

Innovative Techniques of Teaching

Preeti Anand

Abstract

Advance pedagogy is the way to enhance the outcome of teaching and learning process. In the current scenario when everything came to halt and restarted in an entirely new way where learning through the use of technology, multimedia and smart gadgets has come into play but the role of teachers is more important now as they are not face to face with learners but have to communicate effectively. Teachers should apply themselves in utilising innovative methods so that the students' learning process is as free-flowing as possible and the methodology they adopt is conducive to learning. Innovative teaching methodologies such as play way approach, teaching through gadgets, teaching through collaborative learning, etc. is the need of the hour. Studies have shown that this can result in substantial progress in learners' performance when evaluated after implementing innovative methods over the traditional methods.

Introduction

This research was conducted on a group of 20 students of Ramakrishna Senior Secondary School in Vikaspuri, New Delhi in the subject of Mathematics on the learners of 10th grade. This school caters to the needs of its surrounding areas where a diverse group of learners study together. This group of twenty learners were the bottom scorers/low achievers when a written exam was conducted, and belong to four different categories.

In the first category there are first generation learners implying that there is no one to look after their studies as parents are uneducated; they can't give their inputs to help them out.

In the second category there are truant learners i.e. those learners who are missing online classes. The third category learners are low academic achievers with less IQ; these learners do not show interest in studies so they are least bothered with what the teacher is teaching in the class. In the fourth category there are learners who lack prerequisite knowledge necessary to understand the concept being taught.

In this research paper, the Researcher who is also a '**Mathematics teacher**' of 10th grade in the same school, was deeply moved by the performance of these 20 learners. The Researcher worked on the weaknesses of these four types of learners and planned innovative teaching strategies so that these weaknesses can be overcome. To evaluate the same, a written test was conducted and the performance was recorded and learners' progress was judged through their improved scores as shown by the calculated t value. .

Research finding is that Creativity can be developed and innovation benefits both students as well as teachers. Innovation is actually creation of better or more effective products or results, it is not invention rather a substantial positive change in teaching strategies. So any method that serves the purpose of sending the knowledge that teachers have to the learners without destroying the objective, could be considered as an innovative method of teaching. This paper actually highlights some of the innovative techniques used by the

Preeti Anand, TGT (Trained Graduate Teacher) Mathematics, Ramakrishna Senior Secondary School, New Delhi, India

Researcher. In the current situation when teachers are not face to face with students these teaching strategies can turn out to be a miracle in teaching- learning process.

Hypotheses:

Null Hypotheses:

H_{01} : The input of enhancing students previous knowledge can't improve scores remarkably.

H_{02} : The inputs given for motivation and reinforcement will not help in increasing scores in Mathematics.

H_{03} : Creativity in teaching cannot be associated with intellectual ability of learners.

H_{04} : Concepts of Secondary level Mathematics can't be cleared at higher secondary.

Alternative Hypothesis:

H_A : There is a direct relation between the teaching strategies' and the academic results of learners.

Methodology

• Learning Mathematics with tools

Engaging learners with various Mathematics lab tools like construction tools, models, derivational tools, pure mathematics pads for teaching geometry. Using these tools will make learning of abstract concepts easy.

Mathematics lab systems on-line can scale back barriers to participation and learners performance can undoubtedly be improved through this. It can facilitate in increasing their understanding of various Mathematical constructs. For ex: the concept of Surface Areas and Volumes, Trigonometry, Constructions may be best educated to the Mathematics learners of grade 10.

• Flexible Teaching

All learners are unique. But teachers use the same methodologies for a diverse group of learners. This creates a learning problem, by putting unnecessary burden on some learners. A teacher should first understand the needs, experiences and the previous knowledge. For optimal learning of each individual from a group, teacher should plan his instructions accordingly. Project based learning materials, classroom discussions, group learning

Adaptive teaching systems recommend the best places to start new content and tells a teacher when to recapitulate old knowledge. They also provide various tools for monitoring one's progress. The researcher utilised this strategy by observing, analysing and identifying the key areas through a test conducted through online settings on a specific group of learners so as to identify their weak areas and plan lectures accordingly so that their performance can be improved. This is possible if certain abstract concepts are taught to the learners in different ways. For ex. Teacher is using multimedia, audio- visual (ppt), experimentation for teaching one single concept.

• Learning through real life examples

Learning in informal settings, such as in the playground, market, in cooking and baking, travelling, sitting in the room and looking at objects which surround us all involve Mathematics. These real life examples can link educational content and issues that are important to students in their lives; Informal reading can be enhanced

by adding questions and information from the classroom. Moreover the ideas learned in this way will never be forgotten. This connected experience stimulates more interest and motivation to learn.

An effective way for a teacher to raise and discuss a question in class, and then have students explore the same in the outside world to produce individual or group answers. Integrated learning of various subjects can also produce good results.

This crossover experience can be very helpful for teachers, where they simply give small explanations to students as a facilitator or as a guide but the results are outstanding. As learning takes place over a lifetime, from experiences in many ways, it is a great opportunity to support students in recording, connecting, remembering and sharing their various learning events.

● **Learning Through Disputation and creating a Collaborative learning environment.**

Students can further improve their understanding of mathematics by arguing in ways similar to trained mathematicians. It can be used after the explanation of a certain concept by the teacher while solving applications. Controversy helps students to enter into conflicting ideas, which can enhance their learning. This type of learning can give amazing results specially in a group learning. Teacher act as a facilitator and learners creative arguments lead them to arrive at complex results which would otherwise be difficult. It also allows students to filter ideas with others, so they learn how experts think. In mathematics this technique can be used to teach learners 'how to solve word problems based on linear equations, Quadratic Equations ,Arithmetic Progressions and many others.

Teachers can stimulate meaningful discussion in the classroom by encouraging students to participate in Mathematical Quizzes, Role Play, Using models to form explanations. Collaborative learning can give better results than teacher imparting direct knowledge to the students.

● **Play way Approach**

Play way approach can be very helpful in teaching mathematics because it provides a conducive learning environment to the students. In this approach teacher plans small activities to teach simple to complex concepts. If we see in real sense all the progressive methods of education has an element of play in them. Here, the researcher tried to make the tough part of mathematical concepts easy by the induction of elements of interest and motivation. Topics that can be taught using this approach was Polynomials, Trigonometry, Linear Equations and many others to students of grade 10.

Data Based Study

Researcher conducted a standardized paper (by getting it thoroughly checked through a panel of subject experts) of 25 marks on a group of 20 students chosen for research which was based on certain important concepts like polynomials, trigonometry and linear equations. The data the researcher got in terms of marks was recorded. For one-and-a-half-month-long period, Researcher tried these innovative teaching strategies with these 20 students and then conducted a retest for the same topics. Even the level of the examination was kept difficult than before and this was also a standardized test.

For the results that the researcher collected, refer to the Annexure attached at the end of the paper.

Data Analysis:

Calculation of Mean, Standard Deviation for both the samples and T value (paired) reflecting the outcome of the research:

Statistical Measure	Old Data (before the application of innovative techniques)	New Data (after implementation of innovative techniques)
Mean	11.4	18.65
Standard Deviation	3.084767329	3.468277
T value (paired) As both are related data samples	5.54063E-11	

Findings of the Study

- Data-based results reflected that the two samples taken for a group of 20 learners at different time are much varied and also the **t value is very significant** which showed that the strategies adopted with this group of learners actually worked out and can be repeated for the whole population.
- **Mean value has also increased much in new sample** which also indicates a positive hypothesis.
- Innovative teaching strategies can help students' progress.
- Students' grades have gone up when the teacher used some innovative strategies to teach rather than using a regular lecture method.
- Learners were seen to be **more enthusiastic, more participative and more confident** when the teacher shifted her role as a facilitator.
- The most important is that the **performance of all the four categories of learners improved** which showed that these approaches catered to the need of diverse group of learners.

Conclusion

As we saw significant improvement in the scores of learners after adopting innovative techniques, so, the null hypothesis has been rejected and the alternative hypothesis has been accepted.

The strategies can be used for whole group or population as a repetitive measure. It has great scope.

Hence forth we conclude that, In present time when education is totally dependent on online setup as there is no face to face interaction with the students. Whether we talk about school education or University education interactive teaching methods is the need of the hour as it can improve and make teaching learning process more effective when the pupils are sitting at home and they have everything handy with them through internet whether it's subject matter or any project. They have access to more resources than teachers. Its time to prove that if a teacher is passionate and flexible enough to modify his teaching strategies then he can definitely make significant improvement in his or her learners.

References

- Rao, Leena (2009): "Academic Earth Is the Hulu For Education, The Washington Post
- Internet Archive: archive.org.
- Big Think: bigthink.com
- Educators technology.com
- www.researchgate.net
- www.googledocs.com
- www.meritnation.edu
- www.academia.org.in

Annexure:

The following is the table showing the scores of a group of 20 learners in a standardized paper of Mathematics during an evaluation process by the researcher.

S. NO.	Name of student	Marks(25)
1	A	5
2	B	6
3	C	8
4	D	8
5	E	9
6	F	9
7	G	9
8	H	11
9	I	12
10	J	13
11	K	13
12	L	13
13	M	13
14	N	13
15	O	13
16	P	13
17	Q	15
18	R	15
19	S	15
20	T	15

A table showing comparison between the scores of the learners before the research' and scores obtained after adopting some innovative techniques by the researcher.

S.No.	Name of student	Old Marks(25)	New Marks(25)
1	A	5	15
2	B	6	15
3	C	8	14
4	D	8	15
5	E	9	15
6	F	9	16
7	G	9	15
8	H	11	20
9	I	12	20
10	J	13	18
11	K	13	18
12	L	13	22
13	M	13	20
14	N	13	22
15	O	13	23
16	P	13	23
17	Q	15	15
18	R	15	22
19	S	15	20
20	T	15	25

Link for the standardized paper conducted through Google forms:

<https://docs.google.com/forms/d/1MrqaSHVRfR-Z2DLMIDCFxeCT-H2GWV1R8Cd7YELGh5A/edit?usp=sharing>

Some Sample questions from the standardized tests conducted for the study (Research):

Q1. Given that one of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ is zero, the product of the other two zeroes is

(A) $-c/a$

(B) c/a

(C) 0

(D) 3

Q2. A point P divides the line segment joining the points A(3, -5) and B(-4, 8) such $AP/PB = k/1$. If P lies on the line $x + y = 0$, then find the value of k

Q3. The line segment AB joining the points A(3, -4), and B (1, 2) is trisected at the points P (p, -2) and Q (5/3, q). Find the values of p and q.

Q4. A cubic polynomial is given below

$$S(x) = x^3 - 3x^2 + x + 1$$

The zeroes of the polynomial are given as (p-q), p and (p+q). What is the value p and q

Q5. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45° . The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30° . Find the speed of flying of the bird.

Q6. Prove that:

$$\frac{\cos A}{1 - \tan A} - \frac{1 - \cos^2 A}{\cos A - \sin A} = \sin A + \cos A$$