ROOTINDEXING
JOURNAL ABSTRACTING AND INDEXING SERVICE
INTERNATIONAL ADVANCE JOURNAL OF ENGINEERING, SCIENCE AND MANAGEMENT (IAJESM)
January-June 2023, Submitted in February 2023, iajesm2014@gmail.com, ISSN -2393-8048
Multidisciplinary Indexed/Peer Reviewed Journal. SJIF Impact Factor 2023 =6.753

An Analysis of the Use of a Math Lab for Instruction via the Creation of a Plan and Assessment of Its Feasibility

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Abstract

Engineering is the most significant field where mathematics is heavily relied upon. Engineering is said to have mathematics as its base. Surveying, leveling, planning, estimating, building, and other related tasks are all part of engineering. Applications of mathematics are essential in all of these fields. A subfield of mathematics called statistics is concerned with data gathering, analysis, and interpretation. While statistics gathers the data, mathematics is the means by which the data is gathered for subsequent processing. Therefore, statistics is a crucial component of mathematics. For the sake of clarity, social conditions such as fairness, fair play, healthy competition, symmetry, harmony, etc., are frequently expressed mathematically. Many concepts in society, such as workforce planning, demographic statistics, and the cost of living index, are derived from mathematical computations. The greatest way to utilize social resources is through mathematical applications. Government Policy to make Mathematics Subject as a Compulsory in School Education. In one way or another, everyone has to be somewhat conversant in mathematics. However, it is believed that the information gained throughout the primary and middle levels will be sufficient for an average man to deal with real-life issues.

KEYWORD: Mathematics Engineering, Fostering & Development, Mathematical Computations

INTRODUCTION

The majority of professions and more advanced, specialized learning programs benefit greatly from the study of mathematics. Therefore, a lack of mathematical knowledge will hinder a student's advancement in many facets of their life. The government has made mathematics a required subject in schools since a human being needs a larger perspective on the topic in order to grasp day-to-day transactions and make his regular real life methodical and disciplined. Math instruction has traditionally been conducted using conventional approaches, which elicit the least amount of resistance from students. The pupils lacked the development of critical thinking, comprehension, articulation of logical reasoning, and retention skills. Exam results have been directly impacted by this circumstance for the pupils. Thus, the current approach to teaching mathematics is "Teacher Centered," which places the least emphasis on the needs of the students. In addition, using these approaches to teach mathematics was not assisting students in comprehending the relevance and ramifications of the knowledge they were learning in their day-to-day lives. Moreover, these traditional teaching approaches promoted deductive thinking rather than inductive and student participation in the learning process. Therefore, instructors' teaching experiences were insufficiently comprehensive to assert that the techniques used. Students in the current age do not understand the value or purpose of studying mathematics in schools. Because the current educational system is test- and result-driven, students spend most of their time memorizing facts and focusing on chapters that will increase their exam scores rather than considering the usefulness and practical implications of the material they have learned. Because there was a greater focus on outcomes, students' standing was outcome-oriented and directly correlated with instructors' teaching experiences.

Creating a Conducive learning Atmosphere

A teacher's classroom setting, their interactions with students, and the physical layout of the space all contribute to the learning atmosphere that they create. Student involvement, achievement, and self-esteem are all impacted by the learning environment. A classroom with mutual respect and strong rapport, where students recognize the instructors' authority to plan and oversee the learning activities, and where there is a sense of purpose and confidence in

learning is conducive to an effective learning environment. One important factor to take into account is how well the instructor can help students develop positive attitudes about learning by helping them develop a sense of self-worth and respect for their abilities as learners.
Fostering the development of critical thinking
Helping pupils become more adept at using logic
Getting acquainted with intricate theoretical ideas
Connecting the concepts' applicability to actual circumstances
Improving the pupils' capacity for observation
Forming a mind-set of problem-solving, etc.

Merits and Demerits of Inductive method

i) It focuses on learning by doing, it is a scientific method. However, the procedure takes a lot of time.
ii) The student gains understanding of how formulas, concepts, etc. are decided upon and generalized.
Still, it applies to and is appropriate for lower classes.
iii) It calls for a teacher with a keen intellect, good planning, effective communication skills, and the capacity to carry out tasks in an acceptable manner.
iv) This method's conclusions aren't always accurate. Because the quantity of instances collected and validated determines the veracity of the conclusions reached.

DEDUCTIVE METHOD

The inductive technique and this method are diametrically opposed. This teacher moves from the "abstract to the concrete." It implies that issues are solved by using the rules, formulas, or principles that the instructor initially teaches.

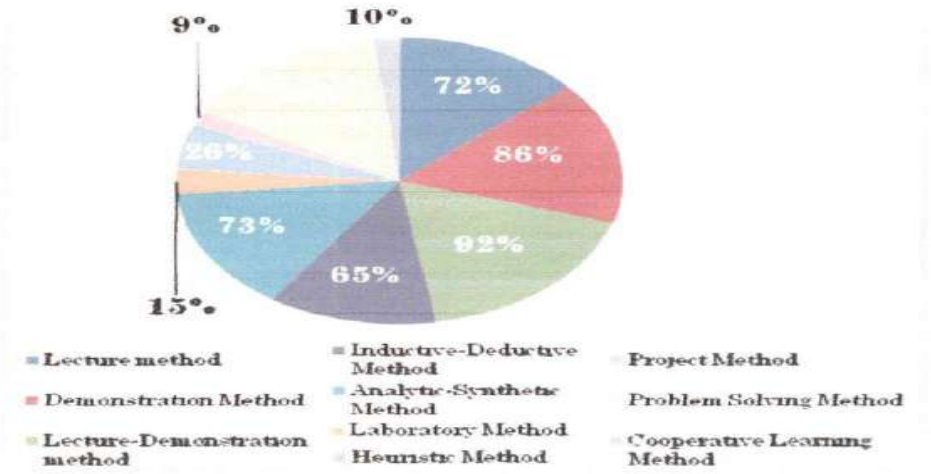
The Report of Visits and Observations:

Initially, the researcher went to a school run by the Ramanujam Institute of Mathematics Learning to see how the mathematics laboratory operated. The researcher's observations from his visit to the mathematics laboratory are listed below.

(i) The Mathematics Laboratory was equipped with different static models on various topics of mathematics of secondary curriculum.
(ii) The Mathematics Laboratory was equipped with manual manipulatives, using which fundamental properties of elementary and plane geometry, Algebra can be verified.
(iii) There was no manual manipulative to explain the complex topics such Calculus or 3-D geometry.
(iv) There was no computer nor any mathematical software available
(v) There was a curator cum trained assistant, who explained the concepts of Pythagoras theorem, derivation of formulae such as (a+ b) 2 , (a- b) 2 etc.

The cooperative learning approach to teaching algebra was the one that the teachers disliked the most. The causes of this include the huge class size and a lack of understanding of and expertise with employing the cooperative learning method to teach algebra in a traditional classroom. The study went so far as to suggest that most math professors were unaware of the Cooperative Learning Method as a teaching strategy. The Laboratory technique came in second to last with 17% and the Heuristic technique with 28%. Both of these techniques were known to the professors. Nonetheless, both approaches were favored for teaching algebra, receiving 17% and 28% of the vote, respectively. This was caused by a number of factors, including a high class size, texts that are incompatible with heuristic approaches, exposure to the laboratory technique, and a lack of infrastructure. Syllabi were also covered. Almost same justifications were offered for the Project Method, which ranked 48°/o as the second least popular approach

of teaching mathematics. The following approach was the 56% Analytic-Synthetic method; the 68% Inductivedeductive method was chosen for much the same reasons, at 58% and 68%. However, a significant degree of preference and inclination towards the use of the Lecture approach (76%), the Demonstration Method (79%) and the Lecture-Demonstration approach at 85°/o has been demonstrated by instructors. This is because, aside from allowing teachers to operate as one man show, the lecture, demonstration, and both together were the easiest methods to implement in any situation, regardless of the size of the class or the availability of infrastructure. Syllabi could also be completed in the simplest way possible. With 88% of the vote, the instructors' favorite teaching strategy was the problem-solving approach.



Graphical analysis of teachers views on methods of teaching Geometry

In a typical classroom, the following instructional strategies were employed to teach mathematics:

1. Lecture Method
2. Exposition Technique
3. Exposition Method (Lecture-Demonstration Method)
4. The Deductive-Inductive Approach
5. Laboratory Method & Analytic-Synthetic Method
7. Using Heuristics
8. Project Approach
9. Method for Solving Problems
10. The Method of Cooperative Learning

CONCLUSION

The instructors' choice for problem solving and the lecture-demonstration approach was quite strong when it came to teaching algebra in a traditional classroom. The laboratory method and cooperative learning method were least popular. The techniques for teaching algebra are listed below along with the proportion of students who use each one, in descending order of preference.

(a) Method of lecture demonstration Eighty to ninety percent of algebra teachers employed the problem-solving approach.

(a) Teachers ranging in age from 600 to 80 taught algebra using the lecture technique, the demonstration method, and the inductive-deductive method.

(c) Between 40% and 60% of instructors employed analytical-synthetic and project techniques while instructing algebra.

(d) Teachers ranging in age from 20 to 40 taught algebra using the heuristic approach.

(e) Ten to twenty percent of instructors taught algebra using the laboratory and cooperative learning methods. The professors employed these two techniques the least.

Teachers have demonstrated a strong preference for the demonstration method and the lecture-demonstration method while teaching geometry in a traditional classroom. The Laboratory technique, Project method, and Cooperative Learning method were the least popular approaches. The techniques for teaching geometry are listed below with the proportion of students who use each in descending order of preference. Teachers have indicated that they much favor the Problem Solving technique, Lecture-Demonstration approach (Exposition technique), Lecture Method, and Analytic-Synthetic approach while teaching Arithmetic in a conventional classroom. The Project technique, Heuristic method, Cooperative Learning method, and Laboratory method were the least chosen approaches. The techniques for teaching arithmetic are listed below with the proportion of students who use each in descending order of preference.

(a) Of the 900+ instructors teaching arithmetic, 80% employed the problem-solving, analytic-synthetic, lecture, demonstration, and lecture methods.

(b) Of the instructors of arithmetic, 60% to 80% employed the Inductive-Deductive technique.

(c) Just 10% to 20% of instructors taught arithmetic using the project method, heuristic, cooperative learning technique, and laboratory methods.

i. Students' habits of critical thinking, logical reasoning, and problem-solving mindset are all developed in the mathematics laboratory.

ii. The mathematics lab fosters a research-oriented mindset in the students. iii. It serves as a useful medium for bridging mathematical concepts with real-world scenarios. iv. Its embedded environment facilitates the teaching of mathematics and gives students practical experience.

v. A mathematics laboratory might provide a curriculum that is suited for students at all levels and help them develop the habit of learning mathematics in a lab.

Rather of employing time-honored teaching techniques, math teachers will use recently iscovered ideas or procedures. To enhance their teaching experiences, educators who wish to use athematics laboratories for math instruction should use the researcher's suggested technique. One possible way to teach mathematics in a laboratory is to incorporate the subject matter within the normal curriculum. A novel approach to teaching mathematics in a mathematics laboratory was the technique that was devised. Therefore, by including this method into the Teacher Education Curriculum, math instructors would receive sufficient training in its use. It is possible to prescribe a certain curriculum in the form of credits for Mathematics Laboratory courses, which students would be required to finish. This program might be incorporated into the standard mathematics curriculum. The evaluation and assessment process will be determined by the minimum number of credits completed. It could become required that every student in every class complete this minimal amount of credits. This requirement might be tied to advancement to the following class.The methods of evaluation and assessment that are currently prescribed could be modified to take the form of different rubrics for group investigation skills, positive interdependence, etc., improving peer interaction and social skills in addition to academic performance.

REFERENCE

Sharan, Y., & Sharan, S. (1992). Expanding Cooperative Learning through Group Investigation, New York Teachers College Press.

Shaw, V (1992). Community Building in the classroom, san Juan Capistrano, CA: Kagan Cooperative Learning Sidhu Kulbir Singh (1998); The teaching of Mathematics, Sterling Publishers Private Limited, New Delhi; (p.261)

Singh Hukum, Avatar Ram & Singh, V.P., (February 2885), A Handbook for Designing Mathematics laboratory in Schools in Schools, New Delhi, In-house Printing Press, NCERT, New Delhi

Slavin, R., Sharan, S, Hertz-Lazarowitz, (Eds) (1985) learning to cooperate, cooperating to learn, New York Plenum Press

Suneetha, E.; Sambasiva Rao, R.; Bhaskara Rao Digumarti (2884); Methods of Teaching

Mathematics; Discovery Publishing House; New Delhi (p.137-p.286)
Watt, S. (eds): computers & Mathematics, Springer -Verlag, New York Bruner, J. (1966). Toward a Theory of Instruction. Cambridge, MA: Harvard University Press.
Kenneth Tobin, Research on Science Laboratory Activities: In Pursuit of Better Questions and Answers to Improve Learning, School Science and Mathematics, 90 (5), May/June 1990, (p. 414.)
Shaw, V (1992). Community Building in the classroom, san Juan Capistrano, CA: Kagan Cooperative Learning Sidhu Kulbir Singh (1998); The teaching of Mathematics, Sterling Publishers Private Limited, New Delhi; (p.261).
Singh Hukum, Avatar Ram & Singh, V.P., (February 2885), A Handbook for Designing Mathematics laboratory in Schools in Schools, New Delhi, In-housPrinting Press, NCERT, New Delhi
Slavin, R., Sharan, S, Hertz-Lazarowitz, (Eds) (1985) learning to cooperate, cooperating to learn, New York Plenum Press Methods of Communication, A book for M. Ed students of YCMOU, Nashik
Prof. Ramanujam, R. Dr. Ravi Subramanian & Group (2006) Position Paper National Focus Group on Teaching of Mathematics National Curriculum Framework {2005), NCERT publications, New Delhi
Rothwell, Dan J. In the Company of Others: An Introduction to Communication. New York: McGraw Hill, 2004
Schroeder, T.L., & Lester, F.K. (1989), developing understanding in mathematics via problem solving. In P.R. Trafton (Ed.), new directions for elementary school mathematics (pp.31-56)
Kenneth Tobin, Research on Science Laboratory Activities: In Pursuit of Better Questions and Answers to Improve Learning, School Science and Mathematics, 90 (5), May/June 1990, (p. 414.)
Lulla, B.P., Shah, G.B.; & Darji, D.R.; (1966); An Investigation into the Academic Causes of Backwardness in Mathematics at the Elementary Stage (Classes I - VII); Centre of Advanced Study in Education; Baroda
Mathematics Laboratory Guidelines Central Board of Secondary Education Delhi to Schools, (2005), New Delhi
Buch M.B.,Educational Survey (1988-1992), published by NCERT, Ministry of Human Resources Development, Government of India, New Delhi
Dave, R.H., & Saxena, Teaching of Mathematics SchoolsJ NCERTJ New Delhi David, W. Johnson (1994):
press, Connectuit, London R.C. (1965), Curriculum & in the Higher Secondary Learning Together; Westport 1e.Dutta, A., (1986), Learning Disabilities in the Reasoning Power of the Students in Geometry Diagnosis and Prevention, Calcutta University
Iqbal Muhammad (2004); Effect of Cooperative Learning on Academic Achievement of secondary school Students in Mathematics; University of Arid Agriculture Rawalpindi
Jain, S.L.; Burad, G.L. (1988) for Rajasthan Secondary Education Mathematics; Kasat, B.S. (1991) for Palghat Tehsil; Chel, M.M.; (1990) for West Bengal Secondary Education Mathematics; Fifth Educational Survey (p.371 - p.375)
Joyce, B., & Weil, M. (1986(). Models of Teaching (3rd Edition). Englewood Cliffs, NJ: Prentice-Hall
Kagan, S (1990). Cooperative Learning: Resources for Teachers san Juan Capistrano, CA: Resources for
Teachers lS.Kagan, Spencer, Juan Capistrano, lG.Kenneth, A.BJ (1992). Cooperative Learning, san CA: Kagan Cooperative Learning