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TEACHERS' AWARENESS OF MATHEMATICAL APPLICATIONS IN DAILY LIFE

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Abstract

The goal of this research was to look into the current state of Secondary level Mathematics teachers' awareness of the use of mathematics in daily life in the State of Telangana. In this present study the investigator identified the awareness in use of mathematics in daily life is in eight areas such as Mathematics awareness in Environment, Science and Technology, Agriculture, Art and Culture, Sports, Weather Forecasting, Industry. The researcher used a mailed questionnaire to collect data for his research for Secondary level Mathematics teachers' awareness in use of mathematics in daily life in selected areas. The study revealed that secondary level mathematics teachers have good awareness in use of mathematics in daily life. Over 80 percent of Secondary level Mathematics teachers' in this study were using daily life situations to understand the concepts and gain the fundamental knowledge of other subjects such as Environment, Science and Technology, Agriculture, Art and Culture, Sports, Weather Forecasting, Industry among the students.

Key terms: *Awareness; Daily life; Mathematics; Secondary level; Mathematics teachers*

1 Introduction

Mathematics is an important subject in overall school curriculum. It has always occupied an important place throughout the school stage due to its plays a main role in developing civilization. Mathematics is an independent discipline and it has its own language and structure. Besides these, it has a lot of applications in other subjects. Since the last four decades, there has been an explosion of knowledge all over the world with rapid development in almost all fields such as science and technology, Agriculture, Art and Culture, Sports, Industry etc. Due to above reasons, the Kothari Commission (NCERT, 1966) emphasized the importance of

mathematics education from the primary school stage to research degree levels and suggested various guidelines and mathematical activities in schools, colleges, and universities. The commission also expressed the view that, if we want to survive as a Nation in the present complex technological World, the proper foundation of mathematics must be laid in the School curriculum. The commission also stated that rather than mechanically teaching mathematical computations, greater emphasis should be placed on grasping basic ideas in mathematics education. It also recommended that the study of mathematics should be compulsory for the students up to the secondary school stage. The National Policy on Education (MHRD, 1988), also making mathematics a compulsory subject of study up to the secondary stage of all children.

However, mathematical knowledge is not limited to computational arithmetic, and geometrical measures played an important role in everyone's education. With converting eventualities of the world, arithmetic has occupied an critical position even in non-mathematical areas, which include social sciences, scientific sciences, etc. (NCERT, 2012). With this new role, the teaching of mathematics at the school level should be related with the daily life situations to understand the concepts and gain the fundamental knowledge of other subjects such as Environment, Science and Technology, Agriculture, Art and Culture, Sports, Weather Forecasting, Industry, etc. To relate these mathematics in daily life an efficient mathematics teacher is needed. To prepare an efficient mathematics teacher we need sound teacher education programmes. Therefore, this paper focuses on the awareness of the secondary level mathematics teachers about mathematics and its use in daily life.

2 Background of the Study

Mathematical applications are now used in a variety of measurement applications, including measuring area, price, and time duration. This has resulted in the development of mathematical theories of equations, dynamical systems, and other related topics. In today' world, use mathematical knowledge will assist in understanding the complicated shape of DNA, development of Google Maps, which makes use of superior imaging algorithms to allow us to discover places, directions, zoom in and out, and find restaurant and also in finding of friends on Facebook, if you want discover the links you need On Twitter. These are all primarily based totally on proprietary algorithms developed by mathematicians and computer scientists. They have altered the manner of society works with information about just everything, simply the whole lot to be had on the touch of a smartphone. The market value of Google, Amazon, Facebook, and Twitter, all built on intellectual property primarily based

totally on mathematical algorithms, isn't much short of half a trillion dollars at current market values(Manish, 2009). It is understood that mathematics is utilized in big industries which includes digital shape. Higher mathematics has a powerful tool built into the high-speed digital computer that can generate and alter mathematical models of many systems in Science, Technology, and Commerce.

Mathematicsalsousedsmall-scalecircles, suchassailboatdesign, doctorreceptionrooms, and all kinds of portable devices. If you have basic mathematics skills, you can figure out how much material you'll need to finish the project in a certain amount of time. Carpenters also estimate how much wood is needed to build a project using mathematics skills. A tile installer can utilise his mathematics skills to figure out how many tiles he needs to transport to the job site by calculating the room's floor size. When installing new electrical outlets, an electrician employs mathematics to determine how much work is required. Understanding basic mathematical concepts will help in saving time and money. With the help of mathematical knowledge, one can save the electrical bill by switching off lights whenever not in use. Mathematics will use every walk of life, it is impossible throughout the day without using mathematics, because the world is full of numbers to handle and problems to solve. There would be no Science, Music, or Art without mathematics. All of those things include mathematics. With this background, the present study was undertaken to know the secondary level mathematics teachers' awareness in mathematics in daily life situations. With this knowledge and skills to understand the concepts and gain the fundamental knowledge of other subjects such as Environment, Science and Technology, Agriculture, Art and Culture, Sports, Weather Forecasting, and Industry.

3 Objectives of the Study

1. To know the Secondary level Mathematics teachers' Awareness of Mathematics in –Daily Life,
2. Assess Secondary level Mathematics teachers' awareness in mathematics in daily life situations.

4 Methodology

A systematic sampling approach was used to choose an equal probability of selection method sample of 578 teachers. Only 311 teachers responded to the survey out of a total of 578. The data were collected from 251 questionnaires, some of which were returned blank or partially completed. A researcher-developed postal questionnaire with 90 items divided into

four parts was utilised to collect data for this investigation. Part A included 30 items relating to mathematical knowledge in everyday life, organised into the following categories:

1. Environmental Awareness in Mathematics
2. Science and Technology Awareness in Mathematics
3. Integration of Agriculture
4. Teaching Mathematics Through Arts and Culture
5. Integration of Sports awareness in Mathematics
6. Whether forecasting awareness in Mathematics
7. Learning Mathematics through Industry awareness

On a 5-point scale, teachers' awareness of relating other areas of mathematics while teaching was measured. Teachers were given the following rating scale to reply to each statement: Strongly Disagree assigned as SD=1, Disagree assigned as D=2, Undecided assigned as UD=3, Agree assigned as A=4, and Strongly Agree assigned as SA=5 are the five levels of disagreement. Part B included 50 items pertaining to the environment, science and technology, agriculture, art and culture, sports, weather forecasting, and industry, among other topics. Teachers were also asked how many times they had used the activities in their lessons over the previous year. Never-0, Once a Year -1, Twice a Year -2, and three or more times a Year -3, and PartC includes one open-ended question that was meant to elicit more remarks from the teachers about teaching mathematics by incorporating other areas that are commonly used in everyday life. Part-D comprised ten questions about demographic data.

A group of education professionals, including teachers and faculty members from the department of education and training, determined the content and face validity. Items related to mathematics in daily life were teaching ideas developed by secondary level mathematics teachers. Theestimatedreliabilitywere0.86foritemsrelatedtoawarenessmathematicsthrough daily life activities. The data was analysed using descriptive statistics techniques. To calculate frequencies, medians, means, and standard deviations, the data were analysed using the SPSS software. Negative statements had been coded in the other direction. For composite scores, mean values were determined. From the means of the items, the conceptual domains' means and standard deviations were determined.

Secondary school mathematics teachers received questionnaires at their school addresses. A remainder was also provided as a follow-up. It's been two weeks since the initial mailing. For comparison, a random sample of 5% of the non-respondents was chosen. The summated means were used to compare these responses to those of the respondents. On ten randomly

selected items, T-tests revealed no significant differences between the data provided by non-responders and respondents.

5 Results and Discussion

Eighty-two percent of the teachers (n=206) were male, while 18 percent (n=45) were female. The teachers have either a bachelor's degree or a master's degree. More over one third oftheteachers(n=84)hadamaster'sdegree. Adoctoraldegreewasheldbylessthan5%(n=13). Almost half of the teachers in the sample (n=126) worked in rural schools. Approximately onefourth of the teachers (n=63) worked in urban schools, while the other one-fourth (n=63) worked in metropolitan schools.

Teachers of mathematics were generally supportive of including other topics into the curriculum. Ninety-eight percent (n=246) of secondary level school mathematics teachers agreed that incorporating mathematics into other disciplines will benefit the school's curriculum. However, 78 percent of Mathematics teachers (n=196) believe that mathematics can be fun. Any topic matter can be incorporated into it. Other courses' knowledge and daily usage of mathematics, according to mathematics teachers, assist people in making decisions. Fifty-five percent (n=145) agreed that basic knowledge of other subjects is important to make daily decisions. Fifty-five percent of respondents (n=145) believed that having a basic understanding of different areas is necessary for making daily judgments. Teachers of mathematics showed good attitudes on the integration of other disciplines into the school mathematics curriculum, as well as the importance of mathematical knowledge in everyday life (Table 1).

Table 1: Perceptions of mathematics teachers on the topic of awareness of mathematics in daily life, and integration of other subject matter into the curriculum. (N = 251)

Domain	Mean	Standard Deviation
Environmental	3.75	0.44
Science & Technology	3.97	0.39
Agriculture	3.84	0.47
Arts & Culture	3.50	0.64
Sports	3.91	0.38
Forecasting weather	3.65	0.41
Industry	3.57	0.65

Note:- *Scale: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5*

5.1 Environmental awareness

"Environmental awareness would enhance the curriculum (96 percent agreed with this statement)", "There is no time to give environmental-related examples (85 percent disagreed or were neutral)", For elements linked to environmental awareness in mathematics teaching, the mean achieved in this area was 3.75 and the SD was 0.44. The agree on category had mean scores ranging from 3.52 to 4.50. As a result, the majority of mathematics teachers in this study believed that incorporating environmental awareness into the classroom might assist teachers in effectively teaching mathematical topics.

Many people think that it is difficult to find points to integrate environmental education into a mathematics course, but it is just a misconception. However, environmental-related materials can be found in algebra and geometry school mathematics textbooks. Teachers should take advantage of these opportunities to educate students about environmental awareness (Mao, 2014). To explain environmental issues such as pollution increase, wastefulness, resource scarcity, air and water pollution, and electric energy, math problems including simple arithmetic, percentages, ratios, tables, pie charts, and bar graphs are employed (Schwartz, 2010).

5.2 Science & Technology

This domain's mean was 3.97 (SD=0.39). As a result, the mathematics teachers in this study were convinced that having a thorough understanding of science and technology makes it easier to improve mathematics teaching and learning.

Technology is the study of the human-made world, whereas science is the study of the natural world. There is a strong emphasis on problem solving in both science and technology. In science education, mathematics knowledge will assist students in solving problems that are often related to scientific laws and principles, knowledge that the science community has already contributed. Students can discover scientific rules and concepts by engaging with challenges. They observe occurrences, make hypotheses, conduct experiments to test their hypotheses, and draw conclusions. Learning becomes more engaging and exciting for the student as a result of this finding, and is thus more likely to stick. Students participate in solving practical problems in technology education, which is a study of the human-made environment. They plan, build, and assess their solutions (James & Mark, 1994).

5.3 Agriculture awareness

"Basic knowledge of agriculture is important for every mathematics teacher to apply those skills in the teaching of mathematics concepts (89 percent were neutral or agreed);"

"Every mathematics teacher should be integrated into their teaching (88 percent agreed or were neutral)." This domain's mean was 3.84 (SD= 0.47). As a result, the mathematics teachers in this survey felt that agricultural knowledge is vital and that all teachers should be knowledgeable of agriculture in some way.

Many schools and universities have found that scholars enrolled of their agriculture programs are missing of their competencies to carry out mathematically and feature various ability levels. Additionally, many of these students are unable to apply previously learned mathematical skills to real-world, agriculturally significant situations (Mitchell, 2011). Therefore, Mathematics made it a compulsory subject in school education, because one can apply their mathematics knowledge and skills in their future studies and occupations. If a mathematics teacher has profound knowledge in Arithmetic, Algebra, and Geometry can correlate mathematics subject with agriculture.In several areas we applied mathematical skills in agriculture field, such as Dairy production, horticulture, agronomy. In every aspect of the agriculture field we apply maths and its logical skills, such as crop production livestock production Horticulture and financial management. Mathematics knowledge can also apply in line drawings, charts, and graphs of agriculture productions, income and expenditure, etc.

5.4 Arts & Culture

"With Arts and Culture providing possibilities to visualise mathematical thinking and express mathematical thoughts that are possibly complex to comprehend theoretically (85 percent agreed);" "the awareness of Arts and Culture teachers with the view that their awareness might stimulate them to make important and relevant connections (85 percent agreed);" This domain's mean was 3.50 (SD=0.64). As a result, the mathematics teachers in this study concluded that having a good understanding of arts and culture will help them improve their teaching-learning process.

There is a 'historical tradition of connection between mathematics and the arts, and culture (Michelsen, 2005). The two learning domains have a long history of interconnected, with Arts and Culture giving opportunities to represent mathematical reasoning and convey mathematical ideas that are theoretically complicated. On the other side, mathematics can aid in the resolution of key unresolved cultural issues such as global birth control and disease control (Sriraman, 2005). It is therefore critical that these topics be brought to the attention of Arts and Culture teachers in order for them to develop vital and meaningful connections as a result of their increased understanding. Teachers must recognise that there are a variety of opportunities for connecting mathematics and the arts, and culture, and that they can take use

of these opportunities to improve their professional experiences in integrated teaching and learning. In school, arts and culture are an important subject to study. Learning about the arts and culture might help kids realise their full potential in disciplines like mathematics. An exploratory study with teachers in a South African school was done on the connections between mathematics and arts and culture (Dhlamini, 2009). The study found that teachers are still struggling with the concept of integration. Teachers appear to be having difficulty navigating the concept of integrated teaching and learning due to a lack of suitable training and insufficient teacher knowledge.

5.5 Sports

"Mathematics has a very important part in sports (92 percent agreed);" "teaching mathematics in real-life circumstances enhances students' pleasure of mathematics sessions (87 percent agreed or neutral)" are among the items in this domain. This domain's mean was 3.91 (SD= 0.38). As a result, the mathematics teachers in this study felt that incorporating sports knowledge into the teaching of mathematics subjects benefits students' learning.

The first regions in which human beings reflect on consideration on mathematics being implemented are with inside the sciences and engineering. Yet mathematics performs a huge function with-inside the performance of sports activities. Coaches continuously try and locate methods to get the maximum out in their athletes, and from time to time they flip to mathematics for assist. This assist can also additionally encompass the pleasant batting order for a crew to maximise the quantity of runs it is able to score or the setting collectively of a software for an Olympic Skater in order that the jumps the skater makes take gain of the scoring bonus whilst those jumps are finished later in a software whilst tiredness begins off evolved to set in. There also are mathematical troubles concerned in scoring structures for a number of the complicated and subjective factors of scoring sports activities events. Mathematics performs a totally vital function in sports activities. While discussing a player's statistics, a coach's components for drafting sure players, arithmetic is concerned. Even principles which includes the chance of a particular payer or team winning, such case of probability, and maintain equipment are mathematical in nature(Seshlatha, Sujatha, & Swathi, 2016)

Many studies have found that teaching mathematics in real-life situations increases students' appreciation of mathematics classes (Anthony & Walshaw, 2009). Students who are taught in a sporting context may find the task more enjoyable because it differs from repetitive mathematics exercises (Reys, Reys, & Reys, 2013). They claim that connecting mathematics to sports fields can provide a context for measurement, estimation, and tessellation in arithmetic

problems. If students have played a game like basketball, they may be able to use that experience to help them figure out what mathematics is required to answer the problem. Because sports are regularly a part of students' everyday lives (Gallian, 2010), they do not have to deal with a large number of records and are more engaged with the assignments. Students can create the challenge by using their own symbols and sentences before performing additional fixing and interpretation (Barnes & Venter, 2008).

5.6 Forecasting weather

"Modern weather forecasts rely on computers to solve the complex equations that replicate the behaviour of the atmosphere (89 percent agreed);" "Modern weather forecasts rely on computers to solve the complex equations that simulate the behaviour of the atmosphere (89 percent agreed);" "Understanding and describing the weather system necessitates a fundamental understanding of Calculus and Geometry (Cartesian system) (82 percent agreed or were indifferent)." This domain's mean was 3.65 (SD=0.41). As a result, the mathematics teachers in this study concluded that integrating the atmosphere, taking temperature, pressure, and humidity into consideration, would help them better grasp the system. A basic background of Calculus and Geometry is required to comprehend and describe the weather system (Cartesian system).

Can trigonometry, algebra, and numbers save the world? The answer is, without a doubt, yes. Weather predictions are important for predicting when and where extreme weather will occur, while climate projections are important for detecting weather patterns that are changing over time. Thanks to mathematics, our capacity to anticipate weather and climate has improved dramatically in recent decades. Computers are used in modern weather forecasts to solve complex equations that replicate the behaviour of the atmosphere, from global processes that influence the jet stream to local rain clouds (Granthaminstitute, 2016).

Mathematicians play a crucial part in this process, using a set of equations to describe the atmosphere while taking temperature, pressure, and humidity into account. Mathematical models and their associated numerical algorithms, computational non-linear optimization in extremelyhighdimensions, massivedatasethandling, andparallelcomputationareallimportant aspects of weather forecasting. In order to predict the weather, we always need to first establish an understanding of the system. Understanding and explaining the weather system requires a ground understanding of Calculus and Geometry (Cartesian system). The displacement of features in this system drags in Linear algebra and vector calculus, Numerical, Real, Functional, and Complex analysis, and dynamical systems.

5.7 Industry

The following items are included in this domain: "Computational fluid dynamics will be used in aircraft and auto-mobile design (88 percent agreed);" "Geometry will be used in computer-aided engineering and design (93 percent of respondents agreed or were neutral)." This domain's mean was 3.57 (SD= 0.65). As a result, the mathematics teachers in this study were convinced that mathematics is critical to real-world problems such as materials processing, automotive design, medical diagnosis, financial product development, network management, and weather prediction.

The significant range and style of mathematics curricula in business and government. Many one-of-a-kind achievement memories attest to the significant value that mathematics has brought to key real-world challenges such as materials processing, auto mobile design, medical diagnosis, financial product development, network administration, and weather prediction.

The following are the areas of mathematics and their related industries: In the cryptography sector, algebra and number theory will be used. Computational fluid dynamics will be used in the design of aeroplanes and auto-mobiles. Aerodynamics, porous media, and finance will all use differential equations. In Communication and Information Technology, discrete mathematics will be used. Information security; formal logic and systems will be used in computer security and verification; In computer-aided engineering and design, geometry will be used. Non-linear will be used in mechanical and electrical system control, and numerical analysis will be used in almost all applications. Asset allocation, shape, and system design will all be optimised. Weather modelling and forecast, as well as accident simulation, will use parallel algorithms. Statistics will be used in experiment design and massive data analysis, whereas stochastic will be used in processes analysing signals (SIAM, 1998).

6 Findings

1. The majority of mathematics teachers in this study believed that incorporating environmental awareness into the classroom might assist teachers in effectively teaching mathematical topics.
2. The mathematics teachers in this study were convinced that having a thorough understanding of science and technology makes it easier to improve mathematics teaching and learning.
3. The mathematics teachers in this survey felt that agricultural knowledge is vital and that all teachers should be knowledgeable of agriculture in some way.

4. The mathematics teachers in this study concluded that having a good understanding of arts and culture will help them improve their teaching-learning process.
5. The mathematics teachers in this study felt that incorporating sports knowledge into the teaching of mathematics subjects benefits students' learning.
6. The mathematics teachers in this study concluded that integrating the atmosphere, taking temperature, pressure, and humidity into consideration, would help them better grasp the system.
7. The mathematics teachers in this study were convinced that mathematics is critical to real-world problems such as materials processing, automotive design, medical diagnosis, financial product development, network management, and weather prediction.

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