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Factors affecting on teaching of mathematics subject at secondary school level

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Keywords

Mathematics, problems, attitude, mathematical aptitude, teaching aptitude, etc

Abstract

The present study reveals the problems and difficulties faced by students in learning Mathematics and problems faced by mathematic teachers in mathematics subjects at School Level in different taluks of Gulbarga District. The problems and difficulties are categorized into personal problems, emotional problems, language problems, problems on teacher's instruction, problems with school facilities and infrastructure and problems arising from over- workloads/ extracurricular activities in schools. During the course of the study, it was found that there are certain issues pertaining to the process of teaching and learning Mathematics that needs to be judiciously redressed. Lack of adequate attitude towards mathematics & teaching aptitude from both students and teachers in learning & teaching Mathematics is a major factor which discourages students into learning the subject. They were taught Mathematics from examination point of view while the core issue, i.e. to conceptualize the subject is being neglected and therefore the student's perception of the subject is being diverted. They now think that Mathematics would mean just calculation and is all about memorizing formulae and thereby conclude that the subject is dull, difficult and complicated as revealed by the respondents in the survey, as such, less number of students are willing to continue Mathematics in higher studies.

Introduction

"Education is the most powerful weapon which you can use to change the world". The teacher plays a prominent role in the life of students. The teacher show path towards success and enrich the personality of their students by imparting ethical and academic knowledge, act as the guide for life and bring out the wide talents of their students and sharpen it in order to bring out best results. For the complete development of the child, the man focus of teaching should be to bring out desirable changes in the behavior of the learner. These changes can bring out only using appropriate teaching strategies.

According to secondary Education commission (1965), "Even the best curriculum and perfect syllabus remain dead unless quickened into life by the right methods of teaching and right kinds of teacher"

According to ball (1988), interact with their assumptions and explicit beliefs about teaching and learning about the context to shape the ways in which they teach learners mathematics.

Mathematics is often called queen of all science subjects. Mathematics is now a language, a way of life. Mathematics today is working as tools and techniques because of which Mathematisation in the sciences including Social science is taking place.

Significance of the study

Factors affecting on teaching of mathematics subjects and teaching performance could be improved with addressing knowledge, attitude, skill, belief and attitude towards mathematics. All these have their significant role to enhance to reduce the factors affecting on teaching mathematics and the teaching on students performance .With their relationship, it can support the way of teaching style by managing the process in the sense that focuses on determining the factors in influencing the teaching performance.

As a result, the value has a direct positive effect on mathematics performance among students with an approach that right attitude towards mathematics, and good teaching aptitude as affective ability in effective learning of mathematics among students. Effective mathematics teaching by teachers enables learners to obtain high mathematical achievement in the sense that both commitment and interest with the general understanding can be integrated with understanding and mastering content, which have a positive relationship with teaching performance.

In this view, this study aims to explore the model development of what kind of factors can influence mathematics teachers' work performance. This study will focus on factors, attitude towards mathematics and teaching aptitude which are considered to be more dominant in influencing mathematics teachers' work performance on student's academic achievement in Secondary schools level in Gulbarga District.

Statement of the problem: - "Factors affecting on teaching of mathematics subject at secondary school Level"

Operational definition of the term used

Factors: - Those **factors** in **teaching** and learning **mathematics**, are divided into three sub categories: Demographic **Factors** (gender, socio-economic status, parent's educational level), Instructional **Factors** (**teacher** competency, instructional strategies and techniques, curriculum, school context and facilities), and Individual

Teaching aptitude: - Teaching aptitude is the capacity to acquire proficiency with a given amount of training in teacher education. It refers to the capacity of an individual to be skilled in teaching by receiving formal or informal training.

"Mathematical Aptitude is the specific ability as represented by the mathematical aptitude tests that have been standardized to prove its effectiveness in predicting success in mathematics and allied areas".

Achievement test in mathematics: A **mathematics achievement test** is one which is designed to measure knowledge understanding or skill in specified subject or group of subjects. Before constructing the **Mathematics achievement test**, investigator analyses the various **tests** available for **testing** in the field of **Mathematics.**

Higher Secondary School Students: Education after secondary education is said to be higher secondary education. Higher secondary education is for a period of 2 years. By the term 'higher secondary students'.

Objectives of the study

Major Objectives:

I (i) To determine the factors affecting on learning mathematics subject at secondary school students of Gulbarga District.
I(ii) To study the factors affecting on teaching mathematics subject at secondary school level among mathematics teachers of Gulbarga District.
II(i). To study the significant differences in Attitude towards mathematics among secondary school students.(with reference to gender, locality, type of schools and medium of instruction)
II (ii). To study the significant differences in attitude towards mathematics among secondary school mathematics teachers.(with reference Gender, locality, Education qualification & type of schools.)
III (i). To study the significant differences in Mathematical aptitude test among secondary school students. (With reference to gender, locality, type of schools and medium of instruction)
III (ii). To study the significant differences in teaching aptitude among secondary school mathematics teachers.(with reference Gender, locality, Education qualification & type of schools.)
IV). To study the significant differences in achievement in mathematics between secondary school students. (With reference to gender, locality, type of schools and medium of instruction)

Hypothesis of the study

I (i)) There is no significant difference the factors affecting on learning mathematics subject at secondary school students of Gulbarga District.
I(ii)) There is no significant difference the factors affecting on teaching mathematics subject at secondary school level between mathematics teachers of Gulbarga District.
II(i)). There is no significant difference in Attitude towards mathematics among secondary school students.
II (ii)). There is no significant difference in attitude towards mathematics among secondary school mathematics teachers.
III (i)). There is no significant difference in Mathematical aptitude test among secondary school students.
III (ii)). There is no significant difference in teaching aptitude among secondary school mathematics teachers.
IV). There is no significant differences in achievement in mathematics between secondary school students.

Method of study/Design of study

For the present study, the descriptive or normative survey research was used. The main purpose of the present study was to find out factors affecting on teaching of mathematics subject at secondary school level" in Gulbarga District and to find out the influence of different levels of factors (students and teacher) ,attitude towards mathematics(for students & teachers) and Teaching aptitude (for students & teacher) on Mathematical achievement test among secondary school level students in Gulbarga District.

Population and sample

So that the investigator under his investigation chosen 100 higher secondary school of both from rural and urban areas of Gulbarga District, and each selected school 05 students have been selected for data collection. And each selected school 01 mathematics teacher and from each school 5 students wereselected for data collection.

Variables undertaken in the study

The following variables were taken into consideration -

(A) Independent or stimulus variable:
(i) Achievement in Mathematic (Mathematical Achievement test (MAT)

(**B) Dependent or response variables**: The dependent variable's values depend upon the value of the independent variables. In the present study the investigator has taken the following three factors as dependent variable:
(i) Factor affecting on teaching of mathematics for teacher and Factors for affecting on learning by for students
(ii) Attitude towards mathematics (for Students and Teachers)
(iii) Teaching aptitude for teachers & Mathematical Aptitude for students.

(c) Moderate variables: In the present study, following are considered as moderate variables in the study:

For Students	For Teachers
i. Gender	i. Gender
ii. Locality	ii. Locality
iii. Type of school	iii. Type of School
iv. Medium of instruction.	Iv. Qualification

Tools to be used

(i) Attitude scales towards mathematics (for students) (2003): Prepared and standardized by R.Yashodha, Department of Education, Sri Venkateshwar University, Tirupati, Andra Pradesh. This tool consists of 42.The intrinsic validity of this scale is 0.896. The spilt half reliability coefficient of this scale is R_{ht} = **0.802**, the reliability coefficient of this whole scale is R_w = **0.670. Scoring procedure:** This tool consists of 43 statements (19 positive and 24 negative statements) having five alternatives i.e Strongly Agree, Agree, Undecided, disagrees, and strongly disagrees.

(ii) Attitude scale towards mathematics (for Teachers) (2003): Prepared and standardized by R.Yashodha, Department of Education, Sri Venkateshwar University, Tirupati, Andra Pradesh. The intrinsic validity of this scale is 0.884. The spilt half reliability coefficient of this scale is R_{ht} = 0.64, the reliability coefficient of this whole scale is R_w = 0.781.

Scoring procedure: This tool consists of 43 statements (19 positive and 24 negative statements) having five alternatives i.e Strongly Agree, Agree, Undecided, disagrees, and strongly disagrees.

(iii) Mathematical aptitude test (MAT)(For students):-By Dr. (Mrs.) Sativa Rawat, &, D.A.V.(P.G.) Mathematical aptitude is a specific ability of a person to tackle the logical, intellectual, abstract or any other practical problem of day to day life. MAT is a questionnaire having 35 items in all. The coefficient of correlation was calculated using Karl Pearson method, The reliability calculated by using Spilt Half method and applying spearman Brown Formula was r_{11} =0.97 which is considerably a high value of reliability of constructed Mathematical Aptitude Test(MAT) Thus the MAT test constructed by the researcher is found to possess a very high validity

(iv) Teaching aptitude test (TAT-GR (35 items):-Prepared by Dr S.G:-

Test-retest method was used for finding reliability on a sample of 40 trainees Reliability co-efficient was found to be. 76. Validity was found out by correlating the scores of teaching Aptitude Test with that of Shah's Teaching Aptitude Test on

a sample of 40 trainees. Validity co-efficient was found out to be. 68.Scoring Four alternative answers have been given for each statement and only on answer is correct, which can be find out with the help of Scoring Key given in Table 3.3. Each correct answer carries 1 (one) mark.

(v) :-Mathematical achievement test prepared and standardized by Dr.Ali lmam and Dr.Tahira Khatoon In this tool /test 60 items or question about achievement in mathematics have been given. **Reliability:-** Reliability is the most fundamental quality which any measuring instrument should possess. The correlation coefficient thus, obtained was 0.89 which when correlated by spearman-Brown prophecy formula increased to 0.94 yet another formula. The estimates of reliability by this formula yield a coefficient of correlation of 0.92. **Validity: -** The major types of validity are content validity and construct validity. Content validity is based on a careful comparison of the items to the definition of the domain being measured.

Procedure of data collection

For the purpose of data collection, the researcher selected few schools from Gulbarga district. The investigator explained the purpose of research to the head master/class teacher and they were very willing to Co-Operate. The VIII and IX standard students were asked to sit comfortably and instructions were given to them on how to go with tools. In the meanwhile, they were eager to motivate and pursued to give honest and frank response. The data from each mathematics teacher from each school were collected individual, total 100 mathematics teachers were selected for the purpose of data collection from selected five talukas, in each taluka 20 mathematics teachers were selected.

Statistical techniques used

The scores obtained from different tools used for the present study were analyzed statistically. Simple percentage, “t” test and Anova test were used for analysis and interpretation of data.

Analysis and interpretation of data

Table No 1.:-Problems faced by secondary school students in learning Mathematical subject

Sr.No	Items/problems area	Responses		
		YES	Cannot say	No
1.	Mathematical formulae	295(59%)	106(21.20%)	99(19.80%)
2.	Mathematical Concept	339(67.8%)	80(16%)	81(16.2%)
3.	Mathematical Problem solving	316(63.20%)	84(16.80%)	98(19.6%)
4.	Mathematical Text book	324(64.8%)	86(17.2%)	88(17.6%)
5.	Home work in mathematics	325(65%)	95(19%)	90(18%)
6.	learning Geometry	316(63.2&)	99(19.8%)	86(17.2%)
7.	Teaching/teachers problems	329(65.80%)	93(18.60%)	78(13.60%)
8.	Due to their Personal problems.	328(65.60%)	92(18.4%)	80(16%)

It clearly indicates that for the problems of understanding the Mathematical formulae related concept, out of 500 randomly selected school student’s.

1. It clearly infers that majority of students (59%) of students facing the problems of understanding the Mathematical formulae in learning the mathematics.

2. It clearly infers that majority of students (67.8%) of students facing the problems of understanding the Mathematical concept in learning the mathematics.
3. It clearly infers that majority of students (67.8%) of students facing the problems of understanding the Mathematical concept in learning the mathematics.
4. It clearly infers that majority of students (64.08%) of students facing the problems of understanding the mathematical text book.
5. it clearly infer that majority of students (65%) of students facing the problems of Home work in mathematics.
6. it clearly infer that majority of students (65%) of students facing the problems of Geometry.
7. it clearly infer that majority of students (65.80%) of students facing the problems of teaching/teachers problems.
8. it clearly infer that majority of students (65.60%) of students facing the problems Personal.

Table No 2: Problems faced by secondary school mathematics teacher in teaching Mathematics

Sr.No	Items/problems area	Responses		
		YES	Cannot say	No
1.	Mathematical formulae	57.33%	17.66%	25%
2.	Mathematical Concept	54.25%	16%	28.5%
3.	Mathematical Problem solving	47.33%	14.33%	38.33%
4.	Mathematical Text book	49%	15.28%	35.71%
5.	learning Geometry	58.5%	16.5%	25%
6.	Teaching/teachers problems	50.12%	14.5%	34.12%
7.	Due to their Personal problems.	53.6%	14.3%	32.1%

1. It clearly infer that majority of mathematic teachers (57.33%) of facing the problems of teaching Mathematical formulae.
2. It clearly infers that majority of mathematic teachers (54.25%) of facing the problems of teaching Mathematical concept.
3. It clearly infers that majority of mathematic teachers (47.33%) of facing the problems of teaching mathematical problem solving to their students.
4. It clearly infer that majority of mathematic teachers (49%) of facing the problems of teaching mathematical text book.
5. It clearly infer that majority of mathematic teachers (58.5%) of facing the problems of teaching Geometry.
6. It clearly infers that majority of mathematic teachers (50.12%) of facing the problems of teaching mathematics due to their poor methodology.
7. It clearly indicates that majority of Mathematics teachers 53.65% the facing the problem of the student is not able to allot more time for doing mathematics.

Table No 3: Mean, standard deviation and t values of attitude towards mathematics among boys and girls higher secondary school students in Gulbarga District.

Sr.No	Variable	N	M	Sd	Variable	N	M	SD	T value
1.	Boys	230	151.964	154.18	Girls	270	157.682	28.832	0.55
2.	Rural	250	146.934	38.60	Urban	250	160.774	14.8348	5.29
3.	Kannada	335	152.57	30.93	English	165	160.99	15.61	4.04

4 Type of Schools	**Teacher attitude towards mathematics**	**Sum of Squares**	**Df**	**Mean Square**	**F value**	**Sign**
	Between Group	74,351.910	2	37,175.955	44.191	Significant
	Within Group	418,100.485	497	841.248		
	Total	492,452.394	499			

1. There is no significant difference exist in Attitude towards Mathematics scale among higher secondary school boy & Girl students of Gulbarga district is accepted.
2. There is significant difference exist in Attitude towards Mathematics scale among higher secondary school rural & urban students of Gulbarga district is not accepted and alternative hypothesis is accepted.
3. There is significant difference exist in attitude towards mathematics among higher secondary school Kannada & English medium students of Gulbarga district is not accepted and alternative hypothesis is accepted.
4. It is inferred that there is significant differences in the scores of attitude towards mathematics among Government, Aided and Unaided secondary school of students of Gulbarga district Therefore the above Research hypothesis is rejected and alternative hypothesis is accepted.

Table No 4:-MeaN,Sd, t and f values of attitude towards mathematics among higher secondary school Mathematics teachers

Sr.No	Variable	N	M	Sd	Variable	N	M	SD	T value
1.	Male	50	178.98	8.53	Female	50	176.80	11.11	1.10
2.	Rural	50	175.25	11.32	Urban	50	181.8	9.09	3.19
4.	Degree	50	175.20	10.86	PG	50	182.80	8.97	3.81

3 Type of Schools	**Teacher attitude towards mathematics**	**Sum of Squares**	**Df**	**Mean Square**	**F value**	**Sign**
	Between Group	1,376.293	2	688.147	7.855	Significant
	Within Group	8,497.760	97	87.606		
	Total	9,874.054	99			

1. There is no significant difference in Attitude towards Mathematics scale among higher secondary school male & female Mathematics teacher of Gulbarga district.
2. There is significant difference exist in Attitude towards Mathematics scale among higher secondary school rural & urban Mathematics teacher of Gulbarga district.
3. There is significant differences in the scores of attitude towards Mathematics scale among Government, Aided and Unaided secondary school of Mathematics teacher of Gulbarga district
4. There is significant difference exist in attitude towards mathematical scale among higher secondary school Graduate & Postgraduate qualified Mathematics teacher of Kamlapur Taluka in Gulbarga district.

Table No 5: Mean, standard deviation, t And F values of mathematical aptitude among higher secondary school students in Gulbarga District.

Sr.No	Variable	N	M	Sd	Variable	N	M	SD	T value
1.	Boys	230	21.73	7.77	Girls	270	25.16	7.60	2.22
2.	Rural	250	23.89	7.60	Urban	250	24.89	7.42	0.66
3.	Kannada	335	23.53	8.18	English	165	26.31	7.46	3.79

4 Type of Schools	**Teacher attitude towards mathematics**	**Sum of Squares**	**Df**	**Mean Square**	**F value**	**Sign**
	Between Group	4,378.070	2	2,189.035	44.191	Significant
	Within Group	26,116.889	497	52.549		
	Total	30,494.959	499			

1. There is significant difference Mathematical aptitude test among higher secondary school boy & Girl students of Gulbarga district.
2. There is no significant difference exist in Mathematical aptitude test among higher secondary school rural & urban students of Gulbarga district.
3. There is significant difference in the scores of Mathematical aptitude test among Government, Aided and Unaided secondary school of students of Gulbarga district.
4. There is significant difference exist in Mathematical aptitude test among higher secondary school Kannada & English medium students of Gulbarga district.

Table No 7:- Mean, standard deviation, t and F values of teaching aptitude among higher secondary school mathematic teachers in Gulbarga District.

Sr.No	Variable	N	M	Sd	Variable	N	M	SD	T value
1.	Male	50	27.65	3.40	Female	50	24.56	7.10	2.77
2.	Rural	50	25.66	4.18	Urban	50	26.75	3.62	1.39
4.	Degree	50	26.13	4.19	PG	50	26.37	3.61	0.30

3 Type of Schools	**Teacher attitude towards mathematics**	**Sum of Squares**	**Df**	**Mean Square**	**F value**	**Sign**
	Between Group	269.159	2	134.580	11.74	Significant
	Within Group	1,168.298	97	12.044		
	Total	1,437.458	99			

1. There is significant difference exist in Mathematical aptitude test among higher secondary school male & female Mathematics teacher of Gulbarga district.
2. There is no significant difference exist in Mathematical aptitude test among higher secondary school rural & urban Mathematics teacher of Gulbarga district.
3. There is a significant difference in the scores of Mathematical aptitude test among Government, Aided and Unaided secondary school of Mathematics teacher of Gulbarga district.
4. There is no significant difference exist in Mathematical aptitude test among higher secondary school Graduate & Post Graduate Mathematics teacher of Gulbarga district.

Table No 8:- Mean, Sd, t and F values of mathematical achievement among Secondary school students in Gulbarga District.

Sr.No	Variable	N	M	Sd	Variable	N	M	SD	T value
1.	Boys	230	36.25	7.906	Girls	270	37.64	8.036	0.86
2.	Rural	250	35.426	8.796	Urban	250	38.98	6.866	2.25
3.	Kannada	335	35.72	8.456	English	165	39.21	6.516	5.16

4 Type of Schools	**Teacher attitude towards mathematics**	**Sum of Squares**	**Df**	**Mean Square**	**F value**	**Sign**
	Between Group	**1,119.402**	**2**	**559.701**	**8.970**	Significant
	Within Group	**31,010.441**	**497**	**62.395**		
	Total	**32,129.843**	**499**			

1. There is no significant difference exist in Mathematical achievement test among higher secondary school boy & Girl students of Gulbarga district.
2. There is significant difference exist in Mathematical achievement test among higher secondary school rural & urban students of Gulbarga district.
3. There is significant difference in the scores of Mathematical achievement among Government, Aided and Unaided secondary school of students of Gulbarga district.
4. There is significant difference exist in Mathematical achievement test among higher secondary school Kannada & English medium students of Gulbarga district.

Suggestive measures for students and teachers for effective learning and teaching mathematics:

Based on the findings as depicted in the bar diagram above, the investigator made the following suggestive measures:

(i) Mathematics should be taught in a way to create and induce interest in the minds and hearts of the student in the subject.

(ii) This can be achieved to some extent by installing Mathematics Laboratories in Schools to make the subject more practical and factual and to promote mathematical awareness, skill building and learning by doing. In the laboratories, pictures of great Mathematicians along with their works and contribution towards Mathematics should be displayed. Relevant experiments and apparatus to demonstrate a particular topic should be procured.

(iii) Teachers should be well trained and mathematics teachers should be the one with mathematics background only and should be the one who knows the subject properly.

(iv) Curriculum and text books should be well planned and revised regularly to reduce the gap between different Academic Levels. Topics and lessons in textbooks should be well demonstrated in the form of pictures and practical Activity.

(v) There should be flexibility in medium of instruction allowing students to learn in languages they are comfortable with.

(vi) Application of Mathematics to the real world should be well demonstrated while teaching.

(vii) Problem session should be arranged periodically to boost problem solving skills of the students. Co-curricular activities should be well managed so that Learning is not affected.

(viii) Workshops/Seminar on mathematics should be organised frequently at School Levels for both teachers and students.

(ix) Mathematics club should be formed at Schools Levels. These clubs can organize debates; discussion, quiz, exhibitions, etc. Mathematics competitions at district level, state level, etc. should be organized

(x) Parents should be involved at all levels in the process of learning of the subject.

Conclusion

The researcher found that maximum students were not interested in mathematics, they found it boring and difficult subject. They reported that they don't like the subject. Some of them said mathematics was their favorite and interesting subject for them. A few numbers of students said it was very refreshing and easy to understand for them. They considered mathematics as an important subject. The researcher found that Mathematics was much complex to understated in comparison to other subjects. Students found difficulty in learning Geometry, Algebra, Trigonometry and Statistics. Students convey that lots of formula to be memorized in Mathematics especially in Algebra, trigonometry and calculus. Teacher's opinion was that, students were unable to memorize formulas due to unclear concept or low understanding. Very few teachers don't face any problem while teaching mathematics.

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