



RESEARCH ARTICLE

FACTORS AFFECTING SECONDARY SCHOOL MATHEMATICS TEACHERS' TEACHING
METHODOLOGY AT WESTERN OROMIYA & SNNP REGIONS, ETHIOPIA

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ARTICLE INFO

Article History:

Received 17th May, 2016
Received in revised form
20th June, 2016
Accepted 17th July, 2016
Published online 31st August, 2016

Key words:

Teaching method,
Effective teaching,
Influential factors,
Content & Pedagogical knowledge,
Teachers' Attitude.

ABSTRACT

This study investigated factors that affect secondary school Mathematics teachers' teaching methodology & it was carried out secondary schools in Western Oromiya & SNNP regions, Ethiopia, from July 2014 to June 2015. Data sources was secondary schools' mathematics teachers, vice principals, students & observations of mathematics lessons. This study involved six sample secondary schools that were selected through stratified random sampling technique & a sample of two, sections from each of the 6 sample schools was selected for data collection purposes. A total of 406 sample students were selected from each sample sections using proportionate allocation system. In addition, 26(all) mathematics teachers & six vice directors in the sample schools was selected & participated in the study. Lottery technique of random sampling was employed to select sample sections as well as the required sample students from each sample section. Data collection tools were structured questionnaire, structured interview & lesson observation check list. The teacher is a crucial tool when we want to ensure that students are developing a concrete understanding of all the mathematics concepts. Therefore I focussed on factors that affect secondary school Mathematics teachers' teaching methodology. The findings of this study revealed that there are negative as well as positive factors affecting mathematics teachers' teaching methodology. Factors related to *teachers, students & schools* that are affecting mathematics teachers' teaching method or strategy was identified from the survey analysis. An awareness of these factors can help, to improving the effectiveness of mathematics teacher's teaching methodology if they are dealt with successfully.

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Citation: Abere Tegegn, Ademe Kebede and Keno Awol, 2016. "Factors affecting secondary school mathematics teachers' teaching methodology at western OROMIYA & SNNP regions, Ethiopia", *International Journal of Current Research*, 8, (08), 36947-36957.

1. INTRODUCTION

Mathematics is regarded as the major tool available for formulating theories in the Science, Engineering, and Economics as well as in other fields (Abiodun, 2007). Altbach (2002) in Fasasi, (2009) noted that the progress of science could be determined by the extent to which mathematics has entered into its methods and contents. Ale (1989) in Simeon & Francis (2012) Opined that mathematics is the queen of science and technology and also a tool for scientific and technological development. Ojerinde (1999) defined mathematics as "the communication system of those concepts of shape, size, symbol, quantity and order used to describe diverse phenomena". Because of the importance of mathematics, already highlighted above, schools must respond with effective teaching and learning of mathematics. Studies showed that there is a high failure students achievement in mathematics. Mkgato and Mji (2006) cite several studies

pointing to high failure rate in mathematics in South Africa in comparison with other countries, the situation is even worse among Black South African learners (Brodie 2004). Kahn (2001) presents the failure rate for Black grade 12 learners in mathematics in 1999, 2000, 2001 and 2002 as 88.3%, 84.5%, 80% and 76.8% respectively.

Ingvarson *et al.* (2004) theorised that there are four main factors that influence the effectiveness of students' learning outcomes in Mathematics. These are:

- (a) The 'school enabling conditions' – conditions in the school where the students are located;
- (b) The 'teacher enabling conditions' – teachers' experiences and professional developments;
- (c) The 'capacity of the teachers' – the knowledge, beliefs and understanding of teachers; and
- (d) The 'teacher practice' – what teachers do in their classroom?

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Mathematics is one of the core subjects in the Secondary School Curriculum in Ethiopia, and is compulsory for all students. However, the rate of success and nature of implementation are depending on the effectiveness of teachers' teaching methods & strategies. Seah (2007) stated that effective teaching is undoubtedly the most important objective in school Mathematics education. This study investigated and examined factors contributing to effective Mathematics teaching methods & strategies at secondary schools in Western Oromiya & SNNP regions, Ethiopia. Aina (1982) had earlier demonstrated the importance of appropriate method in teaching and learning when she referred to the "triangle of teaching". Constituting the triangle are the teacher, the learner and the subject matter with the method in the middle of the triangle as the determinant factor in teaching and learning. Iwuoha (2001) observed that it was teachers' lack of effective methods of teaching mathematics that scared the students away from mathematics. Manouchetri (2002) pointed out that good subject matter knowledge alone is not enough for a teacher to teach well; they (teachers) need adequate knowledge of how to teach to enable them perform well and give out a rich harvest. Posamentier and Stepelman (1999) reported that effective Mathematics teachers helped develop their students' positive attitudes by being sensitive to their students' feelings, by valuing every student's contribution, by recognising students' needs for success, by involving students in their own learning, and by making Mathematics exciting and interesting. The above variables realized the need for effective teaching method to improve instruction in secondary schools mathematics.

Gbamanja (2001) stated certain principles of teaching to include: planned teaching results in more teaching; students tend to achieve in ways they are tested; students learn more effectively if they know the objectives and are shown how to gain the ends; the teachers function in the learning process is that of guidance to reach an objective and that pupils learn from one another. Having examined the basic principles of teaching, I proceed to establish the relevance of the teachers' method of teaching on student achievement with reference to mathematics teaching. There is no question that the effectiveness of Ethiopian mathematics education should be improved substantially. This research focused on different factors that affect mathematics teachers' teaching method at secondary school. A particular attention was given to factors such as, Teacher related factors including Subject and Pedagogical content knowledge, Attitudes & Professional development of mathematics teachers and to what extent these can impact the effectiveness of mathematics teaching methods & strategies in secondary schools. In addition to this attention was also given to Student & School factors.

Teacher Factors

The teacher is the most important resource in an education system in any society (Oliveria and Farrell, 1993:7). Educational quality has been shown to be largely a function of teacher quality (Avalos and Hadad, 1979:156; Fuller, 1986:18). Platt (1970:34) comments: teachers are the most important elements in the realization of educational goals. Earlier, Afrassa and Peeves (1999) showed that in Australia, the teacher factor cannot be undermined in questioning low

achievement of students in mathematics. In the same vein, the National Centre for Education Standard (2000) measured and found that teacher factor stands as a major pivot in students' general achievement and mathematics in particular. Furthermore, Lamb and Fullarton (2000) found that in Australia, although student background variables influenced their achievement in mathematics, classroom and school factors contributed substantially. As stated by Posamentier and Stepelman (1999), effective Mathematics teachers have a broad range of specific teaching strategies available to them. Determining the best strategies for a lesson is an important aspect of teachers' creative role in the classroom, and every teacher is a resource person who determines which classroom teaching strategies will be most effective.

Teachers' attitude

Hill and Rowe (1996) carried out a study on teacher attitude to their work and students' achievement in mathematics and they found out that it is primarily through the quality of teaching that effective schools make a difference. The attitude of teachers in the classroom could cause fear of the subject thereby resulting in low achievement or abysmal failure of the learner. Do these statements point to the fact that teachers' attitude has a role to play in teachers' method of teaching mathematics at the secondary school level in Western Oromiya & SNNP regions, Ethiopia? This research is posed to investigate this phenomenon.

Subject and Pedagogical content knowledge

Shulman (1987; 1986) argued that in addition to general pedagogical knowledge and content knowledge, teachers needed to make a link between the two. Sound content knowledge enables teachers to represent mathematics as a coherent and connected system (Ball & Bass, 2000). Teachers without adequate content knowledge spend more time learning the content instead of planning the lesson to enhance student understanding (Brown & Borko, 1992).

Professional development

Why is the content of professional development so important? One reason is that this kind of learning is 'generative'. It enhances teachers' professional knowledge and understanding (Franke, 2002). Varella (2000) and Franke (2002) have shown that long-term professional development had positive effects on teachers.

School Factors

The quality of teaching is affected by a wide variety of conditions at the school level. Workplace conditions can exert a powerful influence over the quality of teaching in two main ways: (a) when they help to attract and retain quality people into the profession; and (b) when they energise teachers and reward their accomplishments (Darling-Hammond, 2000). Hanna (1987) identified successful teaching strategies as requiring an organised approach to teaching, where material was taught until it was mastered.

Student factors

Student actions within and their reactions to what occurs in the classroom have also been identified as important determinants of teacher practice (Cooney, 1985; Pehkonen, 1997; Raymond & Leinenbach, 2000; Reid, 1997; Tomazos, 1997). In this literature, the question now comes – is there any likely relationship between affecting factors and teachers' method of teaching in mathematics at the secondary school level in Western Oromiya & SNNP regions, Ethiopia? If there is, to what extent is this relationship? This research study is poised to investigate this phenomenon.

2.Statement of the Problem

Despite the significant role played by mathematics both in enhancing comprehension of other school subjects and its general role in life learners continue to fail the subject at various levels in the school system, particularly at Secondary schools. Record of results for mathematics in selected Mthatha secondary schools from 2004-2008 shows the very high failure rate for mathematics exam. Even though there are so many researches done on problems related to teaching methodology toward secondary school mathematics education, there is no any on the same topic in Western Oromiya & SNNP regions, Ethiopia. Hence the ultimate goal of this research is to investigate problems related to teaching methodology toward secondary school mathematics education so as to improve students achievement, in Western Oromiya & SNNP regions, Ethiopia.

Consequently, the research addresses the following research questions:

- i. What are the main factors related to secondary school students affecting the teaching method of mathematics in secondary schools?
- ii. What were the main factors related to secondary school mathematics teachers' attitude & capacity that affect their method of teaching?
- iii. Which aspects of school factors matter most toward teachers' teaching method of secondary school mathematics?
- iv. What were the main factors & to what extent they hindered or improved the success of teachers' teaching procedures or methods toward secondary school mathematics?

3.Significance of the study

The purpose of this study is to assess & identify the main factors that affect secondary school mathematics teachers' teaching procedures or methodology toward teaching mathematics & also aimed to examine the extent to which these factors can hinder or improve the success of secondary school mathematics teachers' teaching methods of mathematics.

The result of the research may help:

- i) Secondary school Mathematics teachers to:
 - Identifying factors related to their capacity & attitude toward teaching secondary school mathematics that affect their teaching method.

- Identify the main factors that can hinder or improve the success of secondary school mathematics teachers' teaching methods of Mathematics & to examine the extent to which they are affecting.
 - Gain new perspectives about methods for teaching secondary school mathematics & develop their ability in the use of teaching aids, language and activity in teaching mathematics concepts and skills.
 - Identify their strength & weaknesses of course delivery methods; plan for a better classroom management and implement state and national standards effectively.
- ii) Secondary school students to improve their learning & perform well in mathematics.
 - iii) Curriculum designers to revise & improve secondary school mathematics curriculum.
 - vi) The study will provide parents; guardian and interested stakeholders information on how they can assist students in the provision basic learning materials.

Parents' education and encouragements are strongly related to improved students achievement (Wang, Wildman & Calhoun, 1996)

4.Research Methodology

4.1 Research Design

A cross sectional design was employed to find out factors affecting secondary school mathematics teachers' teaching procedures or methodology. The research bases its findings through both quantitative & qualitative research methods.

4.2 Study Site & Study Period

The study areas were high schools found in Western Oromia & SNNP regions (Jimma University's CBTP & Practicum sites Zones), Ethiopia. They were purposely selected as study sites on the ground of my observation of poor performance of students in mathematics in secondary schools found in the mentioned site, while I supervise Jimma University students for teaching practice. The study was carried out from July 2014 to June 2015.

4.3 Study participants and Sampling techniques

This study involved six secondary schools which are sampled & selected from all high schools (26) found in Western Oromia & SNNP regions, by using lottery technique. Of these six high schools, two of them are from SNNPR & the rest four secondary schools are in Western Oromiya region. A sample of 12 sections that is two sections from each of the six sample schools (one 9th & one 10th grade sections) was selected lottery technique of random sampling for data collection purposes. After the total sample size of students (406) was determined using sample size determination formula then allocation of sample size of students to each sample section was followed using proportionate allocation system. Therefore participants were 406 (four hundred six) 9th & 10th grades sample students who were selected from the six secondary schools using lottery techniques of random sampling (Table 6.1); all of their

mathematics teachers (26); all of the vice directors(6)in the six sample secondary schools. In addition to these 12 (ninth & tenth grades') mathematics lessons in the six schools were also used for data collection purpose using lottery techniques.

4.4 Sampling Size Determination

The sample size (n) of students was determined using the single population proportion formula based on the assumption of factors that attribute to failure in high schools mathematics be 60% that mathematics teacher's method of teaching was not effective ($p=0.60$), to get maximum sample size, expected margin of error to be 5% ($d= 0.05$) and with 95 % confidence level. Based on this assumption &also by considering alarge population, the actual sample size was computed as follow.

$$n = \frac{z^2 pq}{d^2}, \text{ Where } n = \text{stimated sample size, } z = \text{the desire d confidence level of 95\%,}$$

$P = \text{the estimated proportion of an attribute that is present in the population (0.60),}$
 $q = 1 - p = 1 - 0.60 = 0.40, \quad d = \text{expected margin of error to be (0.05)}$

Thus by considering the non-response rate of 10% the calculated sample size were 406. Therefore sample size of students was 406.

4.5 Data-Gathering Tools & Methods

Semi-structured questioner, structured interview& observation check list was the tools employed. Questionnaires were the primary means of collecting quantitative& qualitative data from 26 mathematics teachers and 406 sample students. A group of researchers (Ingvarson *et al.*, 2004) from the Australian Council of Educational Research (hereafter, referred to as ACER) had developed three different sets of questionnaires to gather information about effective mathematics teaching and learning in Australian secondary schools. The questionnaires were adapted to suit the Ethiopia context, and were used to guide and gather the data needed for this study& it was adopted based on Likert scale form, with range of five point scales, from strongly disagree to strongly agree. To supplement the information collected using questionnaire, a qualitative approach had been conducted by using structured interview consists of a set of guide questions/focus points for all vice directors(6)&also observation of two mathematics lessons was employed in each of the six sample schools by using observation check.

4.6 Measurement

The Likert Scale is the measurement tool to be used in the survey. In the Likert technique, the degree of agreement or disagreement is given a numerical value ranging from one to five, thus a total numerical value can be calculated from all the responses. Therefore, to illicit data from the respondents, the instrument was constructed using the following scale:

1. Very high extent =5,2. High extent =4,3. Uncertain =3,
4. Low extent =2,5.Very low extent =1

A decision cut off point of 3 was adopted. Any item or component in which the respondents have a mean score above 3 was regarded as "a high extent"; while a mean score below 3 was regarded as "a low extent"; a mean score of 3 was

regarded as "Average". Deductions made from results on the constructed tables formed the answers to the research questions.

4.7. Reliability

For validation purposes, a pilot study was made. Data collection instruments were pre-tested, the trial instruments was initially administered to 5 students & 5 teachers respondents found in Sebeta Secondary School which is outside of the sampled schools. Irrelevant questions had been excluded& revised to find out the reliability of the instruments.

4.8. Techniques of Data Analysis

Once data collections through all of the tools are completed, responses of the respondents were tabulated, tallied, compiled, and relevant points squeezed and analysis was done using with the help of different statistical methods. Afterwards the researcher were summarized all the results of the study, a conclusion and interpretation was made and recommendations according to the finding of the study was provided.

4.9 Study procedures

Official letters of support from Jimma University were secured before starting the study. All concerned official at all levels & all participants were communicated and informed about the purpose and importance of the study to get cooperation. Then the baseline assessment was conducted in the middle of the semester using the following procedures. Questionnaires for 406 sample students & their mathematics teachers (26) were administered while students being in their normal classroom. Lesson observation &interview with vice directors were also conducted right after the administration the questionnaires.

5. RESULTS AND DISCUSSION

This was a study designed to assess & identify factors & their extent to which they can hinder or improve the success of secondary school mathematics teachers' teaching methods at Jimma University CBTP and Practicum site zones in Western Oromia & SNNP regions, Ethiopia.

Socio-demographic Characteristics of Respondents: is presented in Table 6.1. As presented in **Table 6.1**, the total number of sample students, mathematics teachers & Vice directors involved in the study was 406, 26, &6 respectively.

5.1 Results of Questioner

5.1.1 Results of Teachers' Questioner

A questionnaire consisting of 26 close-ended and 3 open-ended questions was administered for all (26), ninth & tenth grades' mathematics teachers in the sample secondary schools. All of the respondents were filled the questioner & a completed data have been collected & recorded as shown below.

i) What were the perceived factors related to capacity of secondary schools' mathematics teachers that affect their teaching method?

Table 6.1. Distribution of population of secondary schools' sample students (406), their mathematics teachers (26) & Vice directors (6)

S.No.	Schools	Frequency of Respondents			Mathematics Teachers	Vice directors
		Sample Students				
		9 th	10 th	Total		
1	DejachGeresuSecondary School (Woliso)	45	34	79	5	1
2	AbrosSecondary School (Wolkite)	43	33	76	5	1
3	MetuSecondary School (Metu)	38	31	69	4	1
4	BedeleSecondary School (Bedele)	33	29	62	4	1
5	JirenSecondary School (Jimma)	36	32	68	5	1
6	BongaSecondary School (Bonga)	29	23	52	3	1
	Total	224	182	406	26	6

Table 6.2. Extent to which secondary school mathematics teachers' subject content knowledge and pedagogical content knowledge affect their teaching method

S. N	Factors	Frequency					Total	Mean (\bar{x})	Percentage rating (%)
		Very high Extent	High Extent	Undecided	Low Extent	Very low Extent			
1	Using precise terminology to describe what students will learn.	2	22				102	3.92	78.46
2	Undertaking purposeful instructional planning and delivery.	1	20	1	4		96	3.69	73.85
3	Applying deliberate & purposeful assessment and feedback strategies						87	3.35	66.92
4	Build connections daily. This includes such things as personal greetings, asking about students' lives, sharing your own stories.	2	14	1	9		108	4.15	83.08
5	Respond quickly to misbehaviour.	8	16		2		87	3.35	66.92
6	Notice specific positive behaviours. Mention those to the student(s).		17	1	8		108	4.15	83.08
7	Use instructional design for success. Pay attention to students' level of readiness and set high	4	22				90	3.46	69.23
8	Develop an empathetic classroom culture. This includes students for each other and from the teacher.	2	14	4	6		110	4.23	84.62
9	Sufficient Subject matter knowledge.	8	17		1		107	4.12	82.31
10	Sufficient Pedagogical content knowledge.	3	23				110	4.23	84.62
11	Confident in his/her own knowledge of mathematics at the level he/she is teaching.	8	16	2			122	4.69	93.85
12	My colleagues helped me on the understanding of good mathematics teaching	2	2		2		63	2.42	48.46
13	Teachers evaluate themselves from students feed-back.	1	5		18	2	68	2.62	52.31
14	Teachers' neatness of dressing and personal comporment affects the teaching method of mathematics.	2	6		16	2	123	4.73	94.62
	Group Mean Rating (\bar{x}) =		7					3.55	71.04

Table 6.3. Analysis of the opinions of teachers on the extent to which, factors related to mathematics teachers attitude toward mathematics are affecting their teaching method

S.No.	Factors	Frequency					Total	Mean (\bar{x})	Percentage Rating (%)
		Very high Extent	High Extent	Undecided	Low Extent	Very low Extent			
1	Lack of interest to remain a mathematics teacher	2	15	2	6	1	89	3.42	68.47
2	Negative attitudes and perceptions in teaching & learning of mathematics.	1	10	3	10	2	76	2.92	58.467
3	Teachers' beliefs about the learning & teaching of mathematics influenced the development of their good mathematics teaching.	5	15	1	3	2	96	3.69	73.85
4	Foregoing the real-life connection in what you teach.	2	7	3	14		75	2.88	57.69
	Group Mean Rating (\bar{x}) =							3.23	64.62

Table 6.2 revealed that summary result of the opinion of teachers on the factors related to teachers' capacity, affecting secondary school mathematics teachers' teaching method was 3.55, indicating a percentage of 71.04. Furthermore, the decision rule says that the meaning of the scale used is 3.00; hence any score above 3.00 shows that "to a high extent" the given factors are affecting mathematics teachers' method of teaching mathematics. However, any score below 3.00 indicates that "to a low extent", the given factors are affecting mathematics teachers' method of teaching mathematics.

Therefore, the score above shows that *to a high extent*, mathematics teachers' method of teaching is affected by their capacity. In particular factors presented in item number: 4,6,8,9,10, 11&14 had the most rankings of above 4, hence they are the most influential factors, however items: 12&13 indicated the lowest average among the 14 items; hence they affect mathematics teachers' teaching method to negatively. Many researchers assumed that teachers capacity (subject content knowledge and pedagogical content knowledge) should be positively correlated with mathematics teaching performance and pedagogical content knowledge is influenced by subject content knowledge (Ball, 1991; Confrey, 1990; Noddings, 1990 and Shulman, 1986). Although this study found that pedagogical content knowledge & subject content knowledge are important factors affecting mathematics teachers' method of teaching that means pedagogical content knowledge & subject content knowledge have strong positive relationship with the effectiveness of teaching method toward secondary school mathematics. A good mathematics teacher, such a teacher needs to have a sufficient knowledge of mathematics teaching and learning (Brown & Borko, 1992). In addition, he or she needs to be able to use different strategies to promote children's conceptual understanding (cf. Eisenhart, Borko, Underhill, Brown, Jones & Agard, 1993).

ii) What were the perceived factors related to secondary school mathematics teachers' attitude toward mathematics that affect their teaching method?

Table 6.3 revealed that summary result of the opinion of teachers on the factors affecting mathematics teachers' teaching method was 3.23 indicating a percentage of 64.62. Therefore, according to the decision rule, the score above shows that to a high extent, mathematics teachers' method of teaching was affected by their attitude toward mathematics. In particular, on average, most of the participants selected, teacher' beliefs (about the nature of mathematics, learning mathematics & teaching mathematics) influenced the development of good mathematics with the highest mean of 3.69, followed by lack of interest to remain a mathematics teacher with the mean 3.42. These were the top two factors that influenced the teachers' method of teaching mathematics as selected by the participants of the survey, whereas the factor with the 'lowest extent' was

i) Negative attitudes and perceptions in teaching & learning of mathematics.

ii) foregoing the real-life connection in what he/she teach, with the lowest mean value of 2.92 & 2.88 respectively, thus they are not significant factors that can influence the teachers' method of teaching mathematics. A good mathematics

teacher's beliefs and conceptions should be as many-sided as possible and be based on a constructivist view of teaching and learning mathematics (cf. Thompson, 1991; Pehkonen, 1994). In addition, a good mathematics teacher should have a positive attitude toward learning and teaching mathematics (cf. McLeod, 1992).

iii) Which aspects of *school factors* matter most toward secondary school mathematics teachers' teaching methodology?

Table 6.4 revealed that summary result of the opinion of teachers on school related factors that are affecting secondary school mathematics teachers' teaching method was 3.08 indicating a percentage of 61.54. Therefore, the score above shows that to a high extent, mathematics teachers' method of teaching was affected by school related factors. In particular, the mean scores associated with the factors given in items number: 2 & 7, had the most rankings of above 4, hence they are the most influential factors. Whereas the factors with the lowest mean scores that is rankings of below 3 was the factors given in item number: 1, 3&4, hence they are affecting mathematics teachers' teaching method to a low extent.

Responses of teachers to the open ended questions of teachers' questionnaire

Three open ended questions was presented for 26 ninth & tenth grades' mathematics teachers & a complete data were collected & recorded as follows:

Most of the respondents acknowledged that some times, they have failed to organize their lesson properly & perfectly due to some influential factors. As more than half of them replied their believe, that some of the most important factors that hinder the success of secondary school mathematics teachers' course delivery method in their school were, large class size, inappropriate behaviours of students, the negative attitude of students toward mathematics, unfavourable classroom environments (lack of ventilation, inappropriate lighting, etc), lack of adequate instructional materials & pedagogical centre, lack of previous teaching experience; scarcity of training for teachers; lack of CPD, lack of internet service, computers & other adequate instructional materials; scarcity of text as well as reference books, etc. Concerning the most important factors in developing of good mathematics teaching method, majority of the them replied that, undertaking purposeful instructional planning, responding quickly to misbehaviour, paying attention to students' level of readiness, teachers' qualification, CPD & a brief course work on the program, experience sharing between colleagues, neatness of dressing and personal comportment, availability of current technology such as computer, ICT & mathematical soft wares for the teaching-learning activities, availability of adequate instructional materials & text books, sufficient course content & pedagogical knowledge, etc. are some of the most important factors used to develop a good mathematics teaching method. And some of them responded that some of the best method that help teachers in developing of good mathematics teaching method confidently are emphasizing on problem solving skills & using a variety of teaching methods according to the immediate topic in hand, for instance the art of teaching geometry is different from that of algebra.

Table 6.4. Analysis of the opinions of teachers on aspects of school factors that matter most toward secondary school mathematics teachers' teaching method of mathematics

S.N	Factors	Frequency					Total High Extent	Mean (\bar{x}) Undecided	Percentage Rating (%) Low Extent
		Very high Extent	High Extent	Undecided	Low Extent	Very high Extent			
1	The class sizes are suitable for the teaching learning activities, to address effective teaching methods.				2	24	28	1.08	21.54
2	Instructional materials are necessary to support the teaching method of Mathematics.	22	4				126	4.85	96.92
3	Availability of current technology for the teaching-learning activities.		3		18	5	53	2.04	40.77
4	Availability of adequate pedagogical centres in secondary schools	1	7		16	2	67	2.58	51.54
5	The classroom environments are favourable for teaching-learning mathematics?		13		13		78	3	60
6	Students' active participation & interest toward learning mathematics.	4	15		7		94	3.62	72.31
7	Appropriate behaviours of students.	9	17				113	4.35	86.92
8	Poor connections with families to discussing about their children's learning.	3	11		10	2	81	3.12	62.31
	Group Mean Rating (\bar{x}) =							3.08	61.54

Table 6.5. Analysis of the opinions of students on the extent to which, Teachers, Students & School related factors are affecting mathematics teachers' teaching method in secondary schools

S. N	Factors	Frequency of Responses					Total	Mean (\bar{x})	Percentage Rating (%)
		Very high Extent	High Extent	Undecided	Low Extent	Very low Extent			
1	Lack of adequate resources to enhance the teaching of mathematics	44	222	5	118	6	1365	3.46	69.11
2	Teachers discourage learners from learning mathematics by not adequately discussing their mathematical problem.	38	213	15	113	16	1329	3.36	67.29
3	Using of teaching methods that learners do not easily follow when learning mathematics.	96	181	9	94	14	1433	3.63	72.56
4	Lack interest and laziness toward participating actively in learning mathematics	16	188	8	148	35	1187	3.01	60.10
5	Negative attitudes and perceptions of students toward learning mathematics lesson.	72	160	15	128	20	1321	3.34	66.89
6	Poor involvement of students in practical activities of learning-teaching of mathematics.	98	250	6	37	4	1586	4.02	80.30
7	Teachers assume students already know the content.	77	239	3	65	11	1491	3.77	75.49
8	Teachers treat students fairly.	15	177	12	139	52	1149	2.91	58.18
9	Mathematics is difficult and unpleasant	39	135	5	172	44	1138	2.88	57.6
10	Pedagogical content knowledge of mathematics teachers.	91	261	7	34	2	1590	4.03	80.51
11	Lack of sufficient textbooks	88	257	2	43	5	1565	3.96	79.24
12	Subject content knowledge of mathematics teachers	23	225	8	134	5	1312	3.32	66.43
	Group Mean Rating (\bar{x}) =							3.47	69.48

5.1.2 Results of Students' Questioner

A total of 406 questionnaires consisting of 12 close-ended questions were administered to 9th & 10th grades sample students. Out of the 406 sample respondents (224 from 9th & 182 from 10th grades) who received the questionnaires, only 395 (97.29%) of them, that are 216 (96.43%) from 9th and 179 (98.35%) from 10th grades was responded as presented in the following table.

Table 6.5 Shows that the mean scores associated with the factors given in items: 1, 2, 3, 4, 5, 6, 7, 10, 11 & 12 are above 3.00. Hence, these factors was accepted and considered as factors affecting the mathematics teachers' teaching method. On average, the two factors: i) Poor involvement of students in practical activities of learning-teaching of mathematics with

the mean 4.02. ii) Pedagogical content knowledge of mathematics teachers with the mean of 4.03 were the top two factors that influenced teachers' method of teaching mathematics as selected by the students. Whereas the mean scores associated with the two factors which are given in items number: 8 & 9 was below 3.00 hence they are not significant factors that is they affect mathematics teachers' teaching method to a low extent.

5.2 Interview with Vice directors

Vice directors were also interviewed. The interviewed Vice directors responded as follow.

Table 6.6. Displays the interview result from the six vice directors concerning factors that affect the teaching method of secondary school mathematics teachers

S.N	Category	Reasons
1	How much do mathematics teachers are using their knowledge appropriately ?	Teachers Related Factors All of the respondents revealed that: ✓A culture of openness and collegiality among teachers of mathematics is important, in order to enable them to gain more teaching expertise and mathematics resources while also minimising faults in their teaching instructions. ✓Teachers need more adequate training & support from the school administrators to use their knowledge meaningfully
2	How much do math. teachers use pedagogical centre effectively?	✓As all of the respondents replied, mathematics teachers are not using pedagogical centre appropriately, therefore they need more adequate training & support from the school administrators and the respective departments concerning development & usage of pedagogical centre.
3	Are all mathematics teachers professionals?	As all of the respondents revealed: ✓Mathematics teachers in the schools are professionals.
4	Classroom Organization	As all of the respondents revealed: ✓An effective Classroom Organization can enable teachers to make their teaching method effective, to cover the required curriculum on time, to evaluate students fairly, encourage students to participate actively & also to know their students' needs. Teachers should also be very strict, to start & end the class on time. The school administrators as well as teachers should act cooperatively to maintain the Classroom Organization.
5	Rule Creation	School Related Factors All of the respondents replied that: ✓Their school has already created schools' as well as class room rules & regulations. ✓The rules created were enabling all teachers in particular mathematics teachers to make effective teaching.
6	Meeting & discussion with students.	As all of the respondents replied that: ✓Bad behaviours such as cheating, disorganized, overly aggressive & whiner usually occur in students & these can affect teachers teaching method negatively. As vice directors said, the remedial actions that should be taken are: school administrators, parents as well as teachers have to coach and take care of students, participating students in annual events and programmes organised by the school or other organisations. ✓One of the vice principals said that, school administrators & teachers gather students two times per week to share news, and warm up student for the day to enable the school to maintain the bad behaviours of students & improve the teaching activities.
7	Is there any relevant pedagogical centre in the school for mathematics?	✓Four of the respondents replied that: There is no an adequate pedagogical centre to enhance the teaching learning of mathematics. ✓Two of the respondents said, Computers & education softwares were still not readily available for students' use in the classrooms.
8	How much does the classroom environment favourable improve the teaching learning of mathematics?	All of the respondents replied that: ✓In general the classroom environment in the school is not favourable to enhance the teaching learning of mathematics, i.e large class size, discipline management, student participation etc are some of the problems. ✓If the classroom environment is not favourable teacher cannot manage their class properly, discipline management will be impossible & as a result teachers' teaching method will be poor.
9	Are there adequate mathematics text books in your school?	All of the respondents revealed that: ✓There is shortage of text books for students & it is clear that, the deficiency is influencing the effectiveness of mathematics teaching strategy negatively.
10	Are there misbehaviour students in your school? How do the school is treating them?	Student Related Factors ✓Students need to be constantly reminded that being a misbehaviour student is very bad for the students' future, hence teachers in the school had advise students frequently to enable them to fix and learn from their mistakes & to preserving school as well as classroom rules teachers, unless or otherwise, teachers' teaching method can not be effective & students achievement in mathematics will be weak.
11	Working with Families	Family Related Factors Four respondents said that: ✓Lack of parental support for students to do well in mathematics was one of the main factors that hindered the effectiveness of teaching methods in particular for mathematics lesson. ✓Most parents are not being supportive towards their children's' education. Students are weak in participation on the learning – teaching activities of mathematics. ✓As two of the vice principals said, Parents and students need to be constantly reminded of the importance of mathematics in students' future life. The school should have to work collaboratively with parents concerning their children's' education.
12	What factors that do you believe are hindering the effectiveness of method of teaching mathematics lesson?	General Five vice directors revealed that influential factors toward effectiveness of mathematics teaching method are: ✓Lack of training for teachers' professional developments, lack of appropriate pedagogical centres, shortage of appropriate curriculum materials and resources in the schools such as adequate teaching aids, computers, etc & in order to overcome these drawbacks, the schools need financial and technical support from the Ministry of education in order for teachers to readily use resources that are deemed to make teaching approaches more effective. ✓One vice director revealed that: Some Mathematics teachers had difficulties in seeing the students' difficulties in learning mathematics. This may partly be due to the fact that some students prefer to be passive learners and refuse to participate in classroom discussions; some students also had negative attitudes and a lack of interest in Mathematics as a compulsory subject.
13	What are the most important factors in developing good mathematics teaching method?	As all of the vice principals said, the most important factors used to improve mathematics teaching method are: ✓Teachers' teaching experience, qualification, interest and willingness for professional development, sufficient pedagogical & subject matter knowledge, etc. ✓Cooperativeness & willingness of school administrators to work harder on improving all the required conditions that would make mathematics teachers' teaching activities more effective, availability of adequate instructional materials such as computers, classroom management skills of teachers, etc.

As explained in Table 6.6, secondary school vice principals perceived that teachers, students & school factors played a significant role in the effectiveness of mathematics teaching methods.

Teachers-related factors: Teachers needed to be well-qualified and well-trained in methods of teaching mathematics in order to be effective, ready and willing to adapt their teaching practices and take on new approaches to teaching mathematics so as to cater for students' individual needs. To do this, teachers should believe that they have a need for professional development in order to improve classroom practices. A culture of openness among teachers of mathematics is also looked for, in order to enable them to gain more teaching expertise and mathematics resources while also minimising faults in their teaching instructions.

Schools' factors: Pedagogical centres & adequate teaching materials such as computers & educational software for mathematics teaching were still not readily available in secondary schools. Large class size, bad behaviours of students such as cheating & some students refuse to participate in the mathematics lesson were also some of the problems. The results also reveal that schools' administrators and Ministry of Education need to work harder in developing adequate pedagogical centres that equipped with relevant teaching aids & materials for mathematics teaching. An adequate training & technical supports should be given for mathematics teachers to enable them to make their teaching approaches more effective by improving their capacity of using pedagogical centres & teaching resources effectively. "There is no more powerful influence on student success than the teacher" (Stronge, 2010, p. xiii).

students' difficulties easily in learning mathematics; as a result the teaching method will not be effective. Students have poor command of English and therefore have difficulties in understanding various mathematics concepts, especially weaker students. Furthermore, as was said by majority of the principals, lack of parental support for students to do well in mathematics may have hindered them to achieve positive learning outcomes. The results also reveal that, parents and students need to be constantly reminded of the importance of mathematics in students' life and for the students' future. To do this, teachers may have to work collaboratively with parents to ensure that parents also take responsibilities to support and educate their children in the importance of mathematics in real life.

5.3 Results of Lesson Observations

I observed two mathematics lessons in each of the sample sections. A completed data have been collected & recorded as presented in **Table 6.7**.

The instrument (check-list) was constructed using the following scale: 1. Very high extent=4; 2. High extent=3; 3. Low extent=2; 4. Very low extent=1

From Lessons Observations the researcher could quantified the extent to which different factors affect secondary school mathematics teachers' teaching method as explained in **Table 6.7**. The researcher had observed the following situations in most of the observed classes.

Table 6.7. The average value of the extent to which different factors are affecting the teaching methods of secondary school mathematics

S.No.	Factors	Very high extent	High extent	Low extent	Very low extent
1	Teachers teach only to the whole group				
2	Classroom environments affect motivation				
3	Classroom management effective				
4	Neglected priorities				
5	Have appropriate resources for the students such as books, computers, including various programs for helping students present their project.				
6	Teachers discourage learners from learning mathematics by not adequately discussing their mathematical problem with them				
7	The instructional approach appropriate for the grade level of students at this time?				
8	How much can teachers encourage rich discussions with and among students as they develop understanding and apply the mathematical ideas in a variety of contexts?				
9	Do the teaching strategies encourage students to make sense of the mathematics?				
10	Questions that the teachers ask students will encourage them to think more deeply about the mathematics that I want them to understand?				
11	The learning approach is dominated by the teacher (teacher centre)				
12	Teachers use teaching methods that learners easily follow when learning mathematics.				

Students-related factors: Some students are passive learners and refuse to participate in the lesson & some of them also had negative attitudes and no interest in learning mathematics. Hence mathematics teachers may be unable to observe

- Most students do not exercise & participate by themselves but watching others do the mathematics for them.

- Communication occurred through paired work, small group work.
- Students are not asked higher-level questions in classroom activities and discussions.
- The instructional activities are not learner-centered & a low level student's engagement.
- Teachers was not use cooperative learning strategies and they were not make real-life connections

5.4 Limitation

Respondents might provide not genuine answer on the questionnaire which may lead to information bias.

6. Conclusions and Recommendations

6.1 Conclusions

This study discovered the following as the factor affect the teachers' teaching methods toward secondary schools mathematics.

1. Factors related to 'capacity' of secondary school mathematics teachers

Factors related to capacity of teachers, affect secondary school mathematics teachers' teaching method positively. In particular:

a) Teachers' neatness of dressing and personal comporment b) Confident in his/her own knowledge of mathematics at the level he/she is teaching. c) Developing an empathetic classroom culture. d) Pedagogical and Subject Content Knowledge. e) Build connections daily. f) Notice specific positive behaviours. Mention those to the student(s) was important for effectiveness of teacher' teaching method for secondary school mathematics (affect mathematics teachers' teaching method positively). In other way: discouraging learners from learning mathematics by not adequately discussing their mathematical problem, Using of teaching methods that learners do not easily follow, assuming students already know the content, teachers are not evaluating themselves from students feed-back, unable to share experience with colleagues& teachers are not treating students fairly are factors that affect mathematics teachers' teaching method negatively as the results of the study reviled. As Ball *et al.*, 2001; Fennema & Franke, 1992 stated, teacher knowledge of mathematics and how to teach it, how that knowledge is organised and applied by the teacher are important. Within the everyday activities of the classroom, teachers collect information about how students learn, what they seem to know and are able to do, and what they are interested in, this information helps teachers determine whether particular activities are successful and informs decisions about what they should be doing to meet the learning needs of their students (Wiliam, 2007).

2. Factors related to secondary school teachers' 'attitude' toward mathematics:

Lack of interest to remain a mathematics teacher& negative beliefs about the nature of mathematics, learning mathematics

and teaching mathematics are factors related to teachers' attitude that hindered the effectiveness of mathematics teachers' teaching methods. Harping on teachers' attitude towards mathematics, Emenalo (2000) remarked that since the teaching is carried out by the teacher while the achievement in mathematics concerns the student (learner), it then becomes obvious that the attitude posed by the teacher in the teaching-learning process would likely impact the achievement of the student. He noted that the attitude of teachers in the classroom could cause fear of the subject, which had claimed many casualties over the years in internal and external examinations in Nigeria.

3. Factors related to students

- Negative attitudes and perceptions of students about mathematics
- Students are lazy &lack interest toward participating actively in learning mathematics &
- Poor involvement of students in practical activities of learning-teaching of mathematics, were factors affecting mathematics teachers' teaching method negatively.

In the Nigerian context, Ibebuike (2006) had noted that many students, even as far back as their primary school days did not take interest in mathematics to a meaningful degree; remarking that methods of instruction were not very favourable to these students. He posited that this was due to the paucity of competent and adequately qualified mathematics teachers who were invariably over laboured.

4. School related factors

a) Poor connections of schools with families, b) Non-manageable standard class sizes, c) Lack of appropriate pedagogical centres, d) Lack of sufficient students textbooks, e) Lack of training for teachers' professional development, f) Inappropriate behaviours of students, f) Shortage of appropriate curriculum materials and resources in the schools such as adequate teaching aids, computers, internet services, etc are another factors that affect teachers' teaching method negatively.

Also, the research reviled that, lack of parental support for students to do well in mathematics were also a factor that hindered the effectiveness of teaching methods of mathematics lesson.

6.2 Recommendations

After discovering the factors that affects mathematics teachers' teaching method in this study, the researcher made the following recommendations.

1. Teachers Related

Mathematics teachers should be ready and willing for professional development to: Improve their method of teaching mathematics &subject matter knowledge; Adapt their teaching practices and take on new approaches to teaching

method of mathematics; Improve their attitude toward the nature of mathematics & teaching-learning of mathematics; Undertake purposeful instructional planning and delivery methods.

Teachers need to: Use teaching methods that learners easily follow; Examine instructional materials & implementation methods; Maintain their neatness of dressing and personal comportments; Develop their culture of openness among teachers in order to gain more teaching experience and resources & also to minimise mistakes in their teaching; Practice their teaching skills and get immediate feedback on how their strategies affect student learning; Use precise terminology to describe the lesson; Avoid assuming that students already know the content; Build connections daily, Encourage active student involvement; Notice specific positive behaviours & mention those to the students; work collaboratively with families to strength their children learning. Excellent teachers of mathematics are aware of a range of effective strategies and techniques for: teaching and learning mathematics; promoting enjoyment of learning and positive attitudes to mathematics; utilising information and communication technologies; encouraging and enabling parental involvement; and for being an effective role model for students and the community in the ways they deal with mathematics (Australian Association of Mathematics Teachers, 2002).

2. Student Related

Students need to: Improve their behaviours & participate actively in the learning-teaching activities of mathematics; Develop their attitudes, perceptions & interest of learning mathematics, Enjoy mathematics and view themselves as capable of doing mathematics. Beliefs and attitudes are formed on the basis of knowledge and emotions and they influence students' reactions to future contacts with mathematics (cf. Daskalogianni & Simpson, 2000). Their view of themselves as learners of mathematics is a central element of their view of mathematics.

3. School Related

Schools' administrators as well as Ministry of Education need to: Work harder to maintain the classroom organization & improve **classroom environment** to enhance the teaching learning of mathematics; Coach and take care of students to enable them to fix their mistakes & to preserving school as well as classroom rules; Reduced the class sizes to manageable standard; Make available and affordable students textbooks, adequate instructional materials, appropriate pedagogical centres & other required curriculum materials and resources such as computers & internet service for mathematics in the schools. This will help the mathematics teachers to be more effective in their teaching method. Facilitate professional developments training for mathematics teachers; Provide technical support for development & usage of teaching aids; Organize attitudinal training, workshops to properly inculcate into them the right attitudes to be exhibited in mathematics lessons. Ministry of Education as well as Corporate organizations need to: Provide financial and technical support

for secondary schools, in order to make available and affordable students textbooks & all other related curriculum materials and resources to enable teachers to readily use resources & to make their teaching approaches more effective.

Acknowledgments

The authors acknowledged Jimma University for funding this research project and participants of the study for their participation on the data collection process.

REFERENCES

- Ball, D. L., Ferrini-Mundy, J., Kilpatrick, J., Milgram, R. J., Schmid, W., & Schaar, R. 2005. *Reaching for common ground in mathematics education*.
- Breaux, E. 2009. *How the best teachers avoid the 20 most common teaching mistakes*. Larchmont, NY: Eye on Education.
- Common Core State Standards, 2010. Mathematics, Introduction, Standards for Mathematical Practice. Washington, DC: National Governors Association Centre for Best Practices, Council of Chief State School Officers. <http://www.corestandards.org/Math/Practice>.
- Danielson, C. 2007. *Enhancing professional practice: A framework for teaching (2nd ed.)*. Alexandria, VA: ASCD.
- Dembo, M., & Howard, K. 2007. Advice about the use of learning styles: A major myth in education. *Journal of College Reading and Learning*, 37(2), 101-109.
- Groves, M. 2010. *The benefits of memorizing math facts*. Portland, OR: Quick Reckoning, Inc.
- Hiebert, J. & Grouws, D. A. 2007. The effects of classroom mathematics teaching on students' learning. In F. K. Lester (Ed.), *Second Handbook of Research on Mathematics Teaching and Learning* (pp. 371-404). *Magazine*, issue 9.
- Marzano, R., Marzano, J., & Pickering, D. 2003. *Classroom management that works: Research-based strategies for every teacher*. Alexandria, VA: ASCD.
- National Board for Professional Teaching Standards. 2002. *what teachers should know and be able to do: The five core propositions of the national board*.
- Paisey A. 2010. *Effective mathematics teachers*. Oxford: basil Black hood.
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. 2009. Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 37(2), 101-109.
- Pollock, J. E. 2007. *Improving student learning one teacher at a time*. Alexandria, VA: ASCD.
- Prashnig, B. 2005, Autumn. Learning styles vs. multiple intelligences. *Teaching Expertise*
- Silver, H., Strong, R., & Perini, M. 2007. *The strategic teacher: Selecting the right research-based strategy for every lesson*. Alexandria, VA: ASCD.
- Sornson, B. 2010, September 2. Mastering classroom management. *ASCD Express*, 5(24).
- Stigler, J. W. & Hiebert, J. 2004. Improving mathematics instruction. *Educational Leadership*, 61(5), 12-17.
- Strong, R., Thomas, E., Perini, M., & Silver, H. 2004. Creating a differentiated mathematics classroom. *Educational Leadership*, 61(5), 73-78.