Strategies Used by Public Primary School Teachers for Enhancing Students’ Curiosity in Science

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ARTICLE DETAILS

ABSTRACT

This qualitative study was planned to identify the curiosity enhancing strategies (CES) and explore the challenges faced by teachers during the use of strategies at primary school students in the subject of science. Curiosity is the desire to acquire new knowledge through exploration in order to grow and expand understanding. Curiosity refers to the tendency of children to ask, investigate, and find out the new knowledge obtained from their environment. The researchers did not find a study in the literature that specifically examined identification of curiosity related strategies used by teachers in Pakistan. This research study was conducted to identify the curiosity related strategies used by the public sector school teachers in teaching Science to students enrolled in primary classes in Lahore. Purposive sampling technique was used for selection of the participants of the study. Data was collected from teachers and students of primary school (5th grade) level in science subject. Data from teachers was collected personally and on telephone. Data from students was collected through interviews by visiting the respective schools and after taking consent of the school principal. Two semi structured interview protocols were developed for taking responses at primary school level teachers and students. Data was analyzed by using thematic analysis technique. Findings of the study reflected that primary school teachers of the study were using different strategies for enhancing curiosity in students in the subject of Science. During the use of these strategies public sector primary school teachers faced many challenges like lack of resources, large strength of students in a classroom, lack of students attention, lack of parents cooperation. This study recommended that teachers and parents may use these strategies for enhancing curiosity in students.

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1. Introduction

Curiosity is a Latin word which means the aspiration to obtain new information through investigation (Litman & Spielberger, 2003) in order to grow and develop understanding (Kashdan & Steger, 2007). It is observed as an essential motivator in learning and important for the learning environment (Leslie, 2014). Curiosity is related to the appreciation, recreation, and aspiration to discover innovative, uncertain, difficult, and indefinite actions. There is an aspiration to find out innovative practices - to understand what exists, to discover how one will respond, or ascertain how others respond (Kashdan, et al, 2004). Curiosity has been studied in profundity in terms of infantile modification. It has been thoroughly recognized with other comprehensive areas of interest, counting initiatives, motivation, innovation inclination, affect, and stimulation states (Berlyne, 1960; Cantor & Cantor, 1966; Fowler,1965).

Curiosity is a main growing distinctive ability in children. Berlyne (1960), theorized curiosity as a chain of ongoing initiative states, the approval of which primes to information. He assumed that the initiative states were associated to unambiguous features of impetuses, such as originality, difficulty, and incompatibility. These features were parts of a child's atmosphere (Berlyne,1960). Curiosity is practical among all vertebrates (Lindholm, 2015). Curiosity is the aspiration of getting new evidence and knowledge as motivation to acquire or discover something (Litman, 2003).

Day (1971) indicated that having different features of curiosity would lead to a comprehensive actions design of attentiveness in study and would lead to amplified learning and development. In elementary school, a child was said to reveal curiosity when he (a) responds confidently to innovative, extraordinary, unsuitable, or secretive features in his environment by stirring toward them, discovering them, or operating them; (b) demonstrating a necessity or an aspiration to recognize more about himself and/or his situation; (c) imagining his environments seeking new knowledge; and/or (d) continuing in inspecting and/or discovering stimuli in order to recognize more about them(Maw & Maw, 1964).

Curiosity can be beneficially used to monitor instruction exercise, in a range of learning situations, to motivate pupils to seek out evidence. In specific, inquiry based learning methods such as problem based learning perform to be reliable with philosophies and suggestion concerning the actual stimulus of students’ curiosity. Even without changing patterns, simple methods such as given that consistent comment and assessments of learners’ present state of familiarity may support teachers in improving learning through amplified curiosity (Pluck & Johnson, 2011).

The deficiency in training to communicate about curiosity may be due to a deprivation of experience to evidence-based practices for instructing learners to be curious. The prospective deficiency of official training to communicate learners to be curious is also obvious in the dearth of facts delivered by the instructors in their replies to our detail requesting them to share how they communicate their learners to be more curious (Nadelson, 2019). Nurishlah et al., (2020) stated that students’ curiosity must be able to be characterized both from within students through their minds and through student behavior in the search for truth and information integrity (learning). Students’ curiosity motives must be considered in looking at school as well as parents’ stimulation and feedback on students’curiosity at home. Which includes teacher stimulation, as well as student learning actions that characterize interest in learning, mastery of learning materials, student efforts in solve learning problems, the environment of student learning in class peer learning connections, and learning skills are should be able to be described in achieving academic achievement as students' intrinsic motivation to enhance curiosity.

According to Rowson (2012), curiosity includes obtaining information and knowledge (epistemic curiosity), curiosity to accommodate experience through the senses (perceptual curiosity), curiosity to
know more in the knowledge that already exists (specific curiosity), and curiosity to explore knowledge and information (diversive curiosity).

2. Strategies that Enhance Curiosity in Students
The intellectual point of view mostly teachers would approve that enhancing the curiosity attribute in students is a significant duty. In the learning environment and in a classroom, it becomes the job of instructional designer and the educator to recognize these differences and control them to accommodate all students. Following are instructional design strategies for the purpose of enhancing curiosity in students.

2.1 Curiosity as a Hook
At the starting of a lesson use curiosity as a primary motivator, just like with a surprising and thought provoking question (Arnone, 2000).

2.2 Familiarize an Abstract Conflict
When conceivable, familiarize an abstract conflict in students. To explore the conflict, students will sense to solve until conflict is resolved. Then, the students feel sense of satisfaction when they resolve the problem.

2.3 Create an Environment of Questioning
Rising questions is an important thing in a classroom, so there is need to create an environment where students feel easy to ask questions and can test their suppositions by brainstorming and discussion. Through this method, they not only enhance curiosity but also build confidence in themselves.

2.4 Time Management
For the investigation of an issue, allow enough time for it. Enhancing curiosity in students has been successful if the teacher manages time in a good schedule, then the learners will wish to continue in that investigation.

2.5 Give Chance for Choosing
Within a subject area, give the students an opportunity to choose a topic according to their wish. For instance, a student can discover a topic according to his wish in a writing class. When students are allowed to select a topic according to their choice, it means that they are intrinsically motivated and it will support them to sustain curiosity during the completion of the goal of the writing task.

2.6 Curiosity Moving Elements
In a lesson to arouse curiosity into lesson, familiarize some elements of curiosity including novelty, complexity, surprise, contradiction, uncertainty. Then students will wish to find the source of the novelty, contradiction, surprise, incongruity and then follow on their information to satisfy their curiosity.

2.7 The Right Amount of Stimulation
Every individual has different level of motivation. If incentive of motivation comes to students, some students will be anxious if they feel that the stimulus is too complex, novel, and uncertain, etc.

2.8 Exploration
Exploration is the process to inspire the students to learn by active participation.
2.9 Demonstrating
Arnold (2003) said that eagerness to demonstration, quizzes, involvement in a specific exploration to determination of a problem, and showing curiosity is an important fact. Curiosity can be enhanced through using a variety of curiosity related strategies. Some of these strategies are mentioned here which have mostly been suggested by researchers and used by teachers (Nadelson, 2019; Lindholm, 2018; Pluck & Johnson, 2011).

3. Conceptual Framework

![Conceptual Framework Diagram]

4. Objectives of the Study
The study was conducted to achieve the following objectives:

1. To identify strategies used by public sector school teachers in teaching the subject of Science to students enrolled in primary classes for enhancing curiosity.

2. To explore challenges faced by public sector primary school teachers using strategies for enhancing curiosity in teaching the subject of Science to students enrolled in primary classes.
3. To find out the aspects of perceptual and diversive curiosity in teaching scientific concepts to primary school level students.
4. To give recommendations to public sector primary school teachers on bridging gaps in the use of strategies for enhancing curiosity in teaching scientific concepts to students enrolled in primary classes.

5. Questions of the Study
The study was conducted to answer the following questions:
1. What are the strategies used by public sector school teachers in teaching the subject of Science to students enrolled in primary classes for enhancing curiosity?
2. How do the public sector primary school teachers use strategies in teaching the subject of Science to students enrolled in primary classes for enhancing curiosity?
3. What are the challenges faced by public sector primary school teachers in using strategies in teaching the subject of Science to students enrolled in primary classes for enhancing curiosity?
4. What are the aspects of perceptual curiosity in teaching scientific concepts to primary school level students?
5. What are the aspects of diversive curiosity in teaching scientific concepts to primary school level students?
6. How can the gaps in using strategies for enhancing curiosity in teaching scientific concepts to students enrolled in primary classes be bridged?

6. Methods
6.1 Design and procedure
It was a qualitative study in nature and data were collected through interviews conducted from public primary school teachers (who were teaching the subject of science) and students of fifth grade. The population of the study was all Public sector schools (1227) of Lahore Division.

6.2 Participants
The sample included primary school teachers who were teaching science and students enrolled in primary classes at grade fifth of public sector schools of Lahore District drawn using multistage sampling technique. District Lahore was divided into five tehsils (Cantt, Shalimar, Raiwind, Model town, City), each tehsil had twelve Markaz and each Markaz was divided into two wings: male wing and female wing. For this study, female wing was selected and nine public sector schools were selected including 27 teachers and 45 students as the participants of the study.

6.3 Instrumentation
Two semi structured interview protocols were developed for this study. First semi structured interview protocol was developed for teachers and the second one for students. Teachers’ semi structured interview protocol consisted of four basic questions. Students’ interview protocol included twelve questions. The instruments of the study were validated by the specialized experts of the relevant field.

6.4 Data Collection
Data from primary school teachers who were teaching Science subject, were collected personally after taking their prior consent. Data from students enrolled in primary classes at fifth grade were collected through conducting focused group discussions by visiting the respective schools after taking the consent of the school principals. Teachers’ interviews were recorded through an audio device except one who gave her interview in written form. All students’ interviews were recorded through an audio device. Researchers observed the situation as per the requirement of the study and took field notes during data
collection for data analysis and trustworthiness of the study. According to Gay (2012) during the course of the study, the researcher, as an observer has descriptive information reflective of what he has seen and heard, must be noted by using field notes. The researcher decrease the threats of credibility by using the triangulation to ensure the reliability. In this study researchers used interviews and field notes to ensure trustworthiness of the study. An average interview took twenty minutes.

7. Data Analysis
Qualitative data analysis techniques were used including generating themes, making categories, coding, and reporting findings. By listening to and analyzing the responses of teachers and students, theses were transcribed by thematic analysis technique.

8. Findings
The findings of the study are being presented as under:

What are the curiosity related strategies used by public sector school teachers in teaching the subject of Science to students enrolled in primary classes?
From the teachers’ responses researchers derived the strategies which were being used by public sector primary school teachers to enhance curiosity in science, including: Real life experiences examples, Activity based work, Relevant models and chart, Brain storming, Hints, Chunks, Schema, Time management, Narrative structure, Teachers’ curiosity, Inquisitive attitude, and Active listening.

How do the public sector primary school teachers use curiosity related strategies in teaching the subject of Science to students enrolled in primary classes?
These strategies included: Examples from real life experiences; used as monocot and dicot vegetables, omniverse and carnivores animals. Hints, chunks used as; Photosynthesis process and process of food preparation of plants and KWL chart. Activity based work used as; Practical work, Participation. Brain storming, and Schema; by asking questions, previous knowledge questions, Showing models, Showing chart, drawing diagrams on board, Key terms, Riddles Hints, chunks these sub strategies are used to enhance curiosity in students. Time management is used as; some teachers use 5-10 min, some teachers use 10-15 min, some others take Full period for preparation and developing question for activities for enhancing curiosity in students. Narrative structure strategy used as Story and background telling. Teacher as curious person in the classroom this is used as to ask different questions, probing question, to motivating students and play a role model as curios person in the classroom to enhance curiosity in students. Inquisitive attitude strategy is used by public sector school teachers as Prior knowledge, Familiar activities, Ideas. At the last strategy that is used by public sector primary school teacher to enhance curiosity in science in students is Active listening, and it is used as Suddenly pinpoint any student, Call at desk board to give answer, ask questions related to discussion.

What are the challenges faced by public sector primary school teachers in using curiosity related strategies in teaching the subject of Science to students enrolled in primary classes?
Challenges which are public sector primary school teachers have faced, derived from responses of participants of the study are: Shortage of resources, Strength of class, Lack of students interest, Lack of parents Cooperation, Class management, Social media, Lack of technology, and Pandemic situation.

What are the aspects of perceptual curiosity in teaching scientific concepts to primary school level students? What are the aspects of diversive curiosity in teaching scientific concepts to primary school level students?
The students have different curiosity aspects including inventing something new, mixing things together to see what happens, comparing things (animals, plants, etc.) to find difference between them, facing
problems and puzzles, conducting experiments with stuff to make something new, applying new information of science to existing problem in real life, knowing something new about science, and learning in new situation. These are the aspects of curiosity in students, which were derived from students’ interview responses. Next the teachers’ interviews were reported that about this question is primary school level students have more curiosity in them perceptual as well as diversive, but some extent some students do not show their curiosity in the classroom.

**How can the gaps in using curiosity related strategies in teaching scientific concepts to students enrolled in primary classes be bridged?**

The next question is reported the recommendations from teachers, these recommendations are related to those problems’ solution which they face during their teaching in science to enhance curiosity in students. Recommendations, which were derived from teachers’ responses of interview are: Provide resources and material, Reduced strength of students in classroom, System of teacher parents meeting, Students attention, Introduce technology, parents coordination with teachers, class management, and follow activity base method. Overall participants responses are analyzed in thematic way and then concluded.

**9. Conclusion**

It is concluded that sample of the public primary school teachers of the study are use the different strategies for enhancing curiosity in students in the subject of science. These strategies are describe above. During the use of these strategies public sector primary school teachers face many challenges like lack of resources, large strength of students in a classroom, lack of students attention, lack of parents cooperation,… Then, teachers find the diversive and perceptual aspects of curiosity in students in different ways. From the students interview researcher have find that at public primary school students of fifth grade have great level of curiosity in them. During the interview with students they have good response about the questioning about curiosity mostly students said they enjoy the nature and have many questions about different things, then said they try to know about that things from reasoning, from teachers and parents as well as friends and siblings. They like to invent new, they explore things, they made different projects of like: water filter, plantation, models, etc. They like to face challenges that they face during the fulfillment of their curiosity. They like to play animals and growing plants at their homes, and like to observe changes in them. When the public primary school teachers use these strategies they have to face many different challenges that’s why they recommend suggestion to remove these challenges. Which are here, arrange the system of parents teacher meeting at monthly basis at public sector. Provide proper material according to the strength of students, introduce technology at public schools, to enhance curiosity in students teachers follow the activity base work in science subject, ensure the students participation in classroom.

**10. Discussions**

The findings of the study depicts that strategies used by public sector primary school teachers for enhancing curiosity in students in the subject of science. In his study Willingham (2014) stated about the curiosity related strategies. Can we make students more habitually curious? If curiosity is like other aspects of motivation it's likely that some part of it is genetically inherited but not all (Gottschling et al., 2012). Willingham (2014), stated strategies that may enhance curiosity in students in science. This study results are prove the Willingham suggestion about enhancing curiosity in students in science.

**11. Recommendations**

On the basis of findings, following recommendations are given:

1. These are the strategies Real life experiences examples, Activity base work, Relevant models and chart, Brain storming, Hints, chunks, Schema, Time management, Narrative structure, Teacher as
curious, Inquisitive attitude, and Active listening., find from analysis of this study are useful for enhancing curiosity in the subject of science. It is recommended the in service invoice and prospective teachers may use these strategies to become an expert in their field to enhancing curiosity in students in science.

2. By choosing these following above strategies teachers may further use sub strategies (described above in findings) may use in their teaching to enhance curiosity in students in science.

3. Parents must be take care of their children for enhancing curiosity in them. For this purpose they cooperate with their school teachers whose are working hard for their children’s future.

4. Students also show their cooperation with their teachers.

5. At public sector school, government should be provided proper resources for the good future of the country future (students). And introduce technology in all public sector schools. And also minimize the strength of the classroom students.

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