



Effectiveness of Using Multidisciplinary Approach to Study Concept of Magnets for Grade 6

¹Aditi Anil Ketkar

¹TGT

¹Science

¹Millennium National School, Pune, India

Abstract : A concept is well understood and retained when it studied from a birds eye prospective i.e. its utilization in different fields are known. A multidisciplinary approach was used to teach the concept of 'Magnets' to Grade 6 students using innovative pedagogies. This approach was able to cater needs of different types of learners as storytelling, experiential and problem solving techniques were implemented. Implementation of this type of teaching learning model helped to develop interest in the topic and also encouraged students to pursue the interest in the topic by undertaking different projects based on the topic.

Index Terms – Multidisciplinary, storytelling, experiential, problem solving, project based learning.

INTRODUCTION

Science textbooks impart static content knowledge to students, which means exposing students to facts, laws and theories. However, the interesting and important process in arriving at these laws and theories is often neglected (Varadarajan et al. 2023). In order for teachers to make science enjoyable Turner, Ireson and twiddle (2010) close suggest the use of role play, stories, novel experience and toys in order to ameliorate and alienation of peoples from the subject the concept of educative curriculum material that is material that promote teacher and student learning has been proposed by number of authors. We believe that illumination of the Student teachers' perceptions of the effect of use of toys on their contact knowledge and confidence in this knowledge should make a contribution to wider debate on ways of teaching and learning Complex concepts in science (Webb et al.2012). Teaching competencies are a set of knowledge, skills, attitudes, values, beliefs and experience necessary for the future which manifest in teaching activity. Students get disinterested especially when the abstract concepts of physics are taught to them. Multidisciplinary education relies on the idea of combining knowledge, theories, and methods from different subjects to meaningful whole (Klausen, 2014). Multiple representations of knowledge and various forms of collaborative learning should facilitate the learning process, and it should be characterized by problem solving and active knowledge processing rather than knowledge reproducing (Selander, 2017). An innovative lesson plan was designed for the lesson Fun with Magnets of Grade 6 keeping a multidisciplinary approach in mind. It included use of different pedagogical approaches like storytelling, design thinking, problem solving and integration of subjects like Social Science and Science. We can hit the concepts at its core only when they are introduced in a child centric manner and when it has relevance to real life situations.

NEED OF THE STUDY.

Teaching the alpha generation these days has become quite challenging for the teachers and educators as all the information is available at the tip of your fingers. Hence, there is a need for making teaching learning method more informative, enjoyable and which also imbibes 21st century skills among the learners.

3.1 Population and Sample

This was a pilot study carried out on 1 class of grade 6 which consisted of 40 students of Millennium National School affiliated to CBSE Board. This group of students as a mixed group which had different styles of learning as well as different academic performances.

3.2 Data and Sources of Data

For this study primary data was collected by collecting a survey for reasons of boredom in classroom. Data collection was also done by direct observation (anecdotes) of student participation and student behavior. Post teaching learning process questionnaire and achievement test score was collected from the participants regarding the impact of the concept.

3.3 Theoretical framework

The variables of the study contain dependent variable: achievement scores of students , change in behavior pattern seen in students post the teaching learning process i.e. development of interest in scientific learning of the concept.

Independent variable contains using and integrating different competencies (knowledge, skill, abilities) in science classroom by use of different pedagogies.

RESEARCH METHODOLOGY

The descriptive qualitative methodology was used for this study. The details are as follows;

3.1 Population and Sample

Students of Grade 6 studying in CBSE school of Millennium National School, India were under study. These students belonged to urban area. Sample size was 40 where students were of different religious background, had varied academic scores. This was a pilot study carried out in 1 class of Grade 6.

3.2 Data and Sources of Data

For this study primary data was collected from students to understand the reasons of boredom in the science class. During the implementation of the study anecdote were collected by direct observation of student behavior and the change in behavior pattern was also observed. Post implementation achievement scores of students and their motivation to participate in projects was also noted.

3.3 Theoretical framework

The variables of the study contain dependent variable: achievement scores of students, change in behavior pattern seen in students post the teaching learning process i.e. development of interest in scientific learning of the concept. Independent variable contains using and integrating different competencies (knowledge, skill, abilities) in science classroom by use of different pedagogies.

Instructional strategy:

Pedagogies and competency used to introduce the properties of magnet and with multidisciplinary approach:

3.3.1 Storytelling as Pedagogy

Different stories were used to introduce the property and make students understand the actual use of these properties in real life. Example of few stories which were used and **their correlation with the current day situation**: Story of shepherd Magnes (Magnet attracts to magnetic substances- *this story was linked with use of magnetic cranes to segregate magnetic material from scrap*), folk story of construction of Konark Sun temple (Attraction of unlike poles and repulsion of like poles- floating Sun idol- *this story was linked with working of Maglev trains followed by discussion on hyper loops*), story of Navigation system by Chola dynasty (matsya yantra- *this story was linked with use of magnetic compass*) and chariot of Chinese Emperor Hoang Ti (Hand of the statue on the chariot had magnet embedded in it- Magnet rests in North south direction), story of Sushruta (Father of Plastic surgery- *this story was linked with use of magnets to remove iron particles from eye*) and Maharshi Bharadwaj (Vimanshastra- made use of Guha garbha darshan yantra which was used to find arsenic- *this story was linked with use of metal detectors*)- how they made use of magnets in their work, facts about animals, birds and fish and how they make use of magnetic field while migration.

3.3.2 Design Thinking

After storytelling few questions and activity of constructing a model depicting magnetic properties were given to students to ponder upon.

Construction activities:

- Design a Konark sun temple where the Sun idol would float and there should be attraction phenomena occurring between the base and the dome of the temple (What type of magnet should be used? What should be the orientation of the poles?)
- Design a hyper loop model for fast transportation (Which property of magnet can be used? Why?)
- Design a floating ball (Ball should float in air without contact with any metal)
- Design magnetic levitation using ring magnets and explain working of Maglev train.

Case study questions:

3.3.3 Problem Solving Competency

- Can you locate a place in your school where the magnetic compass will not show you the correct direction? What must be the scientific reason for the same?
- Will the magnetic compass show you the right direction when it is kept in a locker made of iron? Why?
- Identify the soil near the iron mine from the soil sample given using properties of magnet. (different samples of soil were collected from different places)

Students did referencing to find more information of the topics discussed, created models and worked on the projects in groups. This helped to inculcate habit of getting solutions to your curiosity, problem solving, designing prototype for model, collaborative working in team. Post lesson an achievement test was conducted to compare it with the achievement test class performance of the concept which was not taught using this approach.

3.4 Statistical tools

Use of mean and median and their comparison was done to check the effectiveness of the multidisciplinary approach used.

3.4.1 Descriptive Statistics

The mean, median values of class without intervention were 6.5, 7 each respectively. The values of mean, median of class with intervention was 8, 8.25 each respectively. Results showed that the class performance improved and its effectiveness was seen after intervention of the multidisciplinary approach.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Achievement test results should improvement in the class performance for this concept. Incorporation of this lesson plan in teaching gave encouraging response as the students were engrossed in the stories and experienced flavor of different subjects along with different hands-on activities involving design prototyping. This lesson plan involved activities which needed students to go outside the classroom and explore which was enjoyed by students. A good interactive session and extra reading on hyperloop was done by the students. Work and inventions done by the scholars in ancient India (Rishis and Chola dynasty) was highlighted and appreciated by the students which made them proud of being an Indian. Constructing models gave students opportunity to apply and test the concepts. Going beyond the textbook and getting relevance to the concepts taught in the class gives a wider perspective to the student to understand the importance of the topic in the real world. Lesson plan becomes more student centric and integration of subjects imbibes the concept and is able to retain for longer duration. Creating such lesson plans need competent teachers and thus teacher training is also integral part which needs to be focused. Such lesson plans helped to develop 21st century skills among students which would make them self reliant and future ready. Multidisciplinary approach worked very well and feedback received by the students was that they would love to learn many such concepts in a similar way.

Acknowledgment

I would like to acknowledge the Management of Millennium National School for constantly supporting and encouraging me to experiment different ways for teaching learning process. I would also like to thank my students who were the active participants for this work.

REFERENCES

- [1] Varadarajan S. et al. 2023 Doing Science Introducing scientific theory in elementary classes (Resonance pp.929-953).
- [2] Turner S Ireson G and Twitter J. 2016. Enthusiasm, relevance and creativity could these teaching qualities stop us alienating pupils from Science? School science review, 91 (337): 51-57.
- [3] Webb P. 2016. The effect of toys as educative material on pre-service education students' understanding of energy. African journal of research in Mathematics Science and Technology education. 100-111.
- [4] Klausen, S. H. (Ed.). 2011. Disciplinary collaboration in education, research, and teamwork. Akademisk Forlag.
- [5] Selander, S. 2017. Didactics after Vygotsky: Designing learning. Liber.

