

REPRESENTATION OF SCIENCE IN CURRICULUM RELATED PRIMARY SCHOOL TEXTBOOKS

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ABSTRACT

The research work has been done on the Representation of Science in Curriculum Related Primary School Textbooks. For this purpose the primary textbooks of the Punjab Govt were analyzed. Content Analysis was employed for data interpretation and to draw the inferences. It was explored that to what extent our primary syllabus provided the science concepts and the textbooks material is enough for the proper understanding. The qualitative analysis revealed that textbooks of primary level and the representation of science at that level, is that our textbooks not fulfills the actual requirement. Low quality illustrations, improper information and less quantity of the science teaching did not develop the proper understanding of any phenomenon. That mistake could develop the misconception or improper concepts regarding the science.

INTRODUCTION

Education

Education in its broadest sense is the means through which the aims and habits of a group of people lives on from one generation to the next. Generally it has a formative effect on the way one thinks, feels or acts. In narrow technical sense; education is a formal process by which society deliberately transmits its accumulated knowledge, skills, customs and values from one generation to another, e.g. instructions in schools.

Education has gathered new dimensions and stirred the human mind in unpredictable ways with the passage of time. Intelligent and well meaning men have attempted to define the ideals of education in their own ways. While some have emphasized its physical or moral aspects, other has lead greater stress on its intellectual or social role. John Stuart Mill holds: "whatever helps to shape the human beings to make the human being what he is not is part of education."

A more satisfactory definition comes to us from Sir Richard Livingstone. He believes that education must include, "a vocational element, a social or as the Greeks would have called it, a political element and a spiritual element, education must help men to achieve these three ends.

Textbook

"The textbook is, in fact, the heart of the school and without the ubiquitous text there would be no schools, at least as we know them." (Ian Westbury, 2004). Textbook for children are widely recognized as having ideological, educational, socializing and pedagogical implications and objectives. Therefore this is important to understand that text produced and presented in the books. Because, the material produced for the very young children play an important role in reshaping discourse that are already in circulation in the broader social world (Saltmarsh, 2007).

Curriculum

The term curriculum used in a number of ways by parents, educators and businesses. Some see curriculum as the “academic stuff that is done to children in school.” Teachers themselves use the term in different ways depending on their views and needs. In any school staffroom one may hear statements about curriculum such as the following: “The kids are really making progress since I began modifying the curriculum to better meet their needs.”

Webster’s concisely defined curriculum as, “a course of study offered by a school” (Webster II New Revised Dictionary). Curriculum is often referred to as learning content, activities, and structures as experienced by students. Ronald C. Doll, in his book, Curriculum improvement: Decision Making and Process, goes further, stating that: The curriculum of a school is the formal and informal content and process by which learners gain knowledge and understanding, develop skills, and alter attitudes, appreciations, and values under the auspices of that school.”

Education in Pakistan

Education in Pakistan is overseen by the government Ministry of Education and provisional governments where the federal government mostly assists in curriculum development, authorization and in financing of research. The article 25-A of constitution of Pakistan obligates the state to provide free and compulsory quality education to children of age group 5 to 16 years. The education system in Pakistan is generally divided into 5 levels: Primary (grades one through five); middle (grades six to eight) high (grade nine ten, SSC); intermediate (grades eleven and twelve, HSC) and university programs leading to undergraduate and graduate degrees.

According to a report, 20 percent of Pakistan's population does not have access to education opportunities and the country is ranked 117th in the world's list of countries by literacy rate. The Millennium Development Goals have set a target of 86 percent literacy in Pakistan by 2015. It is a fact that the education sector, particularly primary education, has been badly ignored by every government in Pakistan -- political or military. That resulted in the increase in school dropout ratio in the country. According to the statistics, the present gross enrolment rate in schools is 70 percent. Out of this, 50 percent children drop out before reaching the fifth class. Only one third of the 30 percent survivors pass the primary education while only 11 percent of the total target population gets education (Farhana, 2012).

Importance of Science Education

The teaching of science offers students the ability to access a wealth of knowledge and information which will contribute to an overall understanding of how and why things work like they do. Children and students are able to use this knowledge to understand new concepts, make well-informed decisions and pursue new interests. Science also helps to provide tactile or visible proof of many facts we read about in books or see on the television; this helps to increase understanding and helps children and teenagers to retain that information. Many students find science extremely inspiring and interesting. Science instills a sense of intrigue and enables students to develop understanding and form questions based both on the knowledge they already have and the insight they wish to gain in the future. Children are naturally curious. Science education feeds that curiosity and provides students with valuable concepts, life skills, and career options. Science helps give kids a greater appreciation for the world and its inhabitants, a healthy dose of skepticism, strong problem-solving skills, and research know-how.

LITERATURE REVIEW

Some people think of science as learning facts about the world around us, other think of science and other ways of knowledge as, “the having of wonderful ideas” (Duckworth, 1997). This later views of science and ways of knowing match the characteristics of young children as learners. Young children are naturally curious and passionate about learning (Raffini, 1993). In their pursuit of knowledge, they are prone to poking, pulling, tasting, and pounding, shaking, and experimenting. From birth children want to learn and they naturally seek out problems to solve.

As the Duckworth said his study, science for young children should involved asking questions, probing for answers, conducting investigations, and collecting data. Science rather than be viewed as the memorization of facts, becomes a way of thinking and trying to understand the world. This approach allows children to become engaged in the investigation nature of science.

Johnson, the educationist said that, the science is often sadly neglected in the early childhood classroom. Perhaps this is because science is perceived and presented as too formal, too abstract, and too theoretical in short too hard for young children. Perhaps this neglect is also due to the mistaken idea that the constructivists approach to education is incompatible with science education.

One of primary goal of the early childhood classroom curriculum is the development of scientific thinking in young children. Scientific thinking lead children to make their own discoveries. Chaille and Britian (2003), in the young children as scientist, present a constructivist curriculum model for science and emphasize the importance of scientific thinking.

Another research constructed on the ninth grade student’s previous knowledge and misconceptions about plan mirrors, by Anil and coworkers, concluded that the study of science education have revealed that student develop certain ideas that are different from scientific views(misconceptions) and fail to give up these ideas throughout their education. It is for this reason that when introducing students with new science concepts, science teachers should take adequate care and structured teaching process well to help their students attain scientifically accepted conceptions. In this context, the first step to be taken to achieve affective learning is to identify student’s incorrect ideas about various science concepts.

The primary years are crucial in developing pupils longer term interest in science (Ofsted, 2002). It is seen as crucial for primary teachers do not only set in place the knowledge foundations for continued studies in science but also to endanger in students a passion and understanding for the significance of these subjects in modern societies (Vic. Gov, 2003). All the reform documents relating to science require systemic changes in science education (Sandall, 2003) beyond developing knowledge of scientific concepts towards students as scientifically literate through understandings of science and its processes (Weiss, Banilower, Heck, Pasley and Smith. 2003).

Teachers are important to the success of such science education reforms if system-wide school changes are to take place (Fullan and Miles, 1992; Bybee, 1993) but government and independent studies indicate that actual classroom practice demonstrates instructional practices that run counter to the intended reforms (Plourde, 2002). A UK Office for Standards in Education (Ofsted) subject report highlighted concerns that teaching in science is more didactic than for other subjects (Ofsted, 2002, Postnote, 2003). Factors seen as limiting primary school teachers’ ability to adhere to the reform document requirements included the

level of variability of knowledge and conceptual understanding of science, together with teacher confidence in and enthusiasm for delivering engaging science lessons (Vic. Gov., 2003; Osborne and Simon, 1996) and lack of clarity over the reason why they are teaching science, particularly scientific inquiry (Ofsted, 2002).

Certainly textbooks need improvement; what aspect of the profession of schooling does not? And certainly teachers need help in making intelligent use of the textbooks we have and those the future will hold for us. And certainly students, especially, the more capable ones, should be lead to see textbooks as only the beginning, a springboard for further explorations into other sources of knowledge (Maxwell, 2004). The organizations of economic cooperation and development, the World Bank, and Cultural Organization (UNESCO) also recognized the central importance and role of textbooks in the context of developing countries and disadvantaged context. The World Bank, for example, suggest that reform be initiated in relation to textbooks in developing countries; textbook being a “critical part of education, as necessary as classroom itself, as indispensable as the classroom teacher” (De Guzman, 2004). Similarly, research in the area of teacher education in Pakistan indicates that teachers mostly teach to import basic knowledge or textbook content to students. Such an approach typically results in poor academic performance. Some research does identify a positive link between student’s achievement and the role of textbook (Fuller and Clark, 2004).

According to Harlen (2004), primary teachers are generalists and not science specialists and, as in many other countries lack to firm background of science in their own education and consequently lack confidence in teaching science many primary teachers have incomplete understanding of science concepts and lack of teacher content knowledge is limited factor in raising student achievement and ensuring that more than just straight content knowledge is developed.

Research Questions

The objective of the study is to find out that at which extent our primary syllabus provided the science concepts.

At that level, is our students develop true and proper concepts regarding scientific phenomenon.

The textbooks material is enough for the proper understanding.

Style of the textbooks is good enough to learn.

METHOD

The course books of primary level in Pakistan are selected for the analysis. Content analysis methodology used for the research. Content analysis or textual analysis is a methodology in the social sciences for studying the content of communication. "Content analysis is a summarizing, quantitative analysis of messages that relies on the scientific method (including attention to objectivity, intersubjectivity, a priori design, reliability, validity, generalisability, replicability, and hypothesis testing) and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented.

Procedure

The sample is taken on the basis of criterion that these books truly represent the research question, and these books are taught in all schools of the Punjab province .Course books of the primary level are selected for the analysis on the science phenomenon presented in the books.

Total twenty six books are taught at the primary level, I to V class. From these books 17 were chose for analysis.

Sample is taken from the Punjab Textbook Board; the books are free of cost at all government schools. These books are published in 2010 and are approved by the Ministry of Education (Curriculum Wing) Islamabad. Following illustration shows the subjects which are taught in these classes. Majority of the subjects are same but few are different from the other classes. The same subjects are according to their material, knowledge etc.

In the first step of research the books which were not having any science concepts are analyzed. From Class I course the mathematics subject was excluded and from Class II no subject was excluded. Qurani Qaida and math were excluded from Class III. Islamiat and Math both are excluded from the both Classes IV and V because that did not contain any science related concepts. After selection of sample from the course books the next step is done. Thoroughly study of the remaining books is the important step of research work. These books were read line by line and every page was looked attentively.

RESULTS

This section contains the results which were taken from the previous section. The results were taken after the process of analyze thrice. So, no possible mistake was found.

Pictures and Illustration Related To Science Phenomenon

In Class I, four courses are included for analysis which contains science concepts. Total 37 pictures found in these books. Course of English contains 59 units in which eight pictures were found. Urdu Qaida contains five pictures relation with the science phenomenon. Meri kitab have four pictures and General Knowledge has 29 chapters which include 20 pictures related to science.

Total sixteen pictures and illustration are found in class 2 syllabi. English course includes three pictures and math course includes only one illustration related to the concept. Science includes two pictures, in last, Urdu have ten pictures related to the concept which were analyzed from the 39 lessons. Information is given through the illustration and pictures of crescent (moon), sun, stars, and times of the day, levels of the moon, earth, clouds, and snowfall. Informative units are about the earth, sky, sun, moon, daylight, weather and seasons.

In Class III total eight pictures are found in these courses. English have two pictures, one title and one description about the topic been analysis. Urdu includes only four pictures from the 43 chapters. Science has two pictures contain information about the science phenomenon from nine lessons. Pictures of sun, moon, stars, earth, rain and snowfall are included.

Total 12 pictures are found in books of Class IV. Urdu has one illustration related to the science phenomenon from 44 chapters. Science includes 14 units in which ten illustrations and six informative paragraphs and sentences are found. Social studies include one picture and one informative page from 8 lessons. Pictures and illustrations are about sun, sunlight, water cycle, earth, volcanoes, solar system and moon.

English, science, social studies and Urdu is taken for analysis from Class V. Total 15 pictures were found in the courses. From 18 chapters of English there are 4 pictures and from the 16 chapters of science 8 pictures are found. In Urdu only one page with related information is found from 33 lessons. Social studies include 3 pictures. The illustrations are related to sun, earth, crescent, rain, sunlight, solar system and zones of earth.

Titles Related to Science

Titles included in class I courses titles are 'The Sun', 'Kalay Bdal Aaen Gay', 'The Earth', 'The Sky', 'Weather' and 'Seasons of the Year'. 'Structure of Earth', 'Rain is Falling' (poem), 'Our Earth', 'Air, Water and Light', 'Story of Water and Air', 'Summer', 'Sun' (poem) are the titles of Class III. The only title related to analysis is 'Earth and Moon' found in Class IV. The titles related to analysis are, 'Running through the Rain' (poem), 'Seasons', 'Sun and Stars' are in Class V course.

Topics and Descriptive Information Related to Science

Descriptive information, poems and narratives are about sun, earth, weather, seasons, rain and sunlight in Class I course. Informative units are about the earth, sky, sun, moon, daylight, weather and seasons in Class II and in Class III information is given about the sun, rain, seasons, light, clouds, structure and functions of the earth and the heat. Descriptive patterns are about stars, clouds, sunlight, rain, lyres, shape and functions of earth and seasons were found in Class IV course. Informative paragraphs and chapters are about solar energy, earth, seasons, solar system, stars, sun and moon were found in Class V. the following table showed the whole story of analysis:

Table 1. Data Collected from the Books

| <i>Classes</i> | <i>Descriptions</i> | <i>Illustrations</i> | <i>Titles</i> | <i>Total</i> |
|----------------|---------------------|----------------------|---------------|--------------|
| Class 1 | 12 | 37 | 6 | 55 |
| Class 2 | 16 | 6 | 3 | 25 |
| Class 3 | 9 | 8 | 7 | 24 |
| Class 4 | 10 | 12 | 1 | 23 |
| Class 5 | 15 | 15 | 3 | 33 |
| Total | 62 | 78 | 20 | 160 |

DISCUSSION

The findings after research process showed not very good results. The material provided in the textbooks is low quality and as predicted in the early sections of research. That material is not enough for the proper understanding of the students. This type of material would create misconception regarding the scientific phenomenon.

If we looked at the total results of the research there are one hundred and fifty places in the textbooks where we find the related material to the scientific phenomenon. But these illustrations and descriptions are not outstanding, very few have proper resemblance and others have very low resemblance. Very less quantity of pictures are presented with the description of the phenomenon otherwise they just used for the other purposes, as the sun, moon and star are used in many places but without any sense of these things. Descriptive chapters related to the science somewhere depict good concepts but these are in less quantity and with poor illustrations and less attractive material. If we see the findings from the class I there are many pictures related to the research (e.g. sun, stars) but without description and concept just only used to teach the spellings and quantity. Six titles from the five courses are dedicated to the science and in few places science is taught through the poem style which is very good effort and attractive but the quantity is less. Class II findings showed that there are

only six pictures and just three titles related to the science phenomenon and at sixteen places words or sentences are used which are related to the research. These findings showed that less than enough material at this level not helping the student to understand and develop the true and proper sense of anything. In class III the titles and the lessons which are dedicated to the science showed good impression with the outclass illustrations the dialogue and story styles are picked for the understanding of the student about the science and this style is very beneficial and useful for the learning process. But few places depict the bad illustration where it is important to use these strategies for the learning. The syllabus of class IV have the quality material but with poor quantity, e.g. science course included proper descriptive chapter with good illustrations, attractive material and easy to understand with the experimental work. But that type of chapter are very less in quantity and did not fulfill the actual requirement of that level of child's learning. The moon stars, earth and sun are taught at all the levels from class III to class V with some less and more descriptions; in class V new concept of solar system is introduced with the illustrations. Another place the information about the earth and the zones of earth is given with good illustrations.

Anyhow, it is found that more relevant material is analyzed in the science syllabus of the three classes III to V and the other syllabus depict less or improper material.

According to the Chambliss and Calfee (1998) textbooks are at the heart of educational enterprise, as they offer students "a rich array of new and potentially interesting facts, and open the door to a world of fantastic experience". The literature provides evidence of the significant role of textbooks as "primary vehicles for delivering content knowledge, for determining in large measure what goes on in a class" (Spallanzani & Pearson, 2002).

In one research (2007) researchers, Razia Fakeer Mohammad and Roshani Kumari analyzed, "Our analysis of data identifies textbook related issues in terms of two categories: Limited access to the information given in the textbook, i.e., issues related to its clarity and relevance for the students and teachers; Teachers' limited use and appreciation of the textbook content, i.e., of the information as well as learning aids (pictures and activities) provided in the textbook. 'Access' in our paper has been defined in terms of the various gaps in the textbook content that restricted teachers' and learners' access to the information. Issues related to 'use' refer to teachers' inability to utilize the textbook effectively, resulting in failure to teach the scientific concepts in an effective way".

If talked about the personal opinion about these findings related to the textbooks of primary level and the representation of science at that level, is that the our textbooks not fulfills the actual requirement. Low quality illustrations, improper information and less quantity of the science teaching did not develop the proper understanding of any phenomenon. That mistake could develop the misconception or improper concepts regarding the science. There are some suggestions related to the research which could be help to overcome these problems:

SUGGESTIONS

The current primary science curriculum e reviewed and revised to incorporate scientific aspects with the objective of developing scientific literacy.

Personnel associated with curriculum development would benefit from training in designing curriculum and writing textbook.

Immediate steps should be taken to support schools which have an extra room to set it up as a science room.

Teachers' Guides and workbooks for students must be produced to support both in their effort to improve the quality of science teaching.

It is recommended that specialized teachers to teach science be appointed in primary schools.

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