EFFECTIVENESS OF ASSESSMENT TOOLS OF CHEMISTRY USED BY THE BOARD OF SECONDARY EDUCATION KARACHI

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ABSTRACT

The purpose of the study was to analyse the assessment tools of question papers of Chemistry subject grade IX developed by the Board of Secondary Education Karachi. The scope of the study was limited to assessment tools developed by the Board of Secondary Education Karachi. The study mainly obsess on question papers of Chemistry grade IX in terms of application of Bloom's Taxonomy. Two research questions were heightened. The study will help the concerned stakeholders to review their planning and policies for the betterment of assessment process. In depth review of the related literature was made. The population of the study was comprised of question papers of Chemistry grade IX developed by the Board of Secondary Education Karachi. Meticulous sampling was adopted. Therefore, the question papers of Chemistry subject grade IX (Science Group) from 2012 to 2016 were selected. The question papers were analysed and it was found that Bloom's Taxonomy have not been applied in preparation of question papers of Chemistry subject grade IX and the Board has also failed in their decision to make the papers apart from the past five years. On the basis of findings, suggestions were made.

Keywords: Assessment tools, Secondary Education, Karachi, Chemistry

INTRODUCTION

This research study is attempt to critically analyses the assessment tools of Chemistry (Theory) subject grade IX (Science Group) developed by the Board of Secondary Education Karachi (B.S.E.K) for the Annual Examination. The Board of Secondary Education Karachi is liable for conducting the Secondary Examination and appointing the subject experts for paper setting who also lead the supervise the assessment team backed by the deputy head examiners. On the ground of grade or score achieved by the examinees, the Secondary certificate is awarded. The B.S.E Karachi has introduced new paper pattern of question paper in 2009 which is still in practice. The prescribed pattern of Chemistry (Theory) has divided the question paper into three sections with 85 marks. The first section carries seventeen items of multiple choice questions and each question carries 01 mark. The second section is based upon short-answer questions with forty two marks and each question carries 03 marks. The last section carries detailed-answer questions with twenty six marks and each question carries 13 marks. In this section each question is further sub divided into three parts carry 5, 4 and 4 marks respectively.

The objective of the study is to analyse the effectiveness of assessment tools of chemistry used by BSEK.

The purpose of the study is to analyse the application of assessment tools that are frequently used in the question paper and to describe the reliability and validity of the whole process of the assessment.

The study specifically focuses on the two question:

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1. Has the Bloom's Taxonomy been applied in preparation of Annual Examination question paper of Chemistry (Theory) subject grade IX?
2. Has the board been successful to implement their decision, taken on 8-11-2014, to make the papers apart from the past five years?

The present study will bring improvement in setting the question papers. It will also help to the concerned stakeholders to establish the new techniques and methods in order to maintain the quality of assessment.

The study was limited to the question papers of Chemistry (Theory) subject grade IX (Science Group) Annual Examination administered by the Board of Secondary Education Karachi from 2012 to 2016.

The present assessment system of the answer scripts of the Chemistry subject grade IX does not meet the required standards of assessment. The paper setters do not follow the guidelines of assessing the examinees. The examiners are not properly trained in the in the area of assessment. The Board of Secondary Education has been unable to implement the rules, techniques and methods of quality assessment generally.

LITERATURE REVIEW

Assessment involves a very important place in any educational system. It guides to highlight the objectives of the educational system and its outcomes. All the decisions are taken on the basis of assessment regarding educational programs, learner's progress and attitude, development and the application of techniques applied by the teachers. It is an ongoing process that tells about the interaction among teaching and learning. Therefore, it is a main body of quality of teaching and learning. Its importance has been recognizes as the only source that encourage the students to gain more knowledge and skills regarding subject. It attracts learners to learn new knowledge and skills. Brown (2004) asserts that "Assessment is probably the main important thing we can do to help our students learn. We may not like it, but students can do ignore our teaching; however, if they want to get a qualification, they have to participate in the assessment process we design and implement." Assessment has become a regular and main feature of the education system.

Content analysis is the systematization of text analysis. It analyses the form and substance of communication. Underlying meanings and ideas are revealed through analyzing patterns in elements of the text, such as words or phrases" (Yang, 2008, p.689). "Inductive content analysis is applicable in case where there is no previous studies dealing with the phenomenon or when it is fragmented. A deductive approach is helpful if the general aim was to test a previous theory in a different situation or to compare at different time interval". (Elo S & Kyngas H)(2008).

Assessment is the single most essential determinant of student learning. Facilitator communicate to learners for their values, priorities and expectations through assessment. According to Rowntree (1987, p.1), "the spirit and style of student assessment defines the de facto curriculum". Moreover, a great transaction of assessment literature is aimed at delineating between formative and summative assessment, yet summative assessment can be applicable for formative purposes as well. (Bell & Cowie, 2000).

Athanssou & Lamprianou (2002) has described that the assessment has become 'social importance' because of its relationship with formal qualifications. The associates have recognized its significance by playing much attention to educational assessment. They have developed their confidence and expectations on assessment system due to its contemporary and reliable techniques. There are many professional organization which are involved in

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development and progress of assessment all over the world. Assessment is not only based upon a common sense but also upon an extensive international research and application. It is important for teachers to keep themselves up to date and also be familiar with new techniques of the educational assessment.

The word assessment is commonly used in the educational system. It is derived from the Latin word which means to impose a tax or to set a rate (Athansou & Lamprianou, 2002).The Australian National Training Authority defines assessments as "the process of gathering and judging evidence in order to decide whether a person has achieved a standard or objective". The Victorian Curriculum and Assessment Authority defines assessments as "a task set by the teacher to assess the students 'achievements of unit outcomes" (Athanssou & Lampriano, 2002). Assessment is the systematic way by which the educational system can be enhanced by defining, selecting, designing, collecting and using information (Erwin, 1991).

Assessment is the intrinsic part of any educational system. It is necessary to assess the educational targets and standards by using assessment .The result of the assessment dominates the practical life of the students because every students endeavor any form of study is subjected to assessment .Therefore, the outcomes of assessment has put great influence on self-perception of the learners who are groomed to embark his/her practical life (Airsian, 2001, p.22). It also support to provide chance to concerned authorities for making effective programs and planning for assessment.

Assessment is a process of documenting a knowledge, skills, abilities and attitude of students and it also applicable to know the learner's understanding towards the subject. It is the procedure to educate and enhance the performance and abilities of the students in a better way. It does not only help the students to improve the knowledge and skills but it also provides opportunity to the teachers to give banchmark the students' performance. It is alo very useful to upgrade the quality of learning and instruction (Athanssou & Lamprianou, 2002, p.10). It pinpoint the weaknesses and strengths of the learners and it gives necessary information which is helpful to decide how much learner' is improving with its learning (Bachman, 2004, p.9). "The systematic procedure means the assessment is done according to the explicit procedure that is open to public scrutiny". (Bachman, 2004, p.7).

Every activity has a purpose and purposeless activates are meaningless and wastage of sources such as time and money. In the same way, assessment has also many purposes that are being related to the educational progress and development. National curriculum for Chemistry (2006) mentions the primary purpose of assessment is to find out whether students have acquired the useful skills, knowledge, and understanding that the facilitator set as goal for their courses.

Teachers are bound to follow set rules and regulations but they can prepare the students for national assessment. Parents always want the best for their children. Therefore, parents must need to know what teachers are doing in class and why. Parents are the valued source of assessment information and audience for assessment. Assessment result must be disclosed to the parents throughout the education process of the learners.

Benjamin S. Bloom was assigned a project with a goal of creating a comprehensive methodology and technique of instructional objectives. Bloom, with the help of experts of various discipline, prepared Bloom's taxonomy for educators in 1956. Bloom et al. (1956) proposed a cognitive Taxonomy that is steady with critical thinking and educational learning ranks. Since its publications, Bloom's taxonomy has succeeded to draw attention of the educators. Its main purpose was instructional objectives for teaching methodology but it is also helpful in preparation of assessment tools. Bloom's taxonomy is classified into three

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domains namely cognitive domain [intellect], psychomotor domain [physical] and affective domain [emotional].Bloom found that over 95% of the questions of examination belonged to the lowest level of thinking that was recall of information or knowledge (Bloom, 1969).

Bloom clarifies that the acquisition of thinking processes are stratified .It means the lower-level skills must be learnt first before going to the higher-level skills. In other words, in incremental learning, a new concept is created on new data and the existing knowledge base may be modified for improvement over time (Bouchachia, 2009).

The many scholars and educators have developed taxonomies of cognitive skills but Bloom's taxonomy occupies an important place. It has inspired authoritie to develop instructional objectives and assessment techniques. Bloom's taxonomy of cognitive domain consists of knowledge, comprehension, application, analysis, synthesis and evaluation.

1. Knowledge refers to recall of information or remembering previously learnt material. It represents the lowest level of thinking.
2. Comprehension is similar to recall of information but it is one step above or forward of recall or knowledge. It is the ability to grasp the meaning of material and is involved in paraphrasing .It represents and describes the second lowest of cognitive domain.
3. Application is the ability to apply learned material in new situations and it is the use of knowledge to solve some problems or issues.
4. Analysis is ability to disintegrate the material into various parts in order to understand its structure and to draw some conclusion.
5. Synthesis refers to the ability and aptitude of combining various parts of material for the purpose of composing something new and unique.
6. Evaluation is the ability to judge the worth of material and it is involved in application of analysis and synthesis .It is the highest level of cognitive domain because it contains all the elements of other levels of cognitive domain.

However, in comparison with the original Taxonomy, the Revised Taxonomy allows the categories to flap one another (Krathwohl 2002). By taken together, both the original and Revised Bloom's Taxonomy have provided educators with high and low level of thinking closely interconnected with problem-solving skills, creative and critical thinking when cognitive development ascends the level of cognitive process.

RESEARCH METHODOLOGY

Mixed research method was adopted so both qualitative and quantitative method were used.

The research was divided into two steps: a) Collecting information related to content, b) To analyze content of the assessment papers on the Bloom's level.

Population of the study consist of question papers in the subject of Chemistry (Theory) grade IX from year 2012 to 2016, administered by the Board of Secondary Education (B.S.E) Karachi.

The purposive sampling was planned. The question papers of Chemistry (Theory) subject grade IX from 2012 to 2016 (Science group) were selected for content analysis. The question papers of Chemistry (Theory) subject grade IX were collected from the B.S.E Karachi by the researcher personally.

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Instruments

The question papers of Chemistry (Theory) subject grade IX (Science group) from 2012 to 2016 were selected for the purpose of study. The question papers of Chemistry (Theory) subject grade IX comprised of Multiple Choice Questions, Short-answer Questions and Detailed-answer (Long) Questions.

Data Analysis

The data was analysed and discussed by using the qualitative and descriptive quantitative statistical techniques. The finding were described and presented in detail.

RESEARCH QUESTION

The following research question were tested:

1. Has the Bloom's Taxonomy been applied in preparation of Annual Examination question paper of Chemistry (Theory) subject grade IX?
2. Has the board been successful to implement their decision, taken on 8-11-2014, to make the papers apart from the past five years?

DATA ANALYSIS AND DISCUSSION

Research Question 1

Bloom's Taxonomy Level in Chemistry (Theory) Paper

Each question of the Chemistry (theory) papers from year 2012 to 2016 was analysed critically. It is found that in year 2016,the section 'A' of the question papers reveals that 12 questions out of 17 based upon the last level cognitive domain of Bloom's taxonomy that is remembering, 2 questions based upon understanding, 2 question based upon Applying and 1 question based upon Analysing. It is evident that the Section 'A' of Chemistry theory paper is not better in term of assessing the knowledge, abilities and skills. It is just promoting a rote learning. The proportion of MCQ's based upon remembering is 71 %. The section 'B' of the question papers reveals that 3 questions out of 21 Based upon the last level cognitive domain of Bloom's taxonomy that is remembering, 17 questions based upon understanding, and 1 question based upon Applying. It is evident that the Section 'B' of Chemistry theory paper is comparatively better in term of assessing the knowledge, abilities and skills. The proportion of short answer-question based upon understanding is 81 % and 5% on level of applying. The section 'C' of the question papers reveals that 8 questions out of 9 based upon understanding, and 1 question based upon Applying. The proportion of descriptive answer-question based upon understanding is 89% and 11% on level of applying.

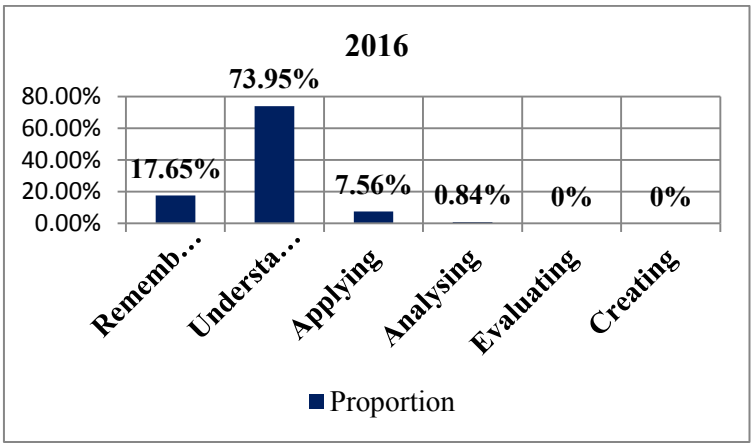

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Figure 1: A bar graph representing the proportion of bloom's taxonomy in Chemistry (theory) paper in 2016

Similarly the proportion of MCQ's (Section A) based upon remembering is 53 % in years 2015 and 2012, and in years 2014 and 2013, the proportion is 47%. In 2015, the section 'B' (Short-Answer/Questions) of the question paper based upon understanding is 62 % and 28% on level of applying, whereas in years 2014, 2013 and in 2012 the cognitive level of understanding and applying is 71% and 24%, 52% and 38% , 71% and 19% respectively. The proportion of descriptive answer-question (section 'C') based upon understanding is 100% in years 2015 and 2013, whereas in year 2014 and year 2012 the proportion of understanding and applying became 78% and 22% respectively.

The overall proportion of cognitive levels used in Chemistry (theory) paper from year 2016 to year 2012 is represented by the figures 1-5.

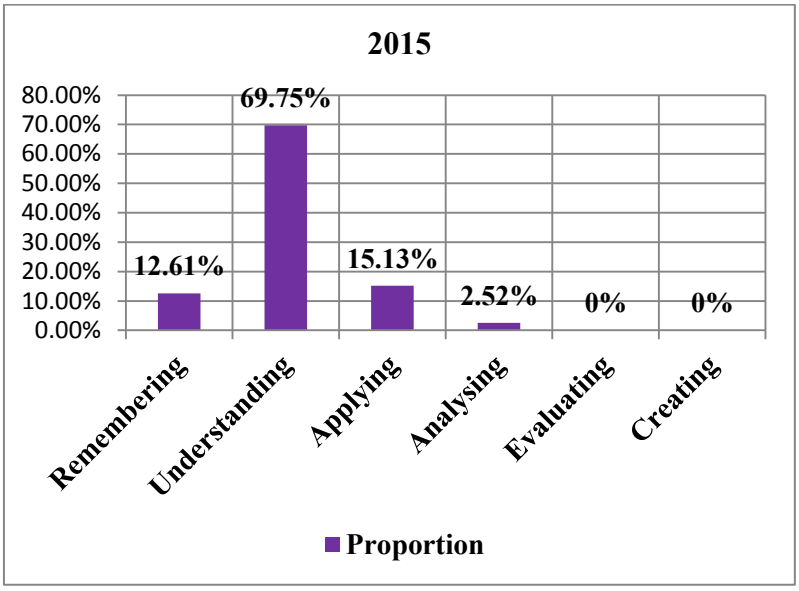

Figure 2: A bar graph representing the proportion of bloom's taxonomy in Chemistry (theory) paper in 2015

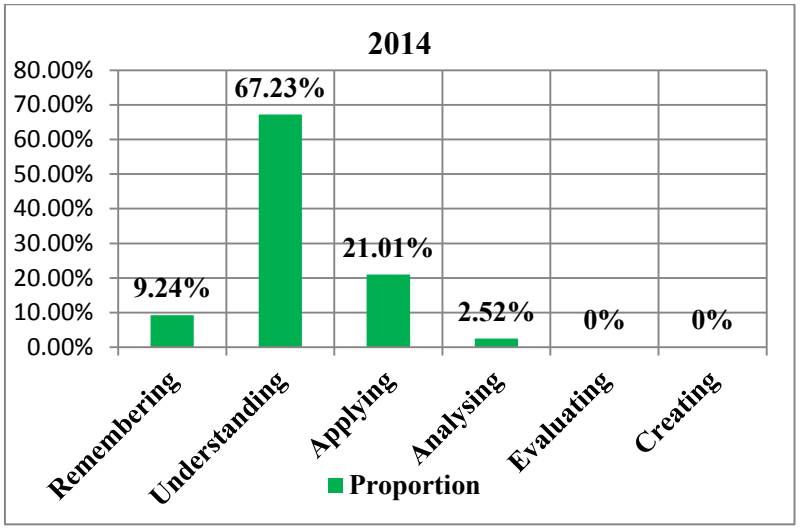

Figure 3: A bar graph representing the proportion of bloom's taxonomy in Chemistry (theory) paper in 2014

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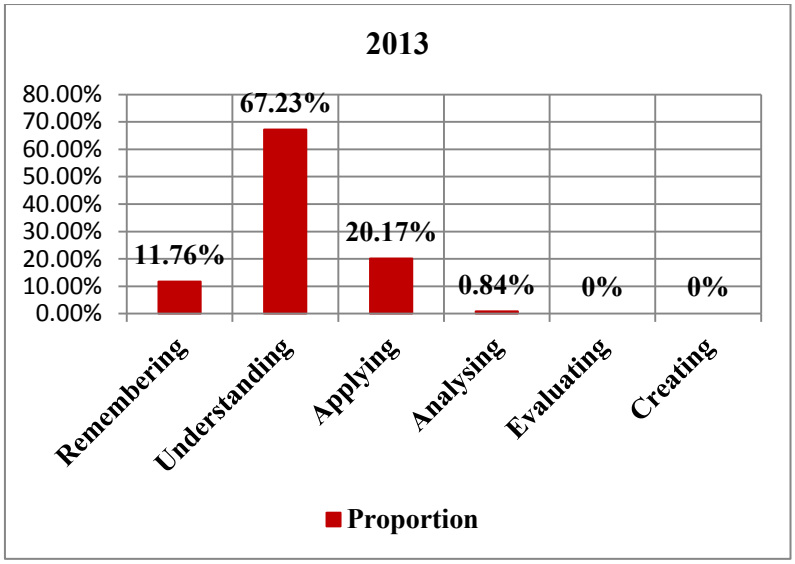

Figure 4 : A bar graph representing the proportion of bloom's taxonomy in Chemistry (theory) paper in 2013

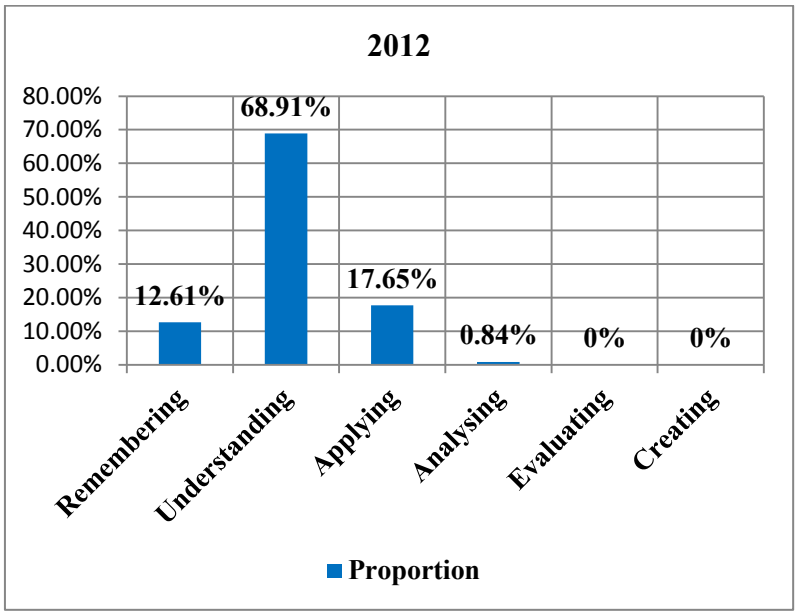

Figure 5 : A bar graph representing the proportion of bloom's taxonomy in Chemistry (theory) paper in 2012

Research Question 2

Implementation on the Decision
(Has the board been successful to implement their decision, taken on 8-11-2014, to make the papers apart from the past five years?)

In November 8th, 2014 (Daily Jang Newspaper), BSEK claimed that students prepared all the content of book for exam as the papers will not make from previous papers. And they became failure in their claim as in Year 2016 section "A" 10 out of 17 part was taken from the previous papers. In section "B" 19 out of 21 questions were taken from the previous papers and students have to just attempt 14 questions. In section "C" only 1 parts were not taken from the past papers otherwise it can be seen that the entire question were taken from the past paper and not only this but the disgraceful condition in this year that the question which was given as short question answer was again given in descriptive portion. The students who

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followed the same culture of preparing for exams only from five years, can not only attempt the questions easily but can also score almost full marks.

Similarly in year 2015, 5 out of 17 MCQ's, 13 out of 21 short answers-questions were taken from the past papers. And in Section "C" only 2 parts out of 9 were not taken from the past papers otherwise it can be seen that the entire question were taken from the past paper.

FINDINGS

Research Question 1

1. In 2012, the overall Chemistry (theory) paper covered 12.61% remembering, 68.91% understanding, 17.65% Applying and 0.84% Analysing.
2. In 2013, the overall Chemistry (theory) paper covered 11.76% remembering, 67.23% understanding, 20.17% Applying and 0.84% Analysing.
3. In 2014, the overall Chemistry (theory) paper covered 9.24% remembering, 67.23% understanding, 20.01% applying and 2.52% Analysing.
4. In 2015, the overall Chemistry (theory) paper covered 12.61% remembering, 69.75% understanding, 15.13% applying and 2.52% Analysing.
5. In 2016, the overall Chemistry (theory) paper covered 17.65% remembering, 73.95% understanding, 7.56% Applying and 0.84% Analysing.

Research Question 2

The Concern authorities totally failed in implementation on their decision, taken on November 8th, 2014, to make the papers apart from the past five years on the behalf of following findings:

In 2015

1. 5 out of 17 MCQ's was taken from past five years papers.
2. 13 0ut of 21 Short-Answer Questions was taken from Past five years papers.
3. Only 2 parts out of 9 were not taken from the past papers otherwise all the Section 'C' covered the past five years papers.
4. The past five years questions covered overall 72 marks out of 119 marks.

In 2016

1. 10 out of 17 MCQ's was taken from past five years papers.
2. 19 0ut of 21 Short-Answer Questions was taken from Past five years papers.
3. Only 1 parts out of 9 were not taken from the past papers otherwise all the Section 'C' covered the past five years papers.
4. The past five years questions covered overall 98 marks out of 119 marks.
5. One question that is question number 13 in Section 'B' and question number 25 (b) itself is repeated two times in Section 'B' as well as in Section 'C' in the same year.

CONCLUSIONS

The process of assessment systems influence a pivotal place in building a quality education; it eventually affects the socio-economic growth of the nation. In order to progress towards the development of the country, this aspect should not be overlooked. To conclude this study, it can be argued that the assessment techniques used by BSEK only justify memory skills of the students and do not assess the affective psychomotor domains. In a modern educational

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system, well-designed tests are essential component of the learning process that strengthen the analytical and problem-solving capabilities of a student. They should test the level of expertise which has been properly internalised and should act as benchmarks of progress. BSEK's assessment system handle this purpose poorly, resulting in poorly designed test papers that bother many good students.

From the findings, it can also be concluded that papers setters do not have the appropriate knowledge of using Bloom's Taxonomy accordingly as the ratio of knowledge, understanding and application is improper. Finding also revealed that topics are repeating again and again which makes paper predictable for student easily, and by preparing only some topic, students can easily achieve high score in exams.

In the year 2014, a major positive action was taken by Mr. Noman Ahsan, Director Examination of BSEK, in order to obstruct of cheating by students in exams, but the present study also proved that the step which was taken by him faced the failure in implementation. A much greater failure was encountered when both consecutive years, 2015 and 2016, the exams papers have had exactly the same questions like pat years.

RECOMMENDATIONS

The question paper of Chemistry (theory) should be comprised of all the contents of syllabus of Chemistry (theory) IX. Bloom's taxonomy should be followed properly in setting of question paper of Chemistry (theory) subject grade IX. The high order of cognitive level questions must be expressed accordingly. Repetition of the questions must be fend off. The paper setters should not give unnecessary focus on past papers. The set pattern of questions paper should not be repeated. The prime focus must be revolved around the Bloom's Taxonomy while teaching – learning along with development of assessment tools.

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