are well defined and clear

	SA	A	UD	DA	SDA	Total	X2
HSC Teachers	9(6%)	21(14%)	10 (6.70%)	74 (49.0%)	36 (24%)	150	72.85*
A-Level Teachers	39 (52%)	11 (14.70%)	5 (6.71%)	7(9.0%)	13 (17.21%)	75	

* Significant df=4 X2 at 0.05 level = 9.49

From table 2, it can be seen that the obtained X2 value is significant at 0.05. Therefore, the hypothesis that there is no significant difference between both the systems on definition and clarity of objectives of physics is rejected. Here we see the difference in opinions between A-level and HSC level. HSC level students are not confident about the syllabus of their system, while the A-level students showed their confidence with the objectives of science curriculum of A-level.

Table 3 Lecture method is most suitable to learn physics

Program	N	Mean	SD	SE	t-value
Experts HSC	20	3.40	1.44	0.40	1.487
Experts A-level	20	4.05	1.10		

* Significant at $p < 0.05$ df =38 Table value at 0.05 = 2.02

From the above table, we see the obtained X2 value is significant at 0.05 level. Hence, the hypothesis 'that there is no significant difference between both the systems on the suitability of the lecture method for learning physics' is rejected. Here, the table reflects that HSC level experts are comfortable to use lecture method while A-level systems expert are in favor of that method to teach physics.

Table 4 Lecture method is most suitable to teach physics

Program	SA	A	UD	DA	SDA	Total	X2
HSC Teachers	56 (37.0%)	54(36%)	12(8%)	21 (14%)	7 (4.70%)	150	17.98*
A-Level Teachers	44 (58.60%)	26 (34.70%)	2(2.72%)	0(0%)	3(4%)	75	

* Significant df=4 X2 at 0.05 level = 9.49

It can be seen from the above table that the obtained X2 value is significant at 0.05 levels. Hence, the null hypothesis that there exist no significant differences between both the systems of education on the suitability of the lecture method for learning physics is rejected.

Table 5 Lecture method is most suitable to learn physics

Program	SA	A	UD	DA	SDA	Total	X2
HSC Students	250 (50%)	150 (30%)	12 (2.4%)	12(2.4%)	76 (15.0%)	500	79.8*
A-Level Students	102 (41.0%)	48 (19.0%)	27 (11.0%)	41 (16.0%)	32 (13.0%)	250	

* Significant df=4 X2 at 0.05 level = 9.49

Table 5 reveals that the obtained X2 value is significant at 0.05 level. Hence, the hypothesis that there is no significant difference between both the systems on the suitability of the lecture method for learning physics is rejected. There, we can deduce that A level students are not comfortable with lecture method in learning physics, whereas HSC students showed their confidence in the said method.

Table 6 The examination system focuses on cramming of knowledge

Program	N	Mean	SD	SE	t-value
Experts HSC	20	4.50	0.61	0.27	7.750*
Experts A-level	20	2.44	1.04		

* Significant at $p < 0.05$ df =38 Table value at 0.05 = 2.02

Table 6 reflects that mean values of curriculum experts from both the systems of education, are 4.50 and 2.44 with standard deviations 0.61 and 1.04 respectively. The 't' value between two groups comes out to be 7.75 it is non significant at 0.05 level of significance. Hence, the hypothesis that 'there is no significant difference between both the systems of education on the examination system focuses on cramming of knowledge' is accepted.

Table 7 The examination system focuses on cramming of knowledge

Program	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	**X2**
HSC teachers	36(24%)	39(26%)	41 (27.00%)	11 (7.31%)	23 (15.30%)	150	45.19*
A-Level teachers	11 (14.70%)	5 (6.60%)	10 (13.31%)	27(36%)	22 (29.00%)	75	

* Significant df=4 X2 at 0.05 level = 9.49

From table 7, it can be seen that the obtained X2 value is significant of 0.05. Therefore, the hypothesis that 'there is no significant difference between both the systems on the examination system focuses on cramming of knowledge' is rejected. Here we see the difference in opinions between A-level and HSC level teachers. HSC level teachers are not confident about the examination made of their system, while the A-level teachers are found more satisfied with their examination system.

Table 8 The examination system focuses on cramming of knowledge

Program	**SA**	**A**	**UD**	**DA**	**SDA**	**Total**	**X2**
HSC Students	391 (78.0%)	13 (2.6%)	29 (6.0%)	40(8%)	27 (5.0%)	500	292.18*
A-Level students	32 (12.8%)	19 (7.6%)	64 (25.6%)	69 (27.6%)	66 (26.0%)	250	

* Significant df=4 X2 at 0.05 level = 9.49

From table 8, it can be seen that the obtained X2 value is significant at 0.05. Therefore, the hypothesis that 'there is no significant difference between both the systems on examination systems' is rejected. Here we see the difference in opinions between A-level and HSC level students. HSC level students are not confident about their examination

system, while the A-level students are found more satisfied with their existing system of examination.

Table 9 Examination system promotes the healthy competition and comparisons among institutions

Program	N	Mean	SD	SE	t-value
Experts HSC	20	4.00	1.11	0.27	1.845
Experts A-level	20	4.52	0.51		

* Significant at $p < 0.05$ df = 38 Table value at 0.05 = 2.02

Table 9 reflects that mean values of curriculum experts from both the systems of education, are 4.05 and 4.55 with standard deviations 1.10 and 0.51 respectively. The 't' value between two groups comes out to be 1.84. It is non-significant at 0.05 level of significance. Hence, the hypothesis that 'there is no significant difference between both the systems of education on evaluation' system' is accepted.

Table 10 Examination system is helpful to improve the standard of education

Program	SA	A	UD	DA	SDA	Total	X2
HSC Teachers	66(44%)	41(27%)	6(4%)	15(10%)	22 (14.7%)	150	16.72*
A-Level Teachers	48 (63.67%)	21(28%)	1 (1.31%)	5 (6.72%)	0(0%)	75	

* Significant df = 4 X2 at 0.05 level = 9.49

From table 10, it can be seen that the obtained X2 value is significant at 0.05. Therefore, the hypothesis that 'there is no significant difference between both the systems on the evaluation system' is rejected.

Table 11Teachers are influenced in internal examination system

Program	SA	A	UD	DA	SDA	Total	X2
HSC Students	159 (32.0%)	183 (37.0%)	56 (11.0%)	85 (17%)	17 (3.4%)	500	48.30*
A-Level Students	49 (19.59%)	98 (39.0%)	52 (21.0%)	21 (8.31%)	30 (12%)	250	

* Significant df = 4 X2 at 0.05 level = 9.49

Above table depicts that the obtained X2 value is significant at 0.05 level. Hence, the hypothesis that 'there is no significant difference between both the systems of education on the evaluation system' is rejected.

Conclusion and Recommendations

The data gathered through the responses of the questionnaire provided valuable information concerning to the comparison between GCE A Level and HSC level systems of examination in Sindh with special reference to physics.

The aims and objectives of education are achieved by both the examining bodies to a certain extent. However, the HSC system has major drawbacks. Syllabus designed for HSC level does not suit educational demand in present science, unclear, vivid and confused information are gathered in the books and in the same way the assessment is made, children fail to develop their thinking ability. They are unaware with the critical technique to infer, deduce and deduct information from a topic taught to them. The curriculum of the HSC level is not up-to the international standards. It has not been reviewed for more than a decade. As a result, the examination questions are repetitive. Questions are asked only from the prescribed text books. Students of HSC education system depend largely on guides and on guess papers. The HSC examination system requires a lot of memorization. On the other hand a vast percentage of the respondents were of the opinion that GCE A-level system of education does not possess these demerits. The question of cheating in the Cambridge based examination does not exist.

Questions are rarely chosen from the endorsed text books and variety of questions is a norm. Teaching standard is high for A-level, but no so for the HSC Level. GCE A-level teachers are relatively experienced, hardworking, committed, result oriented. Teachers far HSC level are qualified as well but force students to leave certain unimportant chapters and focus in selective study. Most of the teachers in both the systems of education are not trained and do not possess the education degrees to combat effectively their syllabi. The assessment objectives in HSC level physics curriculum do not expect from students to evaluate methods suggesting possible improvements. Moderate marking scheme in not introduced in HSC system of education to evaluate the examination papers.

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