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Innovative Mathematical Teaching to Enhancing Creative Problem Solving Abilities among Students

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Abstract
In the 21st century, an important goal of education is to develop individuals with a high level of mathematical proficiency which then supports future participation in employment and citizenship. Mathematical knowledge is fundamental to the understanding and development of science and technology as well as being applicable to many areas in the social sciences. It is vitally important for all countries in this highly competitive global economic environment, yet there are continued difficulties in developing a successful education system which supports all pupils to reach their mathematical potential. The teaching was very interactive with pupils regularly demonstrating and articulating their solutions to the rest of the class at the board. There were eight or nine related activities in the 45-minute lesson; each activity was well prepared and the teacher ensured that all pupils were involved and 'on-task' throughout the lesson. We can make out that the technology has made many innovations in the field of mathematical teaching and also made a drastic change from the old paradigm of teaching and learning. In the new paradigm of learning, the role of student is more important than teachers. The concepts of paperless and penless classroom are emerging as an alternative to the old teaching learning method. Nowadays there is democratization of knowledge on the role of the teacher is changing to that of facilitator. We need to have interactive teaching and this changing role of education is inevitable with the introduction of multimedia technology and the spawning of a technologically-savvy generation of youths.

Keywords: Mathematical Teaching, Enhancing, Creative Problem Solving Abilities, Students

Introduction
Many students dislike classes in mathematics. They give a wide variety of reasons for this and among the most mentioned ones are that mathematics is hard, mathematics is boring and mostly irrelevant. Part of this problem stems from misconceptions about mathematics. It is described as inflexible and formulaic as opposed to fun and creative. The duty of mathematics teacher to counter act those prejudices and create a fertile learning environment. They continually seek to inspire students and convince them that mathematics in all its forms is worthwhile.

Innovative Activities in the Mathematics class
1. Lesson well prepared (teacher knows the lesson plan well and is aware of any problems/difficulties which might occur), resources are at hand, board prepared in advance, pupils haveown resources on desk.
2. Seating – every pupil has direct eye contact with the teacher and can get to the board quickly and easily. Able children seated beside less able.
3. Whole-class interactive teaching predominates, with planned intervals of individual and paired work. All pupils on task and all given the chance to demonstrate, answer, explain, suggest, criticise, etc.
4. Friendly, non-confrontational atmosphere where pupils learn from and support others and have fun. Mistakes used as teaching points. Encouragement given to pupils who have difficulty and praise given when deserved. Pupils are encouraged to appreciate the good work of others.
5. Spiral curriculum with continual revision; learning by heart encouraged with progression in Small, logical steps.
6. Visualization and manipulative are used in the early years and with less able pupils. Contexts are related to pupils' experiences where possible. Demonstrating on a number line and modelling are used to help understanding.

7. Exercises reviewed interactively with the whole class at the same time. Pupils give the solutions, not the teacher, and rest of the class agrees/disagrees or suggests alternative solutions. Pupils are expected to correct their own work (i.e. cross out wrong answer and Write correct answer in red). Teacher gives hints only if the whole class is stuck.
8. Challenges or extension work set for able pupils, or they help their less able neighbours; no one is inactive.
9. Correct notation, layout and language used at all times. Teacher acts as a model for pupils to follow (on board and orally), repeating/showing a pupil's explanation more clearly and succinctly where necessary. New words always explained and written on the board for pupils to copy in exercise books.
10. Fast paced and varied activities related to the concept being taught. Time limits set for individual/paired work. Time allowed for pupils to explain and for whole-class discussion.

Innovative Method of Teaching

If the mathematics class interesting one it is liked by all students although it is very difficult. As a teacher we should use the innovative teaching methods to teach the mathematical subject. The following are the innovative methods in teaching mathematics.

I) Illustration

Almost all these schools were making effective use of creative approaches through illustration to learning. Most of the teachers felt confident in encouraging pupils to make connections across traditional boundaries, speculate constructively, maintain an open mind while exploring a wide range of options, and reflect critically on ideas and outcomes. This had a perceptible and positive impact on pupils' personal development, and on their preparation for life beyond school.

According to Bodmer (1992), illustrations serve to "expand, explain, interpret, or decorate a written text".

In picture books, as in all literature, setting is used to establish a story's location in time and place, create a mood, clarify historical background if necessary, provide an antagonist, or emphasize symbolic meaning (Norton 1987). Illustrations are also extremely effective in determining the mood of a picture book.

llustration in Geometry

Creativity in the creation of proofs is a fundamental part of mathematics. In geometry there are often several ways of proving a theorem and sometimes the proofs are far from obvious. In addition, students often lack the understanding of why certain statements have to be proven. The most common example is that the interior angle sum in a triangle in the Euclidean plane is 180 degree. The students all know this fact but when it comes to proving it they often do not know why a proof is required or how to attempt it. Some students lack the creativity to think of Situations where the angle sum might be different or to (re-)create a valid proof of the fact. The first case can be remedied by drawing triangles on the outside of a sphere where one can easily draw a triangle with angle sum close to 360 degree. It is only to possible the teacher can explain geometrical concepts through illustration.

Benefits of Illustration

1. Clear understanding of the subjects
2. Improvement of personality
3. This leads to the confident level
4. Improves the creative thinking among students.

II) Multimedia Learning Process

I hear and I forget.
I see and I believe.
I do and I understand. – Confucius

Multimedia, is the combination of various digital media types such as text, images, audio and video, into an integrated multi-sensory interactive application or presentation to convey mathematical information to students. Traditional educational approaches have resulted in a mismatch between what is taught to the students and what the needs of the students. As such, many institutions are moving towards problem based learning as a solution to producing graduates who are creative; think critically and analytically, to solve problems.

The teacher uses multimedia to modify the contents of the mathematical material. It will help the teacher to represent in a more meaningful way, using different media elements. These media elements can be converted into digital form, modified and customized for the final presentation. By incorporating digital media elements into the project, the students are able to learn better since they use multiple sensory modalities, which would make them more motivated to pay more attention to the information presented and retain the mathematical information better.

III) Z to A Approach

This approach attempts to explain the application part of a particular concept first. The teacher should explain the effects of such applications. The teacher starts explaining what is promotion and explains what motivation theory in mathematics is another example the teacher explains about the loss and profit, first she/he explains the real life problems and what the future uses of that particular concept.

Strengths

- makes a particular concept clear
- Students develop interest to know exactly the concept.
- Creates long lasting memory/correlation of a concept.

Weaknesses

- Take quite long time for a teacher to introduce a concept
- Initial difficulty in understanding a particular concept will be encountered.

Mind Map

Mind maps were developed in the late 60s by Tony Buzan as a way of helping students make notes that used only key words and images, but mind map can be used by teachers to explain concepts in an innovative way.

The teacher can illustrate the mind mapping technique in mathematics subject to enhance student's creative thinking. Mind Mapping has helped students across the world change the way they make notes, improve their memory and prioritize information. Mind Mapping is a visual way to represent a collection of ideas. When new ideas are offered in brainstorming, mind maps are often used to organize and layout the information that is generated. It often involves a tree structure that can be grouped, connected and cross referenced to show the relationship between ideas.

The key is to build up mind maps that make the most of these things building on our own creativity, thinking and cross linking between ideas that exist in our own minds. As the

recent research point that any particular information explained with the help of graph charts makes a high impact in the minds of the people and keeping this as the core aspect the teachers may try to picture the concepts and show the same to the students.

School Curriculum Enhance Creativity

In schools with good teaching, there is not a conflict between the National Curriculum, national standards in core subjects and creative approaches to learning. In the schools which were visited for this survey, careful planning had ensured that the prescribed curriculum content for each subject was covered within a broad and flexible framework and key skills were developed. These examples were accompanied by better than average achievement and standards or a marked upward trend.

The Advantages of Using the Illustration and Multimedia Process for Teaching and Learning Mathematics in the Classroom.

- Students participate more actively in the lesson and express their different ideas or solutions
- More frequently.
- Students have more opportunities to make comprehensive use of their knowledge, skills and
- Ways of thinking.
- Even low-achieving students can respond to the problem in significant ways of their own.
- Students are instinctively motivated to give their justifications or proof.
- Students experience the pleasure of mathematical activities and receive approval from peer
- Students in the classroom.

Creativity in Mathematical Teaching

Creativity is an integral part of mathematics. In this article examine the awareness of creativity in mathematics and using illustrations in class room teaching. A majority of students found the introduction of the "gifts" of the founder of Kindergarten to a geometry classroom enhancing their interest in mathematics. They judged the wooden blocks helpful in their understanding of geometry. The students showed increased awareness of creativity in mathematics.

In some of the most effective teaching and learning seen, open-ended questioning encouraged independent thinking. Pupils responded enthusiastically and, in most cases, productively to opportunities to work collaboratively, to make choices and to present their work for review by teachers and their peers. Pupils were supported by good teaching that encouraged questioning, debate, experimentation, presentation and critical reflection enjoyed the challenge and had a sense of personal achievement. The confidence they gained encouraged them to develop and present their own ideas with greater imagination and fluency.

Conclusions

Overall I think that the students in the class learned many things about creative problem solving and its importance in mathematics. They were exposed to concepts that have been all but forgotten and had a chance to reevaluate some positions they took regarding mathematics. Students have shown a new or renewed appreciation for the mathematical process and the links of mathematics to the real world. Most students regarded the experiment as a success in so far as they were more interested in the class and the material and the gifts actually helped them understand mathematical creative problem solving and other concepts of mathematics also get better improvement.

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