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Perception of Mathematics Teacher towards Using Math-Kit at Secondary Level

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Abstract

This study aims to find out the perception of mathematics teacher and as well as their practices towards using math kit in teaching learning process of mathematics at secondary school. A descriptive survey method was used in this study. Here researcher employed multi stage sampling for the selection of sample. 50 mathematics teachers were selected as sample from Nayagarh, Cuttack and Gajapati districts of Odisha for the study. A Self-developed Perception scale with different components was employed to collect the opinions and also a check list was used to collect data from the samples. Percentage and t-score were calculated to analyze the data. Study concluded that Most of the teacher has perceived the importance of Math kit as well as the benefits about application of math kit whereas less teacher perceived that they would face difficulties when use math kit. The study also revealed that no difference exists between the perceptions towards using math kit of math teacher in relation to gender at secondary level.

Introduction

All subjects have their own importance for the development of nation but mathematics has been playing a key role for enabling the country to make rapid of the development in various field of nation. There is no life that has remained untouched and unaffected by the use of mathematics. It helps in proper understanding of nature's work and complicated problems of life and converting them into its language of signs and symbols. It also helps in drawing conclusions and interpreting various ideas and themes.

Importance of Mathematics

Developing children's abilities for mathematisation is the main goal of mathematics education. The narrow aim of school mathematics is to develop 'useful' capabilities, particularly those relating to numeracy–numbers, number operations, measurements, decimals and percentages. The higher aim is to develop the child's resources to think and reason mathematically, to pursue assumptions to their logical conclusion and to handle abstraction (NCERT, 2005).

The place of mathematics at secondary education is very important and wide. Mathematics is called the science of logical reasoning. It is the science of measurement quantity and magnitude. It is the abstract science which investigates deductively the conclusions implicit in the elementary conceptions of spatial and numerical relations. It is also defined as science of numbers and space. As consideration of such a crucial subject the Vision has been envisaged in NCF-2005. Which are (1) Children learn to enjoy mathematics rather than fear it.(2) Children learn important mathematics: Mathematics is more than formulas and mechanical procedures(3) Children see mathematics as something to talk about, to communicate through, to discuss among themselves, to work together on.(4) Children pose and solve meaningful problems(5) Children use abstractions to perceive relation-ships, to see structures, to reason out things, to argue the truth or falsity of statements(6) Children understand the basic structure of Mathematics: Arithmetic, algebra, geometry and trigonometry, the basic content areas of school Mathematics, all offer a methodology for abstraction, structuration and generalization(7)Teachers engage every child in class with the conviction that everyone can learn mathematics.

In spite of above beneficial visions persist in learning of Mathematics, several skills on visualization and representation can also be developed through learning mathematics. Basic structure of mathematics includes arithmetic, algebra, geometry and trigonometry the basic content area of school mathematics, all requires a methodology for abstraction and generalization. At the secondary stage, student begins to perceive the structure of mathematics as a discipline for which learning through math kit may be focused as

essential tool to make the secondary class more understandable.

Importance of Math Kit

To make child thought process mathematisation is one most significant recommendation of NCF 2005. In achieving this goal, concrete mathematical experiences play a major role. A child is motivated to learn mathematics by getting involved in handling various concrete manipulates in various activities. In addition to activities, games in mathematics also help the child's involvement in learning by strategizing and reasoning. For learning mathematical concepts through the abovementioned approach, development of mathematics kit is necessary. Therefore a child centered Mathematics kit has been developed for the students of Secondary stage based on some of the concepts from the newly developed NCERT mathematics textbooks.

Learning and teaching materials are critical ingredients in learning and the intended curriculum cannot be easily implemented without them. Over the past forty years the importance of adequate Learning and Teaching Materials provision (including textbooks, teachers' guides and supplementary materials) to support educational development and quality upgrading has been recognized by governments throughout the developing world and by most development partners. There is now substantial research evidence which shows that textbooks are one of the most important inputs that have a demonstrable impact on student learning". (The World Bank, A Chance to Learn, 2001)

Math kit makes learning and teaching experience funny and interesting. The only way we can get students closer to the subject is if we have something interesting for them to learn; that's the only way it will stick in your memory (Times of India, 2016).

In order to monitor the scheme of providing quality education, Govt. of Odisha has sanctioned much of fund for science and math kit, computer lab and teacher training programme to secondary school. (Activity report 2011, school and mass education, govt. of Odisha).

Policy perspectives on importance of mathematics

The Kothari Commission (1964-66) emphasized Mathematics as essential for national development since education in science and engineering was dependent on mathematics. The commission thus made mathematics compulsory up to Grade 10. It recognized that teaching through lectures was prevalent in most science and mathematics classrooms and recommended emphasis on developing understanding of basic principles rather than "mechanical teaching of mathematical computations".

The National policy on Education (1986) emphasized on using of mathematics in daily life and applications of mathematics in other areas. Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulate logically. Apart from being a specific subject, it should be treated as a concomitant to any subject involving analysis and reasoning. (NPE, 1986)

The NCF 2005 emphasized developing the capability to understand abstract terms, use and understand logical forms, grasp ideas and discover, create as well as appreciate patterns. The idea of mathematisation and giving learners the space to discover the way mathematics functions was an important change in the NCF 2005 formulation. It also urged focus on developing concepts and learners' own ways of solving problems and building new algorithms rather than remembering short cuts and efficient ways to calculate. To understand concepts, to explore mathematical ideas as well as to build upon understanding for applications and problem solving, mathematics kit is to be provided to all the elementary and secondary Schools. (Rastriya avishkar abhijan, 2015).

Rationale of the study

As mathematics consists of many concepts, abstract terms, logic and reasoning etc. it becomes sometimes difficult to understand for the child in the classroom setup. For providing a good understanding among student regarding different content of mathematics, different strategies, several activities may be adopted, by teachers.

To learn more mathematical concepts and for making mathematics joyful, interesting and fruitful, activity based approach is most important. (Rathva, P.). Several teaching and learning materials can be provided for teachers as well as student. For improving achievement in mathematics among students, and providing quality mathematics

education, presence of mathematics laboratory at the school is very much essential. (Yeasmin, 2016).Use of mathematics laboratory enhances achievement in mathematics and concrete knowledge on mathematics can be imparted through mathematics laboratory in high school. (Pasha, Rao and et. al.2012).Not only the learning material, teacher's lesson plan, but some teaching kits and teaching strategy like dynamic learning program are responsible for mathematics achievement among student (Aloquina, Marpa, 2016). Use of instructional materials generally improved students' understanding of concepts and led to high academic achievements. (Adeluku, 2012). Use of concrete teaching learning material enhances the process of teaching mathematics. Teacher perceives the use of concrete teaching learning materials differently with respect to gender (Mutodi& Ngirande, 2014). Using appropriate and relevant media materials is important in the teaching of mathematics in secondary school. Perception of teachers differs towards use of media material with respect to gender(Krishnasamy, Vello and et.al. 2013).Supplying science and mathematics kits to schools is a step forward for quality education. These kits are a set of portable labs, aimed at making the subjects more student-friendly by helping them understand and apply basic concepts. (Mohanty, 2014).The kit is one of the efforts in adhering to the National Curriculum Framework 2005 guidelines, to change the classroom atmosphere and make it more children-friendly by introducing educational aids (Sharma, 2014).

After reviewed some related literatures and theories, researcher found the importance of teaching learning material on mathematics teaching. Several study also revealed about the perception of teacher towards effect of TLM in achievement of students in mathematics. In order to fulfillment of higher aim of mathematics education, teaching mathematics must be activity oriented in school level. NCERT has also designed math kit for primary to higher secondary level students for providing an experienced and activity oriented learning. Therefore in this study, researcher wants to know about perception of teacher towards Math kit in terms of importance, applications, and difficulties faced among teachers in the class room.

Statement of the problem

Math kit provides a chance to make an activity among students in classroom by which the concept can be clarified through the activities. For employing the kit, perception of teacher and for getting the output practices to kit within the classroom is necessary. Therefore the study entitled as **"Perception of mathematics teacher towards using Math-kit at secondary level".**

Operational definitions

- **Math-Kit**

This is a wooden box which includes various kit items along with a manual for performing activities. The kit broadly covers the activities in the areas of geometry, algebra, trigonometry and mensuration. For secondary mathematics, items like circular Board, Geo board, cut – outs, cube with adjusting cut-outs of cuboid, cylinder, cone and hemisphere, algebraic Tiles, cut-outs of plastic cardboard in the form of triangles, quadrilaterals and rectangle etc. are included in the kit box. (NCERT manual of mathematics kit, 2014)

- **Perception**

Perception is the organization, identification, and interpretation of sensory information in order to represent and understand the presented information, or the environment. Here perception of mathematics teachers towards importance, application, difficulties and practices of math kit in the class room are considered.

- **Secondary Mathematics Teacher**

The teacher who teaches mathematics to secondary school students is called as secondary math teacher. All the teachers who are posted against TGT-PCM post at high school are considered in this study.

Objectives

- To study the perception of math teacher towards using math kit.
- To compare the perception of math teacher in relation to gender

Research questions

- What is the perception of mathematics teacher towards math kit?
- Are there any differences in perception of secondary school teacher with respect to gender?

Hypothesis

H_0: There is no significant difference between perceptions of male and female math teacher towards use of math kit.

Delimitation of the study

This study has delimited to secondary school mathematics teacher of Odisha and has also delimited to all govt. school of Odisha from three districts namely Nayagarh, Gajapati and Cuttack. The collection of sample was delimited to 50 secondary mathematics teachers.

Method and Design

The nature of present study is descriptive. A quantitative survey method was used in the study.

Population and Sample

The population of study is comprised of all secondary mathematics teacher of Odisha.

A multi stage sampling was employed in the present study. There are 30 districts in Odisha. Three districts have been selected randomly. They are the Nayagarh, Gajapati and Cuttack. One block is chosen randomly from each district. Ten high schools are selected randomly from each chosen blocks. All the mathematics teachers have been taken as the sample of the study. 50 mathematics teachers are selected as sample.

Tools and Technique

In order to collect the relevant data for the study, a self-developed Perception scale was administered for teachers. A 3-point scale with 20 statements was included in the perception scale. There are 15 positive statements and 5 negative statements. The points are like A- agree, U- Undecided, D-Disagree. For positive statement, number assigned for each point is 3 for A, 2 for U and 1 for D whereas for negative statement it is just reversed order of above. The maximum score is 60 and minimum score is 20.

Validation of Tools

Before administering the tools in research work, Researcher had given the tools to two experts to check grammatical correctness and relevance of the items. There were 25 items included in the perception scale before the opinion of expert. After taking suggestion, researcher omitted 5 items from the perception scale.

Analysis

Perception of teacher towards using math kit:

A perception scale was administered to the teachers which contain three components like importance of math kit, application of kit and difficulties faced when using kit.

In first component (importance of math kit), there are 8 items, in second component (application of kit), there are 8 items and in third component (difficulties faced when using kit) there are 4 items. The tool was administered to 50 teachers. In the first component there are 8 items, so the total responses are 400. Similarly in second component, total response is 400 and in third, total responses are 200.

Table no.-01

Components of Perception	Responses to components	Agree (3)	Undecided (2)	Disagree (1)
Importance(8)	Responses	242	90	68
	percentage	60.5%	22.5%	17%
Application (8)	Responses	272	70	58
	percentage	68%	17.5%	14.5%
Difficulties (4)	Responses	38	44	118
	percentage	19%	22%	59%

Testing of hypothesis

H_0: There is no significant difference between perceptions of male and female math teacher towards use of math kit.

Table no.-02

	Gender	Mean	SD	MD	df	t-value	Sig (2 tailed)	
Importance	Male	18.34	2.919	.964	48	1.172	.247	Not significant difference exist at 0.05 and 0.01 level
	Female	17.38	2.801					
Application	Male	19.00	3.273	.476	48	.468	.642	
	Female	18.52	3.907					
Difficulties	Male	9.21	2.128	.159	48	.278	.782	
	Female	9.05	1.802					

Major findings

1. Most of the teacher (60.5%) has perceived the importance of Math kit as it provides a children friendly atmosphere, clear understanding about concepts, abstract terms, and as well as it explore the ideas of student. but less no. of teachers (17%) disagreed about the importance of math kit because they don't perceived that both algebra and geometry can be made understandable and easy through the use of math kit.
2. Near about one forth (22%) of teachers did not decide that whether it persipts importance or not.
3. Majority teacher (68%) perceived the benefits about application of math kit as it encourages activity based learning, gives direct experiences, promote skill, increases achievement level and enhances creative thinking. 17.5% of teachers are neutral towards benefits about application of math kit.
4. Few teachers (14.5 %) perceived that applying math kit in the class room has no benefits for student because of it encourages towards group work and new learning.
5. Most of the teachers (59%) have perceived that they don't face difficulties when employing Math kit during class room. 22% teachers could not express exactly whether they face difficulties or not. 19% of teacher perceived they would have faced problem because using kit is time consuming and require more work in classroom.
6. The study also revealed that no differences found between the perception of male and female teacher towards using math kit at secondary level in relation to several components like importance, application and difficulties to handle.

Discussions

The findings indicate that most of the teacher (60.5%) has perceived the importance of Math kit as it provides a children friendly atmosphere in the class room, clear understanding about concepts, abstract terms, and as well as it explore the ideas of student. which is consisted with the study conducted by Adeluku, 2012, Krishnasamy, Vello and et.al. 2013, Rathva, P.(2013). Majority teacher (68%) perceived the benefits about application of math kit as it encourages activity based learning, gives direct experiences, promote skill, increases achievement level and enhances creative thinking which is similar to the studies conducted by Yeasmin, 2016, Thomas, 2011, Aloquina, Marpa, 2016, Pasha, Rao and et. al. 2012. Study revealed that no difference exists between the perception of male and female teacher towards using math kit which contradicted to the studies conducted by Mutodi& Ngirande, 2014 and Krishnasamy, Vello and et.al. 2013.

Educational Implications

Research is focused on the perception and practices of math teachers towards using math kit at secondary level. The findings may have implemented in making a training module for improvement of different skills regarding skill on time management, operating skill of several kits for teachers. Manuals for different kit may be designed and implemented in pre service teacher training programme for creating awareness about the importance of math kit in teaching learning process.

Suggestion of further study

Study has focused on perception of math teachers towards using math kit at secondary level. Similarly study can be done in other areas like primary education, upper primary and higher secondary education.

A study can be conducted to find differences in perception with respect to different variables like type of school, teacher's qualification, experiences and gender.

Conclusion

As secondary mathematics makes a strong base for higher mathematics, the importance of teaching process is significant. For providing a quality teaching, teacher follows activity based strategies, creates student friendly environment in the class room. Use of math kit has also an important factor for providing quality teaching. Therefore perception level of level of teacher towards using math kit is remarkable for the improvement in learning mathematics. Consequently this study has described the perception of mathematics teacher towards use of math kit in the class room during teaching learning process.

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