A STUDY OF MATHEMATICAL BELIEFS AMONG SECONDARY SCHOOL TEACHERS

SUMMARY OF DISSERTATION

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SUMMARY

Education is that which serves as the main resource of human development. Education helps us to develop the inherent power of human beings, and change their knowledge, skills and behavior. Education makes a man civilized and a better citizen. In the primitive age, education was a process of exchange of knowledge through guru and disciple. Also, in the primitive age, education was knowledge-centered as the Guru's duty was to only inform and instruct. The disciples used to follow all the orders of the Guru and also followed all the rules of the Guru Kul or Ashram, but in the present day education means the process of learning and teaching and to bring out the inner potential of the children and the all-round development of the learner. All round development means mental, physical, moral, social and spiritual and development of the learners. Philosophers, sociologists, psychologists and scientists play an important role in explaining the form of education process and define their approach to education. Education transforms the Culture, beliefs and values of our society from one generation to another and every subject has its own importance in our daily life and mathematics is one of them.

The basis of a mathematical discipline is our sense organs and includes one's language, mathematical terms, mathematical concepts, formulas, and principles. It helps us to understand to develop inductive, deductive and generalizing power or abilities in the learners. It helps in developing confidence and self- reliance in the learners and provides scientific approach to solve any mathematical problem among the learners. It helps in inculcating the characteristics of morality along with discipline and character building in the learners. It provides an opportunity for developmental abilities and to relate to important, abstract and coherent structures. The study of mathematics develops observation power, logical power, decision-making power, thinking and reasoning power, concentration, memory and hardworking in the learners. So the imagining life without mathematics is the same as imaginary life. If we understand the concept of mathematics completely, then beliefs play an important role in the path of success, therefore the beliefs about mathematics are necessary for learners and teachers.

The reason this research is needed is that although there has been much research on mathematical beliefs in general and there has been very little done on the mathematical

beliefs of secondary school teachers and no research was found on the mathematical beliefs of secondary school teachers of CBSE and U.P. Board.

Research Questions: The following were the research questions of the study-

1. What are the levels of mathematical beliefs of secondary school teachers of CBSE and

   U.P. Board?

2. What are the levels of mathematical beliefs of secondary school teachers of CBSE and U.P. Board with respect to gender, teaching experience and educational qualification?

3. Is there any difference in mathematical beliefs of secondary school teachers of CBSE and U.P. Board?

4. Do the mathematical beliefs of secondary school teachers of CBSE and U.P. Board are affected by their gender, teaching experience and educational qualification?

5. Is there any association between gender and mathematical beliefs of secondary school teachers of CBSE and U.P. Board respectively?

6. Is there any association between teaching experience and mathematical beliefs of secondary school teachers of CBSE and U.P. Board respectively?

7. Is there any association between educational qualification and mathematical beliefs of secondary school teachers of CBSE and U.P. Board respectively?

8. Is there any association between gender and teaching experience of secondary school teachers of CBSE and U.P. Board-wise with respect to their mathematical beliefs?

9. Is there any association between gender and educational qualification of secondary school teachers of CBSE and U.P. Board-wise with respect to their mathematical beliefs?

10. Is there any association between teaching experience and educational qualification of secondary school teachers of CBSE and U.P. Board-wise with respect to their mathematical beliefs?

Objectives: The researcher had constructed following objectives for the present study-

1. To explore the levels of mathematical beliefs of secondary school teachers of CBSE and U.P. Board.
2. To explore the levels of mathematical beliefs of secondary school teachers of CBSE with respect to their gender, teaching experience, and educational qualification.
3. To explore the levels of mathematical beliefs of secondary school teachers of U.P. Board with respect to their gender, teaching experience, and educational qualification.
4. To study the mathematical beliefs of secondary school teachers of CBSE and U.P. Board.
5. To study the mathematical beliefs of secondary school teachers with respect to their gender, teaching experience, and educational qualification.
6. To study the mathematical beliefs of secondary school teachers of CBSE with respect to their gender, teaching experience, and educational qualification.
7. To study the mathematical beliefs of secondary school teachers of U.P. Board with respect to their gender, teaching experience, and educational qualification.
8. To study the association between gender and mathematical beliefs among secondary school teachers.
9. To study the association between gender and mathematical beliefs among secondary school teachers of CBSE.
10. To study the association between gender and mathematical beliefs among secondary school teachers of U.P. Board.
11. To study the association between teaching experience and mathematical beliefs among secondary school teachers.
12. To study the association between teaching experience and mathematical beliefs among secondary school teachers of CBSE.
13. To study the association between teaching experience and mathematical beliefs among secondary school teachers of U.P. Board.

14. To study the association between educational qualification and mathematical beliefs among secondary school teachers.

15. To study the association between educational qualification and mathematical beliefs among secondary school teachers of CBSE.

16. To study the association between educational qualification and mathematical beliefs among secondary school teachers of U.P. Board.

17. To study the association between gender and teaching experience of secondary school teachers with respect to their mathematical beliefs.

18. To study the association between gender and teaching experience of secondary school teachers of CBSE with respect to their mathematical beliefs.

19. To study the association between gender and teaching experience of secondary school teachers of U.P. Board with respect to their mathematical beliefs.

20. To study the association between gender and educational qualification of secondary school teachers with respect to their mathematical beliefs.

21. To study the association between gender and educational qualification of secondary school teachers of CBSE with respect to their mathematical beliefs.

22. To study the association between gender and educational qualification of secondary school teachers of U.P. Board with respect to their mathematical beliefs.

23. To study the association between teaching experience and educational qualification of secondary school teachers with respect to their mathematical beliefs.

24. To study the association between teaching experience and educational qualification of secondary school teachers of CBSE with respect to their mathematical beliefs.

25. To study the association between teaching experience and educational qualification of secondary school teachers U.P. Board with respect to their mathematical beliefs.

Concomitant Objective

Construct and standardize the tool on mathematical beliefs for secondary school teachers.

Research Hypotheses: The researcher formulated the following research hypotheses-

H_{R1}: There is significant difference between mathematical beliefs of secondary school teachers of CBSE and U.P. Board.

H_{R2}: There is significant difference between mathematical beliefs of secondary school teachers with respect to their gender, teaching experience, and educational qualification.

H_{R3}: There is significant difference between mathematical beliefs of secondary school teachers of CBSE with respect to their gender, teaching experience, and educational qualification.

H_{R4}: There is significant difference between mathematical beliefs of secondary school teachers of U.P. Board with respect to their gender, teaching experience, and educational qualification.

H_{R5}: There is significance association between gender and mathematical beliefs among secondary school teachers.

H_{R6}: There is significance association between gender and mathematical beliefs among secondary school teachers of CBSE.

H_{R7}: There is significance association between gender and mathematical beliefs among secondary school teachers of U.P. Board.

H_{R8}: There is significance association between teaching experience and mathematical beliefs among secondary school teachers.

H_{R9}: There is significance association between teaching experience and mathematical beliefs among secondary school teachers of CBSE.

H_{R10}: There is significance association between teaching experience and mathematical beliefs among secondary school teachers of U.P. Board.

H_{R11}: There is significance association between educational qualification and mathematical beliefs among secondary school teachers.

H_{R12}: There is significance association between educational qualification and mathematical beliefs among secondary school teachers of CBSE.

H_{R13}: There is significance association between educational qualification and mathematical beliefs among secondary school teachers of U.P. Board.

H_{R14}: There is significance association between gender and teaching experience of secondary school teachers with respect to their mathematical beliefs.

H_{R15}: There is significance association between gender and teaching experience of secondary school teachers of CBSE with respect to their mathematical beliefs.

H_{R16}: There is significance association between gender and teaching experience of secondary school teachers of U.P. Board with respect to their mathematical beliefs.

H_{R17}: There is significance association between gender and educational qualification of secondary school teachers with respect to their mathematical beliefs.

H_{R18}: There is significance association between gender and educational qualification of secondary school teachers of CBSE with respect to their mathematical beliefs.

H_{R19}: There is significance association between gender and educational qualification of secondary school teachers of U.P. Board with respect to their mathematical beliefs.

H_{R20}: There is significance association between teaching experience and educational qualification of secondary school teachers with respect to their mathematical beliefs.

H_{R21}: There is significance association between teaching experience and educational qualification of secondary school teachers of CBSE with respect to their mathematical beliefs.

H_{R22}: There is significance association between teaching experience and educational qualification of secondary school teachers U.P. Board with respect to their mathematical beliefs.

Operational Definitions of the Terms

Mathematical Beliefs – Mathematical beliefs refer to a highly personalized mental construct that is developed by prior own experiences about mathematics, through communication with others and upgraded by the environment.

Secondary Schools Teachers- In the present study, secondary schools teachers are defined as those teachers who are teaching in class 9^{th} and 10^{th} of CBSE and U.P. Board.

Delimitation of the Study

This study has been limited as follows-

1. Present study was restricted to the secondary school teachers of U.P. Board and CBSE.
2. Present study was restricted to Lucknow city.
3. Present study was limited to know the mathematical beliefs of secondary school teachers.

Method of the Study:

Type of the Research: The nature of the present study was descriptive survey research.

Research Design: The research design adopted for the present study is cross sectional survey design.

Population of the Study: Population was defined as the secondary schools teachers of CBSE and U.P. Board of Lucknow city.

Sample: 80 secondary schools teachers of CBSE and U.P. Board were chosen as the sample of present study.

Sampling Technique: Researcher used Purposive Sampling technique to identify the schools and teachers.

Variables of the Study:

Independent Variable

1. Board of the institutions (U.P. Board and CBSE)
2. Gender
3. Teaching Experience
    a) Below 5 years (beginning teachers)

b) From 5 to 10 years (middle teachers), and
c) Above 10 years (veteran teachers)

4. Educational qualification
   a) Bachelor's degree (U.G)
   b) Master's degree (P.G)

Dependent Variable: Mathematical Beliefs (MB)

Tool of the Study:

Teachers Mathematical Beliefs Scale (TMBS) - It was constructed and standardized by the researcher with the help of experts' opinion.

Statistics used in the Study

To test the null hypotheses of independent distribution, the Mann-Whitney U-Test, Kruskal-Wallis H-Test and Chi-Square Test were used to analysis the data.

Findings of the Study:

Finding-1: It was found that the percentage of the secondary school teachers of CBSE on the scores of mathematical beliefs is higher than the percentage of the secondary school teachers of U.P. Board.

Finding-2: It was found that the percentage of the secondary school teachers of CBSE on the scores of mathematical beliefs is nearly equal to the percentage of the secondary school teachers of U.P. Board with respect to gender, their teaching experiences and their educational qualification.

Finding-3: Secondary school teachers of CBSE were found to have better mathematical beliefs than U.P. Board teachers of secondary level.

Finding-4: It was found that secondary school teachers have similar mathematical beliefs with respect to their gender, teaching experiences and educational qualification.

Finding-5: It was found that there is no difference in mathematical beliefs of secondary school teachers of U.P. Board with respect to their gender, teaching experiences and educational qualification.

Finding-6: It was found that there is no association between gender and mathematical beliefs among secondary school teachers.

Finding-7: It was found that there is no association between gender and mathematical beliefs among secondary school teachers of CBSE Board.

Finding-8: It was found that there is no association between gender and mathematical beliefs among secondary school teachers of U.P. Board.

Finding-9: It was found that that there is no association between teaching experiences and mathematical beliefs among secondary school teachers.

Finding-10: It was found that that there is no association between teaching experiences and mathematical beliefs among secondary school teachers of CBSE.

Finding-11: It was found that that there is no association between teaching experiences and mathematical beliefs among secondary school teachers of U.P. Board.

Finding-12: It was found that that there is no association between educational qualification and mathematical beliefs among secondary school teachers.

Finding-13: It was found that that there is no association between educational qualification and mathematical beliefs among secondary school teachers of CBSE Board.

Finding-14: It was found that that there is no association between educational qualification and mathematical beliefs among secondary school teachers of U.P. Board.

Finding-15: It was found that there is no association between gender and teaching experience of secondary school teachers with respect to their mathematical beliefs.

Finding-16: It was found that there is no association between gender and teaching experience of secondary school teachers of CBSE with respect to their mathematical beliefs.

Finding-17: It was found that there is no association between gender and teaching experience of secondary school teachers of U.P. Board with respect to their mathematical beliefs.

Finding-18: It was found that there is no association between gender and educational qualification of secondary school teachers with respect to their mathematical beliefs.

Finding-19: It was found that there is no association between gender and educational qualification of secondary school teachers of CBSE Board with respect to their mathematical beliefs.

Finding-20 It was found that there is no association between gender and educational qualification of secondary school teachers of U.P. Board with respect to their mathematical beliefs.

Finding-21: It was found that there is no association between teaching experience and educational qualification among secondary school teachers with respect to their mathematical beliefs.

Finding-22: It was found that there is no association between teaching experiences and educational qualification among secondary school teachers of CBSE with respect to their mathematical beliefs.

Finding-23: It was found that there is no association between teaching experiences and educational qualification among secondary school teachers of U.P. Board with respect to their mathematical beliefs.

Educational Implications of the Study:

For Learners

We study that mathematical beliefs are those that lead to beliefs about the nature of mathematics, teaching mathematics, and learning mathematics. Students apply and develop various values in their lives if they clearly know the concept of mathematical assumptions that mathematics is what activates the mind of the learners and develops intellectual abilities. If a student is faced with a mathematical problem, then the mental work of solving that problem and understanding the problem also starts. Every math problem occurs sequentially which is essential for a creative and creative process. It emphasizes the development of the learner's observation power, logical power and concentration, originality, search power, thinking and reasoning power, hard work, problem-solving skills and creative and

critical thinking. It helps the learners to understand and explain the function of daily life, like the house, market etc. Without its knowledge, we cannot run our family smoothly. It emphasizes understanding and explaining the measurements and calculations of the learners. The use of mathematics becomes necessary after waking up in the morning and before going to sleep at night, it also imports qualities like seriousness, discretion and contemplation in the personality. Interest and seriousness towards mathematics in students can arise only when the teacher is serious and they also have full knowledge of the importance of mathematics and at the same time they have a high level of mathematical confidence. If the mathematical confidence of the teachers is low, then they cannot inculcate interest and seriousness towards mathematics in their students. Many researchers found that there is the direct relationship between teachers' mathematical beliefs and beliefs of students towards mathematics and students' achievement in mathematics.

This research will provide the mathematics education community with information on how to create a better plan for teaching-learning by incorporating a teacher's mathematical beliefs in an appropriate and coherent manner with a good lesson plan that negatively impacts the teaching of mathematical content. Don't impress. Thus teachers will be able to teach their students mathematical assumptions that will help them become more successful students of mathematics now and in the future. However, without research into how student beliefs are formed and how they affect and change, this goal of positively influencing student learning would not be possible.

Therefore, this research will be fruitful for the students to make their bright future in the field of mathematics.

For Teachers:

Teachers should teach in a way that builds confidence and competence in the students. This, in part, requires a teacher who is knowledgeable and enthusiastic about the subject and has appropriate pedagogical knowledge. It should be noted that the ability to create a classroom environment conducive to promoting self-efficacy and cognitive development depends greatly on the teacher's self-efficacy. Therefore teachers should use multiple cognitive and metacognitive learning strategies in the classroom so that their teaching becomes enjoyable and informative for students. For this, it is necessary

that the mathematical confidence of the teachers should be of high level. To take the mathematical confidence of the teachers to a higher level, adequate facilities should be provided by the institutions to the teachers so that the students can benefit and their achievement can be high.

Therefore, high achievement in mathematics for students is directly affected by the mathematical belief of the teachers. Teachers' educational experience, gender educational qualification also affects their belief in some way which makes them effective teachers. For the high achievement of students in mathematics, it is necessary that the students have knowledge about mathematical beliefs and this information can be given to the students by the teacher in the right way.

Group education is needed for some low achievers. These students feel more comfortable speaking in small groups. In groups, students can receive emotional support and academic support. More structured group activities reduce math anxiety, students with high math anxiety do not rely on themselves to obtain math answers, often prefer not to work alone, and do not necessarily enjoy discovery learning. So by using peer learning strategy students feel more comfortable and enhance their learning.

Teachers should help students store information in long-term memory by creating internal connections between the objects they learn, then helping them achieve their goals. To fulfill this objective, it is first necessary that teachers should have sufficient knowledge of their mathematical beliefs. When their mathematical confidence is of a high level, then only they will be able to generate interest in mathematics in the students. For this, it is necessary that teachers should be given adequate training to increase their mathematical confidence and they should be made aware of the new research happening so that they can become aware of new methods of teaching mathematics.

Therefore, there is a need to do research on the mathematical belief of teachers so that students can develop an interest in mathematics and self-confidence can be developed in them. This study will also help teachers to properly implement the curriculum and constructivist practice.

The current study recommends that more research should be done in this area, and this study can be used to guide further research for more successful ways of capturing student and teacher beliefs.

Suggestions for further Research:

Meaningful research always provides reason and paves the way for further investigation. Also, each investigator may feel motivated to do more research after completing the work with the own efforts.

Therefore, on the basis of findings, observations and subsequent conclusion of this research, the following suggestions are made by the researcher for further work.

1. The present study was confined only to Lucknow city, so it cannot claim to have comprehensiveness. Conclusions may not be universally valid. It is therefore suggested that study may be conducted on other cities and states also to establish the results fairly.
2. The study was conducted only on 80 teachers of secondary school. It may be conducted on the primary teachers and on the higher education teachers.
3. The study was conducted only on 80 teachers of secondary school. It may be conducted on the large sample of students also.
4. In the present study the sample taken was rather small. The study may be carried out with a large sample to make broader generalizations.
5. More psychological variables could be included in the study as the present study is confined to few variables such as mathematical beliefs and secondary school teachers.

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