Benefits of Introducing 3-D Technology in the Indian Education System

Smruti Shah, Ojus Save, Prajakta Bhatkhande, and Dilip Arbune

Abstract—**India is a developing nation. However, the scenario of education in India still remains the same where a student's achievement and progress is measured on the basis of what he/she writes in his exams. This paper focuses on the drawbacks of the current education system and how the introduction of 3D technology in the Education system would help the students build their interest in various subjects.**

Index Terms—**3-D technology, classroom layout, education, India, information, learning, student motivation.**

I. INTRODUCTION

Life has become easier with the advancement of technology. While India continues to develop in several aspects, some things remain unchanged and traditional. Notable example of this is the education system of India. Use of technology is still minimal in the field of education.

The current economic standing of India is to a large extending a reflection of its education system. The exceptional success of a few institutions in India is overshadowed by the dismal failure of educational system as a whole. 90% of the students do enrol for primary education in India, but a study conducted showed that even after five years of schooling, around 50 percent of the students fail basic reading tests and are unable to perform single-digit subtractions. Ninety percent of Indian children drop out by the time they reach high school [1].

Indian scenario of education remains one of the traditional types, where a student's achievement and progress is measured on the basis of what he writes in his exams, and how well he can write things mentioned in textbook [2]. Failure to use textual terminologies in an examination paper often results in lower marks for the child and the child's achievement maybe considered lower than that of other children. Hence, it can be said that mid-term and unit examinations are measuring child's memory or capacity of rot learning; rather than the actual understanding of the child.

Recent changes in Maharashtra board refer to 80-20

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system, where 80 marks exam paper is to be written by student and 20 marks are given for orals and internal assessment [3]. Reliability of marks received in internals can be considered low, as most teachers often overrate a student so that he/she can pass in the examination or marks given to students are based on several other biased factors, like behaviour in class and attendance. Hence, actual achievement of a student is not being measured through 20 marks allotted for project and internal assessment. In many households, parents tend to complete student's project; while student is under pressure of studying and preparing for 80 marks paper to be written based on memory.

In traditional way of teaching [4]:
- Students are provided textbooks which contain syllabus and content to be studied.
- Teacher comes prepared in class to take a lecture.
- She explains concepts, reads from textbook, and uses blackboard to clarify some complex ideas and explanations.
- Often questions and answers are given to students in notebook.
- Notebook is collected at the end of a semester for corrections.
- In most cases, internal marks depend on completion of notebooks and signature of teachers. Sometimes the teacher may not really go through the content of the notebook.
- Students are asked to prepare for midterm examinations from the notes provided in class.
- Students who successfully memorize the given notes score well in exams in contradiction to students who spend extra time to understand the concepts but may not memorize.
- Successful students are given tag of being bright students.

This type of system or teaching has many drawbacks. Students are not allowed to express themselves or think for themselves. In fact, their learning or understanding is completely dependent on teacher's explanations and notes given by them.

Stimulating interest among students for a subject being studied should be the primary goal of education and of the teacher. However, this traditional method of teaching fails to achieve this. In fact, when students are asked reason for their low scores in examination, student's often blame teachers or the subjects.

In many cases, it is observed that a student dislikes a subject because of the teacher who fails to create necessary interest or the student not liking the teacher. Student interested in practical subjects like Science and Maths, may not have inclination towards theoretical subjects like History and Geography, or vice-versa. But little do students

understand importance of having clear base of every subject. Every subject is interrelated. Being excellent with numbers helps a person to develop own thoughts and discoveries. Yet inability to express ideas in words could result in failure of an individual. Can you imagine what a loss would humanity have faced had Einstein not been able to express his ideas, theories and discoveries in words through research papers?

Every subject during school days is essential for future success. It is important for education to create interest in each subject and help student understand its true significance in larger perspective; be it arts, science or commerce.

A research conducted by Dr. Ebbinghaus suggested three concepts of learning [5], [6]:

- Rehearsal,
- Repetition
- Relearning,

Wherein it is often suggested that a student learns the textbook and then keeps on repeating, relearning during the time of exams to make it easier for him to by-heart.

- But as, Lockhart and Craik suggests, there are two ways of rehearsals [5], [7].
- Maintenance rehearsal: low-level repetitive information cycling. In this case, once you stop rehearsing, you tend to forget the learned information.
- Elaborative rehearsal: More complex rehearsal that uses the meaning of information to help store and remember it. This kind of information is more permanent.

These two types of memory are also embedded into framework called Levels of Processing. Every piece of information which is received by the senses requires some kind of attention, or mental processing. When only little (incidental attention) attention is given to information, it is processed at low level or shallow level. When meaning is attached to the given information, processing level deepens. Several ways are there to give meaning to information learned. These include, watching it, listening to it, experiencing it.

To overcome the current drawbacks of education and to create interest for various subjects among the students, we propose the use of 3D technology in schools while teaching.

Every subject can be made interesting with the use of this technology where a student doesn't only see and hear teacher, but experience concepts being explained. This was learned material can also achieve deepest level of processing, as student gets actively involved in subject rather than being passive attendee in lecture.

II. WORKING OF THE PROPOSED SYSTEM

Classrooms can be arranged subject wise, as shown in following Fig. 1.

Computer generated animation has been in development for some time with early work dating back to the 1960s [8].Number of classrooms for each subject can vary, depending on number of students in school. Sometimes, a whole floor can also be assigned to one subject or a specific area to one subject, where several charts/ posters and activities models of concerned subjects are kept. This would instigate curiosity among students. At the same time, the management needs to make sure that these charts and models are updated and changes are made in area every week. This is done so as to release inhibition about particular subject and break monotony, and contribute in learning [9]
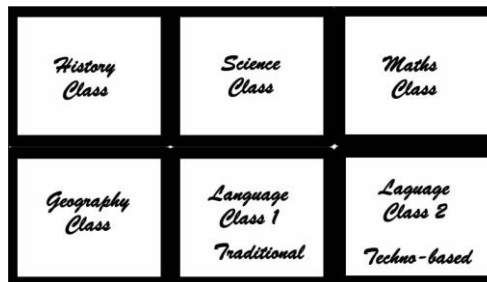

Fig. 1. Example of classrooms design.

Classroom Design: Each classroom will have a screen to display 3D movie/images, a cupboard to store class-wise curriculum CD, teacher to provide insight and explanation to subject, extra staff member to handle technical part of the class (CDs, headsets, and 3D glasses).

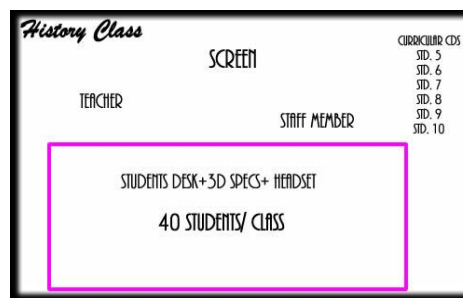A basic design of the classroom could look as shown in the Fig. 3.

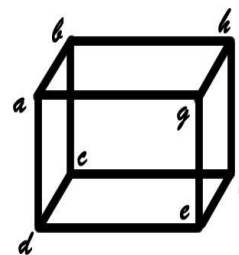Fig. 2. The proposed design of a class.

Fig. 3. Cube in mathematics.

III. IMPLEMENTATION (USING TECHNOLOGY IN HISTORY AND MATHEMATICS CLASS)

History: This subject is disliked by many students with arguing "Event happened in past, so why study now?"

Traditional way of learning the subject involves use of black and white textbook with minimum images, and details of several events which happened in past. On the other hand, History when thought as a lucid story can be fun to study and learn. Children find it hard to understand what is not visible. Dr. Anne Bamford suggests in her paper, Visual learning improves the pupils' understanding of functionality.

By seeing the whole of something; children are able to understand the parts. The research results indicated that the pupils had a strong preference for visual and kinaesthetic learning, with 85% of the pupils preferring seeing and doing, while only 15% of pupils preferred hearing [8]. Students today enjoy watching 3D movies whereby contents of a movie is remembered more vividly and understood more deeply. They can similarly enjoy the subject of History if it is studied in the form of a story like watching a movie. History can thus be made exciting by making students undergo the experience of living through history.

If a student watches 3D movie explaining uprising of 1857, or Shivaji Maharaj's struggle for establishing Swaraj, or World Wars, students can undergo real experience of struggles and wars. In-case of Indian Independence movement, when a student goes through events during nineteenth and early half of twentieth century comprising stories of trust and betrayal, formation of Indian National Congress and nationwide freedom movement, martyrdom of freedom fighters, and finally a success which led to a day of independence, students could actually celebrate the day and experience inner happiness and value of independence that people during 1949 might have experienced.

Mathematics: Numbers are staunch enemies of majority of the students. Mathematics is disliked by many students\ who may be keen to pursue disciplines not known to demand much of mathematics, like medicine, humanities etc. Stimulating subject like maths is given cold shoulder by many students, just because they are uncomfortable with numbers. However, Teachers can use 3-D technologies to help students appreciate spatial and number concepts more vividly it could also illustrate how the knowledge could be useful in practical life. Just solving problems- in textbook, does not solve problems faced in reality by the students. For example, when teachers explain concept of fractions and decimals or percentages, many students wonder why do they take out of 100 for percentage or how is 2/3 greater than ½. Now when we use graphics, students can be shown one big Rod, the rod is being cut into 3 parts, with two parts being separate from the remaining one. Another rod can be presented beneath it, and that rod is being cut into two parts, with both being compared to 2/3 and 1/3/ of the earlier rod. Now students can visualize that 2 parts of first rod is bigger than 1 part of second rod. Hence 2/3 is greater than ½.

Similarly subjects like Geometry will be much simpler when taught using graphics and 3D figures, particularly for 3D geometry.

Though 2-D can also be effective, 3-D technology can provide better visualization and have better impact. Using two dimension figure to explain three-dimension concepts like cone, cube or box, is very clumsy alternative. For example, explaining diagonal in Fig. 4 would be difficult, as there are three ways for forming the figure. Concept of edges, height, length, would be even more confusing. It is equally complex for students to understand the concept. Understanding gets more coherent when we grow up, but at level of initial stage like when it is introduced in school, these teachings could lead to confusion. Hence when these concepts are explained using 3D technology with proper design, it can definitely help student improve their mathematical ability, and understanding of Geometry.

IV. ROLE OF TEACHERS

Even with the introduction of technology, the role of teachers would remain crucial in moulding the understanding of the student. Teacher would enliven the subject with additional insights, clarify doubts and discuss important points while watching video scenes/ Images. For example, in Geometry class, teacher would use 3D technology while explaining figures and concepts.

In addition to this, she should be the person who designs curriculum and plans the lessons as to how would videos be used to inculcate learning among students.

Creating videos (especially for history) would require special technical skills and creating animated figures. Teacher having basic ideas of these technical skills can help student recreate scenes and hence remember concepts more deeply, rather than writing notes and building paragraphs.

Every child needs to realize his own strengths and weakness with help of teacher. Schools can provide some special room and time for allowing students to interact with, teachers and other students in a sense of collaborative learning.

Teachers are the ones who would then encourage students to prepare their own notes and summarize learning in class. Teacher should provide timely feedbacks to students about their progress.

Practical lectures can include making 3D models with help of teachers in school time. Practical and homework is given to students with an expectation for students to learn something new, but this depth is lost when parents do the project and homework for students while students prepare for written examination. Teacher needs to be skilled enough to provide students with proper guidance and help them complete the given task and explain parents the importance of allowing students to do their own work.

V. CONCLUSION

Implementation of the 3D technology in the classroom, will lead to led to positive changes in the student's attitude towards coursework and communication. There would be an improved interaction in the classroom. The students studying the subject in a 3 D classroom would be inclined to ask more complex questions. On the teacher's side, an efficient teacher needs to think from student point of view to make the explanation lucid, because knowledge without proper explanation skills is fruitless. Alongside the use of all the technology, teacher should be equally comfortable with board and chalk/marker. Teacher can assign every student a small research topic to be presented in front of the class, with each student getting turn to present This will inculcate the habit of going through research paper and studying something extra beyond the curriculum. Moreover, it will also increase the student's public speaking capability and confidence. Through use of this technology, we encourage students to develop their own views and ideas about subject matter, rather than confine to textbook and present ideas in their own words.

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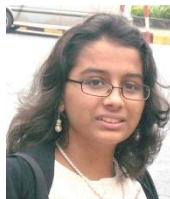
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