Qualitative Analysis of Science Question Paper of Class X Board Examination

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Abstract- *Examinations, to assess students' learning, are an important aspect of curriculum implementation, as it affects what the students learn and the way they learn. Ideally, examination process is meant to guide teaching-learning process and hence considered supportive to it. Many tools and techniques have been developed to assess the learning of learners. Some of them are- written tests, oral tests, practicals, projects, interviews etc. However, in Science learning assessment process, the activities/experiments/technological modules within the textbook should also be assessed for Class X Board Examinations. The theoretical science paper for examinations for the Class X Board examinations should have carefully designed experiment/technology-based questions, questions testing critical understanding and ability to solve problems. In view of the above, an attempt has been made in the present study to analyze the Science question paper of class X (2015) of Rajasthan Board of Secondary Education*

Keywords: Examination, Question Paper, Design and Blue Print

Background

Sincere efforts have been made since long to improve quality of science education considering examination reform as an important part of it. The National Policy on Education (1986) and its Programme of Action (1992) envisaged an improvement in the programme of evaluation to make it serve as a powerful instrument of quality improvement in the teaching and learning process in schools. In 1991, the National Advisory Committee appointed by the MHRD under the Chairmanship of Prof. Yashpal, highlighted in its report (1993) that the examination system is memory based and it is focusing only on the child's ability to recall facts from prescribed textbooks. Observation and exploration are discouraged; syllabus and textbooks are packed with facts and information that burdens the child, making learning with understanding impossible. Thus, this report recommended re-designing of public examinations taken at the end of Class 10 and 12, so that questions test not just memory and information, but the understanding and application of concepts (MHRD, 1993). Examinations, to assess students' learning is an important aspect of curriculum implementation, as it influences what the students learn and the way they learn. Ideally, examination process is meant to guide teaching-learning process and hence considered supportive to it. However, due to importance of marks achieved in our day to day life, more particularly, in getting admissions to higher level programmes and securing jobs, examination process has gained so much importance that gradually teaching-learning process has become subordinate to it. In other words, in some cases question papers of the last five years become the de-facto curriculum, and sometimes, even teachers start teaching as per the question papers of last years. In such a scenario, there is a need to address the quality of question papers. If quality of question paper is not good enough, it may lead to improper learning as well as

teaching. It is generally observed that most of the time question papers consist memory based questions and because of this, students also study accordingly. In this situation many students are able to pass their examinations without understanding of the subject knowledge and ability to apply it in real life situations. It is therefore imperative to ask understanding and application level questions as per blue print of the question papers. Other problems associated with the question papers are improper coverage of the curriculum, ambiguity in questions, role played by chance or luck factor, subjectivity in understanding the scope of questions by students as well as examiners. According to Gupta (1993) examination results can make or mar the career of students. The entire future of the students depends on how they perform in the Board Examination. All these problems may be addressed if proper types of questions are selected, proper language is used and proper marking scheme is provided with the questions. Most of the paper setters are good in subject knowledge but they may need training for developing good question papers.

Ncf 2005 And Examination Reforms

The National Curriculum Framework-2005 emphasizes that the learning of Science in schools should be based on the approach of enquiry, creativity and objectivity in the learners. It should also nurture the ability of learner to explore and seek solutions of problems related to the environment and daily life. At the secondary stage, learning of science should focus on understanding of concepts and applications of principles of science (NCF 2005). In order to address these issues, mode of assessment of learning should be appropriate and effective. The Position Paper of NCF-2005 on Examination Reforms (2006) which examined the major shortcomings of the public examinations in our country, has recommended for drastic reform in paper setting. It also refers to a detailed study of Question Papers of the recent 10th grade Board Exams. Following conclusions of Focus Group were important

1. Paper setting required drastic reform and for testing the conceptual understanding of students setting of Multiple Choice Questions could go a long way in; and
2. The paper setters are not aware about the role of examinations in evaluating the attainment of competencies and objectives and they focus to test merely factual knowledge possessed by students.

The Key Recommendations of the Focus Group on Exam Reforms Are

1. The 10th Grade Board Exams should be made optional forthwith;
2. The examiners should be paid better
3. Paper setting needs drastic reforms, so that focus should shift to cover the different objects in the question setting rather than paper setting
4. The skills of analyzing and evaluating information can be tested through well designed MCQs, instead of the short answer questions
5. The system of internal assessment should go hand in hand by grading system with the external examination

NCF, 2005 (Position Paper, Examination Reforms, 2006) also states that skill of presenting findings coherently, integrating them into a persuasive argument and applying them to real life situations are important which can be best evaluated through essay type questions. It has also discussed on 'What do Board Examinations Test?' It remarks, examinations, though fairly reliable tests of narrow textbook content, Indian school board examinations are rarely valid tests of desired competencies and broader curricular objectives even within cognitive domain. It

further states that it is designed to test a detailed knowledge of textbook rather than competencies and concepts. However, the core of examination system is the Examination Question Paper.

Need and Significance of Question Papers

Many tools and techniques have been developed to assess the learning of learners. Some of them are- written tests, oral tests, practicals, projects, interviews etc. However, in Science learning assessment process, the activities/experiments/technological modules within the textbook should be assessed internally for Class X Board Examinations. The theoretical science paper for examinations for the Class X Board examinations should have carefully designed experiment/technology-based questions, questions testing critical understanding and ability to solve problems. There may be problems of logistics which will reduce examination related stress to some extent.

In a Board Examination, question paper is the main tool employed to assess students' achievement through a written examination. If the question papers are improved, its impact will percolate down to schools. As mentioned above, about requirement of science question paper, the analysis of existing question papers is the first step towards improving the quality of testing. During analysis one can look for many factors, (DEME,) quality of questions, typology of questions, abilities being tested by different questions, difficulty level of questions, the language of question, etc. What can be a model question paper in any subject is difficult to decide, however, in the light of NCF-2005, attempt has been made by NCERT in this regard which have been shared with CBSE. NCF-2005 emphasizes inclusion of different types of questions testing higher order thinking skills rather than mere memorization with enough scope for a child to construct his/her own correct answer. Department of Educational Measurement and Evaluation, NCERT is working with different boards in this direction. According to Rama and Reddy (2013), more application level questions must be given and utmost care must be taken to see that question papers contain questions from all areas. Therefore, it was felt that there is a need to analyze the question papers of class X Board Examination.

OBJECTIVES

1. To analyze the Science question paper of class X with reference to design and blue print provided by Rajasthan Board of Secondary Education.
2. To identify the strengths and weaknesses of the Science question paper of class X.

Methodology

Sample

For the study, the Question Paper of Science of Rajasthan Board of Secondary Education of the year 2015 was chosen.

Tools

The proformas for Question Paper Analysis (Proforma-A; Proforma-B and Proforma-C) developed by the Department of Educational Measurement and Evaluation, NCERT, New Delhi were used. The main areas covered in the tools are mentioned below.

(I) Proforma-A

Proforma A is used to work out following information for each individual question:

- Mental Processes involved
- Content Area tested
- Type of Question
- Marks Allotted
- Estimated Difficulty Level
- Time Allotted

The observation regarding the language, difficulty level, scope of the question, whether question is within the syllabus or not, quality of diagrams and sketches, about instructions and the comparability of options, etc. will be summarized in the remarks column.

(II) Proforma – B

Proforma B is based on Proforma A and is used to calculate percentages of marks and a comparison is made with the weightages decided in the design of question paper. Proforma B in fact deals with all aspects of a question paper and is the basis for making observation about the quality of questions and question paper.

(III) Proforma C

The observations made in Proforma A and B are consolidated in Proforma 'C'. It takes care of general and specific suggestions also.

Procedure of Data Collection

The Rajasthan Board of Secondary Education, Ajmer was contacted and they supplied design, blue print, and Science question paper of class X of Board Examinations of 2015, along with the text books. A workshop was organized for three days from 19 - 21 January 2016 in which there were five Resource Persons to analyze Science Question Paper. The Resource Persons examined the design, blue print, question paper and also had discussion on tools and their usage. The Resource Persons filled Performa A, B and C and wrote detailed report. The experiences of the school teachers who were a part of the workshop were of great help in giving suggestions for improvement of the question paper.

Analysis

As the present study is qualitative in nature, the data collected has been analyzed qualitatively and presented in detail in the succeeding pages. The Science Question Paper for class X was analyzed from the following parameters:

- Mental processes tested
- Types of questions used for testing them
- The content areas covered, and
- The difficulty level.

1.1 Weightage to Objectives

Analysis was done in terms of the weightage given to the objectives in the design and the question paper of Science. Table 1 gives the details.

Table: 1 Weightage to Objectives

S. No.	Objectives	Marks allotted as per design	Marks allotted as per analysis	Comments
1	Knowledge (K)	30.50	27.50	There is difference between the marks allotted as per design and as per question paper analysis.
2	Understanding (U)	29.00	25.00	
3	Application (A)	9.50	15.50	
4	Skill (S)	11.00	12.00	

It has been observed from the Table 1, that, there is difference between the marks allotted to the objectives as per design and marks allotted as per analysis of the question paper. It is seen that for Knowledge domain as per the design out of 80, 30.50 marks has been allotted and 27.50 marks allotted as per analysis of the question paper. For Understanding, Application and Skill domains out of 80, 29.00, 9.50 and 11.00 marks allotted as per design and 25.00, 15.50 and 12.00 marks allotted as per question paper analysis respectively.

So, it can be inferred that, in the question paper, less weightage has been given to the knowledge and understanding domain in comparison to the weightage assigned for these domains in the design. It has also been noted that Application and Skill domains are given more weightage in the question paper in comparison to the design presented by the Board of Secondary Education.

1.2 Weightage to Content

Analysis was done in terms of the weightage given to the content, Unit wise in the design and Science question paper. Details are summarized in Table 2

Table: 2 Weightage to Content

S. No	Name of the Unit	Marks allotted as per design	Marks allotted as per analysis	Comments
1	2	3	4	5
I	Chemical Substances	24.00	24.00	There is difference between the marks allotted as per design and as per question paper analysis Unit VI is not taken into consideration while framing the question paper.
II	World of living	20.00	22.00	
III	Effects of Current	14.00	14.00	
IV	Light	10.00	10.00	
V	Natural Resources	8.00	10.00	
VI	General Awareness	4.00	Nil	

It has been noted from the Table 2 that, there is a difference between marks allotted to the units as per design prescribed by the Board of Secondary Education and marks allotted as per analysis of the question paper.

It has been observed that, in the question paper, unit I, III and IV has been given same weightage (i.e. out of 80, 24 (30%) to unit I, 14 (17.50%) to unit III and 10 (12.50%) to the Unit IV) as mentioned in the design but Unit II is allotted 20 Marks (25%) in design and 22 (27.5%) marks in question paper, similarly unit V is allotted 8 marks (10%) in design and 10 marks (12.50%) in question paper. It has also been noted that unit VI is not taken into consideration while framing question paper.

1.3 Weightage to forms of questions

Analysis was done in terms of the weightage given to forms of questions in the design and Science question paper. Table 3 gives the details.

S. No.	Form of Questions	Marks Allotted as per design	Marks allotted as per analysis	Comments
1	Essay/Long Ans. (LA)	30.00	30.00	There is a perfect match between the marks allotted as per the design and as per analysis of the question paper.
2	(a) Short Answer- I (SA-I)	12.00	12.00	
3	(b) Short Answer- II (SA-II)	30.00	30.00	
4	Very Short Answer (VSA)	8.00	8.00	

It has been found from Table 3 that, there is no difference between the weightage to forms of questions as per design and as per analysis of the question paper.

All the forms of questions are in the question paper as per the marks allotted in the design.

1.4 Difficulty level of questions

Analysis was done in terms of the difficulty level of questions in the design and Science question paper. Table: 4 gives the details.

Table: 4: Difficulty level of questions

S. No.	Difficulty Level	Marks allotted as per design	Marks allotted as per analysis	Comments
1.	Difficulty (A)		8	Design does not indicate the marks allotted to the difficulty level of questions. Most of the questions are of average difficulty.
2.	Average (B)		55	
3.	Easy (C)		17	

Design does not indicate the marks allotted to the difficulty level of questions. Most of the questions are of average difficulty.

So it can be inferred that, the difficulty level of most of the questions is average.

1.5 Distribution of Marks over questions

It is found from the analysis of design and question paper that, Q. No. 30 is framed with five (3+1+1) marks, but the total of the distribution of marks in the 'OR' part of the Q. No. 30 is only three as per the question paper. This shows that there is variation in the distribution of marks over questions in the question paper, when compared with the design.

1.6 Estimated Time

The estimated time for Unit I as mentioned in the design is 50.96 minutes but according to the analysis the time required for this unit is 49 minutes which is less than what is given in the design.

In contrast, for Unit II time mentioned in design is 46.72 minutes but required time is 47.00 minutes which is more than the time given in the design. For unit III to V the time mentioned in the design (i.e. III unit = 29.73 min, IV unit=21.23 minute and unit V=21.23 minute) is sufficient.

1.7 Arrangement of questions and format in the question paper

The arrangement of the questions in the question paper is as per design. Diagrams are at proper place. The quality of printing can be improved.

1.8 Translation - Compatibility between English and Hindi version of questions

Translation is found to be satisfactory.

1.9 Adequacy and clarity of instructions to the students

Although adequacy and clarity of Instructions to the students are satisfactory, word limits can be mentioned for each question in the question paper.

1.10 Comments regarding quality of questions- language, scope, relevance to content

The difficulty level of most of the questions is average. Questions are based on the content of the Text Book. There is ambiguity in the language of Q. No. 19.

1.11 Major findings of the study

- There is a difference between the ratios of the marks allotted to the objectives (Knowledge. Understanding, Application and Skill) as per the design and as per the analysis of the question paper.
- The weightage given to the skill (objective) is less in comparison to the other objectives.
- There is a difference between the marks allotted to the units, as per design and marks allotted as per analysis of the question paper.
- There is no question from Unit VI.
- There is no difference between the weightage to forms of questions (i.e. Essay/ long Answer, Short Answer-I, Short answer-II and Very Short Answer) as per the design and as per the analysis of the question paper. Both of them have a perfect match.
- The difficulty level of most of the questions is average.
- There is ambiguity in the language of the question number 19.
- As per the design the question number 30 should carry five marks but in the question paper it is (3+1+1) and shown as three.
- There is difference between total number of chapters as per the design (9) and as per the text book (6).
- The time required for the Unit I is less and for Unit II is more than the time mentioned in the design.
- The difficulty level of most of the questions is average.

1.12 General suggestions for further improvement

- The weightage given to the skill (objective) in the design can be increased.
- Some more questions of difficulty level can be included in the question paper for the benefit of gifted children and average may be reduced.
- Unit VI has to be taken into account while framing question paper.
- The quality of the printing of question paper can be improved.

- Word limits can be mentioned for each type of question in the question paper.

Conclusion

The analysis of the question paper has reflected the strengths and weaknesses of the Science question paper. Since the study is limited to question paper of only one year, the findings cannot be generalized. However, with more rigor, commitment and monitoring, it is possible to improve the quality of question paper and test what is actually required to be tested. It was also felt during the analysis that some degree of freedom has to be given to the question paper setters though it is their responsibility not to deviate much from the design and blue print. This would surely ensure improvement in quality of the Science question paper.

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