



OUR HERITAGE

ISSN: 0474-9030 Vol-68, Special Issue-6

Impact Factor (2020) - 6.8

Special Issue on "Importance of Mathematics Education"



Learning Outcome-based Pedagogy for Teaching Mathematics in Higher Education

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Abstract

Higher education plays a vital role in country's success. The effective way to improve the teaching in Mathematics depends on the preparation that Mathematics teacher undergo. For continuous improvement in teaching, teacher should analyze the pedagogies in the subject. The quality of Mathematics teaching depends on the enhancement of the educational experience of students. The use of innovative and effective pedagogy explores the possibilities for change in new educational system.

Once teacher defines the learning outcomes that students would achieve after learning particular course, it is easier to devise the techniques and methods for imparting teaching-learning experience related to it through effective pedagogy.

Present paper is an attempt to explore the use of different pedagogy of mathematics in higher education.

Keywords: Pedagogy, Mathematics, Teaching-Learning, Learning Outcomes

Introduction:

Higher education plays a vital role in country's success. The effective way to improve the teaching in Mathematics depends on the preparation that Mathematics teacher undergo. For continuous improvement in teaching, teacher should analyse the pedagogies in the subject. The quality of Mathematics teaching depends on the enhancement of the educational experience of students. The use of innovative and effective pedagogy explores the possibilities for change in new educational system.

Once teacher defines the learning outcomes that students would achieve after learning particular course, it is easier to devise the techniques and methods for imparting teaching-learning experience related to it through effective pedagogy.

Learning Mathematics improves inner resources of students in higher education and encourages them for critical thinking. Mathematics includes the conversion of nonconcrete perceptions into the concrete form. It is useful in the study of different branches such as physics, chemistry, biology, geology, economics, geography, etc.

Teaching of mathematics in the class is not only concerned with the computational knowledge of the subject but is also concerned with the selection of the mathematical content and communication leading to its understanding and application. While teaching of mathematics mostly use the teaching methods, plans and pedagogic resources that are more fruitful in gaining sufficient reactions from the students. All one can know about the teaching and learning of mathematics is a complex activity. It encompasses many aspects that determine the success of this activity. The nature and quality of instructional material, the presentation of content, the skills of the teacher, the learning environment, and the motivation of the students are all important and must to ensure quality in teaching learning of Mathematics.





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Objectives:

1. To develop abilities in mathematics at the fundamental level through learner friendly pedagogies.
2. To relate the capabilities of mathematics, are specified in the particular learning outcomes with the given syllabi.
3. To conduct suitable pedagogical methods for mathematics to help learner to achieve the learning outcomes.
4. To assimilate evaluation with pedagogical methods are make sure the progress in learning by all learners.

Definition:

- (a) Pedagogy, a term that is used to describe an approach to schooling, learning and teaching that includes what is taught, how teaching occurs, and how what is taught is learned. (5)
- (b) Pedagogy is the study of the methods and application of educational theory to create learning contexts and environments. (6)
- (c) Pedagogy, most commonly understood as the approach to teaching, refers to the theory and practice of learning, and how this process influences, and is influenced by, the social, political and psychological development of learners. Pedagogy, taken as an academic discipline, is the study of how knowledge and skills are imparted in an educational context, and it considers the interactions that take place during learning. (7)

Learning Outcomes:

Learning outcomes are an important part of study. When, in the beginning, the learning outcomes are made clear then the learner knows very well about what he or she is able to do and experiences the desired change in his/her attitude, behaviour after completion of an unit of the particular study. It would determine that how the learner should be predicted to achieve the outcomes. Generally, students of Mathematics should possess certain amount of expertise by developing following skills:

1. Mathematical stories to produce interest in the subject.
2. Use of innovative teaching aids in classroom.
3. Some interesting games and puzzles designed to motivate the students.
4. Some of the innovative methods are used in classroom teaching learning process to eliminate math phobia.

UGC has propagated the outcome-based curriculum framework. It is described the various skills and attitude that a student of a particular subject would develop during its study and achieve the positive change in the form of developed mind set, acquired proficiencies, positive attitude, habitual to critical thinking and problem-solving skills. He or she would be better student than before after learning that particular course.

UGC has given Program/Learning Outcomes for Mathematics. It is expected that students would achieve the following graduate attributes:

1. Disciplinary Knowledge
2. Communication Skills
3. Critical Thinking and Analytical Reasoning
4. Problems Solving
5. Research Related Skills
- Information/digital literacy
- Self-directed Learning

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8. Moral and ethical awareness/reasoning
9. Lifelong Learning (LOCF Mathematics, UGC)

To achieve above mentioned graduate attributes teachers can adopt different types of pedagogies relevant to the specific course in Mathematics i.e. Calculus, Algebra, Geometry, Differential Equations, Statistics, Analysis, and Mechanics. Teachers can select topic and provide concerned learning experiences to them through proper pedagogy.

Pedagogy of Mathematics in Higher Education:

The knowledge of Mathematics and how to teach Mathematics together is commonly known as pedagogical content knowledge in Mathematics. When teacher teach in classroom, students donot understand that they are learning but they are gaining knowledge through take part in different activities. This activity helps students to develop interest in Mathematics and motivate students to learn more.

Teacher chooses a particular problem and gives it to students and involves them to solve the problem without spending time to do other things. All students not only listen the information but do something practically also. When students doing something practically, then they discover mathematical facts, which gives them happiness, mental satisfaction and encourages them towards further achievements. Students learning in realistic environment and give real world examples, most of the students have difficulties in the Mathematics subject to real world applications.

Conclusion:

To sum up, when teachers of mathematics would use effective pedagogy to achieve the graduate attributes and learning outcomes it results into the behavioural and cognitive level changes in students. They develop the capability to think critically, identify and distinguish among various cultures through the history of mathematics. They are be able to engage in activities directly helping the community. They utilize an understanding of the common frame of knowledge in mathematics. They develop the capability to apply logical and speculative skills to ideal and solve mathematical problems. Students develop the capability to evaluate data and draw suitable statistical deductions. They are be able to efficiently apply a variety of teaching methods and classroom tactics to positively impact student learning.

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