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Examination of Teachers' Motivational Skills for Fostering Students' Interest in Learning Mathematics in Secondary Schools in Jos Metropolis

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Abstract:

This study used exploratory and descriptive survey to examine the use of various motivational skills for arousing, developing and fostering students' interest in learning mathematics. The sample comprised of 30 full-time mathematics teachers from SS schools in Jos Metropolis. Data was collected using TMSQ made of 26 items drawn on a nominal scale of Observed, Used well and not observed. The TMSQ was validated by experts. It was administered by 15 trained research assistants (Observers). At the end of the observations, data was gathered and analyzed using frequency counts, percentages and chi-square statistics at 0.05 level of significance. The findings revealed that teachers use different skills, with varying intensity, to help in motivating students to develop and sustain interest in learning mathematics. For example, it was observed that teachers significantly used and maintained eye contact with students, used voice effectively and spread questions evenly in class but their ability to control the pace of lessons and vary their style of instruction was insignificant. Also, it was found out that the use of motivational skills is not significantly associated with teachers' years of teaching experience and qualification. It was recommended among other things that research should be conducted on the influence of various motivational skills on achievement of learning goals and attention span and teachers should devise new motivational skills that will help promote students' interest in mathematics.

Key words: Motivation, Skills, Mathematics, Students, Interest, Learning, Achievement

1. Introduction

It is a fact that the performance of secondary school students in mathematics in Nigeria is poor. To curb this problem in the interest of national development, the causative factors must be identified and solved holistically. These include poor mathematics knowledge, lack of good problem solving skills and competences, poor teaching and learning, poor preparation of students for examinations (Binda, 2005; WAEC Chief examiners' reports, 2009, 2010; Akpan, 2011) and lack of interest or fear for mathematics among students, parents, the society and the general public (Lassa, 1984). Lack of interest, for example, makes students to abhor mathematics, avoid lessons and perceive it as something that is not useful although it is a core subject. While commenting on lack of interest in mathematics, Odili (2006) stated that this problem is common because it is easy for students to say that they don't like mathematics.

Interest is the state in which a student is curious, enthusiastic, show or is concerned about the way he/she perceives and learns something. According to Hidi and Renninger (2006), interest refers to the psychological state of engaging or the predisposition to re-engage with particular classes of objects, events, or ideas over time. It is the psychological state that, in later phases of development, is also a predisposition to re-engage content that applies to in-school and out-of-school learning. When applied to mathematics, interest is a motivational variable that enables students pay attention and learn the subject. For example, if a student perceived mathematics as a useful subject and develop interest in it, he/she will be curious to learn it by way of attending lessons, paying attention, doing exercises, activities and assignments promptly and striving to achieve success. On the contrary, if a student is not interested in mathematics, his/her attitudes, performance and commitment or concentration and so on will wane. Interest, therefore, is a powerful stimulus that is capable of drawing attention of students to learn and understand mathematics. Besides this, interest can also help students to learn many new things just as Ainley, Hidi and Berndorff (2002) posited that it motivates people to try new things, explore complex ideas, meet intriguing people and do novel actions.

Motivation is one of the most important means of helping students to develop interest in mathematics. It describes the direction, intensity, initiation and persistence of behaviors; it is the process of instigating and sustaining goal-directed behaviors; and it stimulates thinking, feelings and perceiving (Geen, 1995; Agbo, 2002). This suggests that motivation represents drives or motives that

spike action, direct behaviors towards a goal and it increases the energy and effort to achieve the goal. This is achieved by way of reasoning and paying attention. Liu and Lin (2010) concurred that motivation enhances the strength of relationship between the input and output of human behaviors. For example, it can help in strengthening the relationship between the ability of students to solve problems and their achievement in mathematics. For this purpose, proper utilization of motivational skills is required. According to Kleinginna and Kleinginna (1981), this is predicated on the types and intensity of the learning needs of students and the ensuing psychological process. Accordingly, students need to be motivated to learn mathematics based on their emotional and academic needs and abilities and interest. In agreement, Agbo (2002) stated that motivation is important in learning because it is present naturally in students and it is the force that helps them to achieve their learning goals. Similarly, Wilen, Hutchison and Ishler (2008) endorsed that motivation is the cornerstone of instruction. Thus without it, it will be difficult for students to learn mathematics successfully.

Motivation is also important and influential in producing favorable learning activities and attitudes. For example, when students have strong motivation in learning mathematics, it will generate interest and positive attitudes that will enhance their desire and performance, but the reverse is the case if motivation is lacking. Thus, whereas interest can influence learning positively through motivation, lack of motivation can cause negative attitudes towards learning. Also, lack of motivation can cause lack of interest in learning which can affect the performance of students in mathematics. What is required, therefore, is motivation to help drive interest towards meaningful and successful learning of mathematics.

Gleaning from the foregoing, motivation, no doubt, produces and sustains the energies that students require to succeed in mathematics. Consequently, teachers need to search for and use different motivational skills to promote effective teaching and learning of mathematics. To this effect, researchers have suggested how students can be motivated both intrinsically and extrinsically (Dweck, 1986; Middleton, 1995; Ajaegbu, 1999). These include the use of marks, rewards, games, contests, tricks, puzzles, films, projects, clubs and applications of mathematics and the use of different techniques, methods or strategies of teaching. Using different methods of teaching is particularly important because research has shown that it is better than using one extended method (Good & Brophy, 2003). Moreover, Wilen, Hutchison and Ishler (2008) have argued that there are no guaranteed effective approaches to instruction. Perhaps, this is because of the differences that exist among students in their learning styles, understanding of concepts, acquisition of skills and in their attitudes and values such that no single method of teaching is sufficient. Nonetheless, for any instruction to be successful, teachers are supposed to use different skills, techniques, methods and strategies since the process involves teaching, motivating, supporting, questioning and listening and so on. Through these, the teacher and the students are brought into fruitful teaching and learning encounter.

However, there are other means of motivating students to learn mathematics. These include catering for their learning needs, creating an inclusive classroom atmosphere which they can feel respected and connected and developing positive attitudes by relating what is taught with what obtains in their environment. Others include active involvement of students in learning, valuing what they like to do and encouraging them to it, solving challenging puzzles, playing simple games, maintaining eye to eye contact, speaking aloud, using handshakes, head nods and so on. Others include the need for achievement (achievement motivation), internal orientation (ability to perceive learning tasks as important and to subject it to personal control i.e. locus of control), curiosity in knowing novel, complex or incongruous patterns (unexpected events), interesting events, varying the tone of one's voice, using relevant humor occasionally, demonstration and group activities (Driscoll, 2005). Also, others include making teaching and learning meaningful and attractive using principles of positivism, constructivism, objectivism, v-mapping and concept mapping (Akpan, 2011). Akpan contended that these principles should be used so that disciplines like science, technology and mathematics can be learnt and utilized intrinsically. In addition, Nunley (2006) suggested the use of layered curriculum (three layers of differentiated instruction) to enhance motivation and foster complex teaching and thinking.

The means of motivating students thus far discussed underscore their importance in teaching and learning. For this reason, it is pertinent for teachers to utilize them in the class. This will help create a class of motivated individual learners that will actively learn mathematics and develop required problem solving skills (Sousa, 2008). Also, it will help make the learning realistic, challenging, meaningful and interesting because if students are not motivated, they can easily misbehave in class by refusing to do their assignments, fail to take corrections for their mistakes and not read well to understand what they are taught. This can lead to poor performance and lack of interest in mathematics. Legault, Pelletier and Green-Demers (2006) concurred that lack of motivation remain as one of the major reasons why students do not succeed in mathematics but in the present dispensation, this should not be allowed to hinder the progress of students in mathematics.

Nevertheless, research has revealed that motivation is useful for it helps students to perform and have good mathematics performance in international competition even though they tend to have low confidence in learning mathematics well (Liu & Lin, 2010). Also, it helps students especially boys to develop high motivation for learning mathematics and ability to use learning strategies better than traditional methods. For example, students who are extrinsically motivated partake in academic tasks to obtain rewards (e.g. good grades, approval) or to avoid punishment (e.g. bad grades, disapproval). This type of motivation, according to Ames (1992), Duda and Nicholls (1992) tend to center on performance goals to obtain favorable or avoid negative judgments from teachers, parents and peers. However, according to these authors, when students engage in tasks which they are motivated intrinsically, they tend to exhibit a number of pedagogically desirable behaviors. These include increased time on task, persistence in the face of failure, more elaborate processing and monitoring of comprehension, selection of more difficult tasks, greater creativity and risk taking and selection of deeper and more efficient performance tasks. Unfortunately, in mathematics education, not much work has been done on students or people's motivation to date (Evans & Wedge, 2004; Hannula, 2006). Only a few researchers have tried distinguishing between intrinsic and extrinsic motivation in mathematics (Goodchild, 2001). Others only discussed students' motivation under motivational

beliefs (Op't Eynde, De Corte & Verschaffel, 2002) and interest (Koeller, Baumert, & Schnabel, 2001). Thus examining the extent of using various motivational skills in teaching and learning and seeing how it helps students to develop and sustain their interest in learning mathematics will add to existing literature on the subject.

2. Statement of the Problem

It has been pointed out that students lack interest in mathematics (Odili 2006; Lassa, 2012) and also have weak motivation resulting into less usage rate of strategies in learning mathematics (Liu & Lin, 2010). This constitutes a problem because it affects their performance negatively. However, it has been suggested that teachers need to look for diverse ways of improving the performance of students in mathematics including the use of concrete materials, past questions papers for revision, effective or proper teaching to cover the syllabus and the use of new teaching strategies. It is believed that these various ways will not only help students develop interest in mathematics, it will also help them a lot to develop their problem solving skills and competences and increase their ability to answer questions in examinations towards improving their achievement in mathematics.

However, an important means which teachers can employ to help students develop interest, which will in turn help improve their achievement in mathematics, is motivational skills. Research has shown that this means has not been extensively explored because teachers lack the experience as they rely much on using traditional methods of teaching. Nonetheless, the problem of this study is to examine the extent which teachers consciously or otherwise employ different motivational skills to help students develop and sustain interest and attention in mathematics by way of understanding, enjoying, participating, interacting and applying their knowledge and experience.

3. Purpose of the Study

The main purpose of this study was to find out the motivational skills teachers use in teaching to help students develop interest in mathematics. The study, therefore, aimed at achieving the following objectives: (i) find out the motivational skills teachers use in teaching to help motivate students to be attentive in class, engage in learning and foster their interest in mathematics (ii) examine the extent to which teachers use various motivational skills to motivate students to learn mathematics with interest and attention (iii) find out whether the use of motivational skills to help students learn mathematics with interest varies according to the experience and qualification of teachers.

4. Research Questions

The following questions were raised and answered in this study: (i) what motivational skills do teachers employ to motivate students to develop interest and attend or concentrate in learning mathematics? (ii) What is the extent to which teachers use various motivational skills to help motivate students to learn mathematics with interest and attention or concentration? (iii) How does the use of various motivational skills help students to learn mathematics with interest and attention or concentration vary according to teaching experience and qualification of teachers?

5. Theoretical/Conceptual Framework

One of the main factors that influences the interest and attention or concentration of students in learning generally is motivation. Motivation is said to be naturally present in all categories of students in varying degrees (Agbo, 2002), but the extent to which it is utilized in teaching and learning in the classroom depends on the skillfulness of the teacher. However, in learning mathematics, giving that students tend to be naturally motivated in one way or another because motivation is a natural phenomenon, teachers need to use their acquired or inborn motivational skills to help students learn mathematics with interest and attention.

A useful model for understanding and using various motivational techniques in teaching and learning has been propounded (Keller, 1983). According to Keller, teachers need to explore various techniques to help students to develop intrinsic motivation towards effective learning of mathematics. Keller submitted that students' motives (values) and expectations (efficacy and outcome expectations) influences the degree of their attention, effort and the way they utilize these variables in learning tasks. The motives and expectations are largely determined by the ability of students to pay attention or concentrate and the degree of effort they put in learning. In mathematics, the motives and expectations determine the rate of success or performance of students. For example, if students expect to get a good job in life and know that mathematics is the means of getting the job, they will be highly motivated to learn the subject as the leeway otherwise they will not be keen about it. The motive or leeway, a good job, therefore, becomes influential in the way and manner the students learn mathematics. Other factors that help in determining the rate of success of students in mathematics include their abilities, practical skills, knowledge and experience, performance (or achievement) or failure to achieve and their attributions (cognitive evaluation). These factors, according to Keller, influence the level of motivation of students, which in turn influences their future learning and performance in mathematics.

Furthermore, since motivation is useful, Keller posited that it is important for teachers to explore and use it in teaching mathematics. To do this successfully, four conditions need to be fulfilled. These are (i) attention (ability to focus on, and process given information), (ii) reference (things that are instrumental in meeting, satisfying and achieving personal needs, desires and goals), (iii) confidence (having assurance or the willingness to engage in learning without fear), and (iv) satisfaction (what is acceptable because it is rewarding). To meet these conditions so that students can develop genuine interest in learning mathematics, teachers need to assist the students by way of teaching, demonstrating, illustrating and emphasizing the conditions with relevant examples including the use of various forms of rewards or feedback. Also, to enhance the efficacy of these conditions, teachers need to engage students in

mathematical activities that are related to their personal goals that will meet their specific needs in life. Other means include the use of various instructional styles (novel or unexpected approaches), practical problems or activities and providing statements of utility along with the goals of instruction, that is, let students determine their own goals and means of assessing their progress towards attaining the goals. Others include providing opportunities for matching motives and values, relating instruction to students' experiences using concrete examples and analogies, disclosing what students are expected to do in each lesson to enable them to be ready before hand and breaking down learning goals into relevant sub-goals and small teachable steps to attain the overall goals. Others also include providing success opportunities, that is, what will help students to achieve success rather than failure in learning, providing immediate feedback and giving students the opportunity to apply their acquired knowledge. If these means are utilized effectively, it will help elicit intrinsic and extrinsic motivation among students, which can make them to be curious, wanting to learn more on their own and develop the feelings of personal competence or growth in mathematics.

6. Method

This study employed exploratory and descriptive survey research design to examine the motivational skills teachers employ to help arouse, develop and foster the interest, attention or concentration of students in learning mathematics. The population of the study comprised of full-time mathematics teachers from public Senior Secondary (SS) schools in Jos metropolis. The sample consisted of 30 teachers (26 males and 4 females). It was selected using purposive sampling technique since the study targeted SS schools located within the Metropolis.

Data was collected using Teacher Motivational Skills Questionnaire (TMSQ) consisting of 26 items drawn on a three-point nominal scale of Observed (O), Used Well (UW) and Not Observed (NO). The TMSQ was rated by counting the responses (frequencies) of each observed skill. For example, if a particular skill was observed and used well, the frequencies were counted otherwise it was left out. For instance, one of the items in the TMSQ read 'teacher moves round during class discussion'. Once a teacher is observed to move round in class during lesson, the cell for 'O' in the TMSQ is ticked, if the observation is used well, the next cell 'UW' is ticked and if the movement is not observed, the cell 'NO' is ticked. The TMSQ also sought other information from the sample like area of specialization, years of teaching experience, the mathematics topics taught, the lesson time and school location. It was validated by experts in test and measurement and well experienced mathematics educators.

The TMSQ was administered, through direct observations, by 15 trained and qualified research assistants each with a Bachelor of Science degree in mathematics education. The research assistants observed the sample teach mathematics during the time of their lessons in their respective schools with each observing two teachers, one at a time either from the same school or from two different schools. The TMSQ was used for the observations so as to obtain first hand information on the extent of usability of the various motivational skills among the teachers. This was done in the third term of 2013 school year. Enough time was given for the observations and scoring of the TMSQ. At the end, data was collected and analyzed using frequency counts, percentages and chi-square statistics.

7. Results

N	Item	O	%	UW	%	NO	%	χ^2	Decision
1	Moves round during classroom discussion	21	70.00	9	30.00	0	0.00	22.2	Sig.
2	Stays a little while and a bit far from students when asking questions	11	36.67	9	30.00	10	33.33	0.20	Not sig.
3	Does not sit on desk more than a few minutes during discussion	8	26.66	8	26.66	14	46.66	2.40	Not sig.
4	Avoid sitting or standing behind students	12	40.00	11	36.67	7	23.33	1.40	Not sig.
5	Maintains eye contact with students	18	60.00	11	36.67	1	3.33	14.6	Sig.
6	Uses gestures from time to time	11	36.67	14	46.66	5	16.66	4.20	Not sig.
7	Uses body movements e.g. head shake, nods	9	30.00	11	36.67	10	33.33	0.20	Not sig.
8	Uses voice effectively e.g. loud, clear, pleasant	15	50.00	13	43.33	2	6.67	9.80	Sig.
9	Language is simple, clear and appropriate	15	50.00	13	43.33	2	6.67	9.80	Sig.
10	Lesson is smooth without disruptions	15	50.00	13	43.33	2	6.67	9.80	Sig.
11	No mannerism in lesson e.g. you know, hello	6	20.00	10	33.33	14	46.66	3.20	Not sig.
12	Quality of voice is nice	14	46.66	13	43.33	3	10.00	7.40	Sig.
13	Control pace of lesson, e.g. pause, continues	12	40.00	13	43.33	5	16.67	3.80	Not sig.
14	Allows students think before teaching, writing	14	46.66	7	23.33	9	30.00	2.60	Not sig.
15	Varies instructional modes/styles	10	33.33	11	36.67	9	30.00	0.20	Not sig.
16	Spread questions evenly	14	46.66	13	43.33	3	10.00	7.40	Sig.
17	Calls students by names in asking questions	14	46.66	13	43.33	3	10.00	7.40	Sig.
18	Gives feedback promptly	14	46.66	13	43.33	3	10.00	7.40	Sig.
19	Fulfils promises	4	13.33	7	23.33	19	63.33	12.6	Sig.
20	Does not shout in answering questions	10	33.33	11	36.67	9	30.00	0.20	Not sig.

N	Item	O	%	UW	%	NO	%	χ^2	Decision
21	Does not bend over desk to listen to questions	11	36.67	5	16.67	14	46.66	4.20	Not sig.
22	Does not get closer to students to listen and attend to them	13	43.33	5	16.67	12	40.00	3.80	Not sig.
23	Does not look at time in asking and attending to questions	9	30.00	7	23.33	14	46.67	2.60	Not sig.
24	Touches students to help them solve problems	10	33.33	10	33.33	10	33.33	0.00	Not sig.
25	Mode of dress is distracting	8	26.67	7	23.33	15	50.00	3.80	Not sig.
26	Avoids annoying words or phrases	12	40.00	7	23.33	11	36.67	1.40	Not sig.

Table 1: Profile of Observations of Teachers on their Ability to Employ Various Motivational Skills in Teaching Mathematics in the Classroom

(Key: O=Observed Motivational Skills, UW=Used Well Observed Motivational Skills, NO=Not Observed Motivational Skills, Chi-square Critical Value=5.99, df=2, Level of Significance=0.05, Sig. =Significant)

Table 1 reveals the various motivational skills teachers employ to help students to develop interest in mathematics. The use of these skills varies in intensity. For example, the ability of teachers to move round during classroom discussion, maintain eye to eye contact with students, use voice effectively, use simple language for communication and spread questions evenly in class and so on are significant. These influence the ability of students to develop and sustain their interest in mathematics. On the other hand, the ability of teachers to control the pace of their lessons, vary their style of instruction and not getting closer to students when asking questions and so on are not significant. Also, behaviors like lack of fulfilling promises (63.33%) and wearing of distracting dresses (50%) and so on tend to be avoided by teachers.

Observations/Years	0-5years	6-10years	≥10years	Total	χ^2	Decision
O	111	96	98	305	0.24	Not sig.
UW	89	87	95	271	1.78	Not sig.
NO	86	52	64	202	3.29	Not sig.
Total	286	235	257	778	5.31	Not sig.

Table 2: Summary of χ^2 Calculations Based on Years of Experience Associated with the Use of Motivational skills in Teaching Mathematics among Teachers

(Key: O=Observed Motivational Skills, UW=Used Well Observed Motivational Skills, NO=Not Observed Motivational Skills, Chi-square Critical Value=9.48, df=4, Level of Significance=0.05)

From Table 2, the χ^2 calculated value 5.31 is less than its table value 9.48 at 0.05 level of significance. This means the use of motivational skills in arousing and sustaining the interest of students in learning mathematics is not significantly associated with teachers' years of teaching experience.

Qualification/Observation	O	UW	NO	Total	χ^2	Decision
B.Sc. (Mathematics)	64	57	31	152	4.26	Not sig.
B.Sc. Ed. (Mathematics Education)	211	182	166	559	1.24	Not sig.
Other Qualifications e.g. Diploma, etc	22	33	23	78	3.30	Not sig.
Total	297	272	220	789	8.80	Not sig.

Table 3: Qualifications of Teachers Associated with their Ability to Use Motivational Skills in Teaching Mathematics

(Key: O=Observed Motivational Skills, UW=Used Well Observed Motivational Skills, NO=Not Observed Motivational Skills, Chi-square Critical Value=9.48, df=4, Level of Significance=0.05)

From Table 3, the χ^2 calculated value 8.80 is less than its critical value 9.48 at 0.05 level of significance. This means there is no significant association between the ability of teachers to use motivational skills to arouse and sustain the interest of students in learning mathematics and their qualifications. Thus qualification of teachers is not a major factor in determining how students should be motivated to learn mathematics. Perhaps, this could be a function of other variables like interest in teaching, attitudes towards mathematics and rapport with students in class and so on.

8. Discussion

The role motivation plays in arousing the interest of students in learning mathematics cannot be overemphasized. To be effective in teaching, classroom teachers need to explore and use various motivational skills to help motivate students to learn mathematics with interest otherwise many of the students will find the subject uninteresting. The findings from this study (Table 1) revealed that teachers have several skills to motivate students to develop and sustain interest in learning mathematics but are employed at different

degrees or levels of intensity. For example, from Table 1, the findings revealed that skills like moving round during classroom discussion (70% observed, 30% used well), maintaining eye contact with students (60% observed, 36.67% used well) and the use of natural voice (e.g. loud, clear, pleasant), simple language (clear, appropriate, etc) and smooth lesson without disruption (50% observed, 43.33% used well) were each employed significantly.

Skills like spreading questions evenly (46.66% observed, 43.33% used well), calling students by their names when asking questions (46.66% observed, 43.33% used well) and giving feedback promptly (46.66% observed, 43.33% used well) were also employed significantly. However, specific teacher behaviors like mannerisms (e.g. you know, hello, etc, 46.66% not observed), fulfilling promises (63.33% not observed), bending over desk to listen to questions (46.66% not observed), looking at time when asking questions (46.67% not observed), distractive mode of dress (50% not observed) and so on were not significantly employed. This means that, as much as possible, teachers tend to avoid behaviors or what will distract students from developing interest and paying attention or concentrate in learning mathematics. This is important because research has shown that teachers need to devise strategies and techniques as well as use teaching materials that will help encourage students to develop interest and increase their achievement in mathematics (Good & Brophy, 2003; Odili, 2006; Liu & Lin, 2010; Lassa, 2012).

However, the findings from this study concurred with Hidi and Renninger (2006) who stated that interest exert a powerful influence on learning especially when it is high. This implies that whatever be the case, students should be assisted to develop high interest in what they are made to learn. In line with this thinking, this study established the use of various motivational skills to help students achieve high interest in mathematics. Consequently, teachers need to continue to search for strategies or techniques that, when applied, will help motivate students to develop interest at the highest level in mathematics. This will guarantee effective and successful teaching of mathematics.

The findings from this study (Table 2, Table 3) also revealed that the use of various motivational skills to help develop and sustain the interest and attention or concentration of students in learning mathematics is neither associated significantly with the years of teaching experience of teachers nor with their teaching qualifications. This means that qualification or years of teaching experience does not significantly determine the extent to which teachers make use of their motivational skills in teaching mathematics in the classroom. Most probably, the use of the motivational skills is a thing of the mind because individual students including teachers are said to have motives that forces or energizes them to take action to achieve certain goals in life (Agbo, 2002). Thus as a teacher, it does not necessarily require any higher qualification or many years of teaching experience to apply what is good to help students to develop interest in mathematics especially when there is a clamor for it towards improving their (students) performance in mathematics (Bot & Binda, 2013). Also, as teachers who are conscious of the need to be effective in teaching, it behooves on each one to naturally use his/her motivational skills to achieve huge success in teaching any topic in mathematics.

9. Conclusion

This study examined various motivational skills used by teachers in mathematics instruction in the classroom. Based on the findings of the study, it is concluded that there are a multiple of motivational skills teachers can use to help motivate students to develop and sustain their interest in mathematics. The use of the motivational skills does not depend largely on the qualification and teaching experience of teachers but is a function of their teaching efficacy. Therefore, the various motivational skills should be explored in teaching mathematics, and if it is possible, more of such should be searched for and utilized intensively in the interest of helping students at different levels of learning to develop and sustain genuine interest, and achieve better results in mathematics.

10. Recommendation

Based on the findings of the study, the following recommendations are made:

- Research should be conducted to find out the effects of using various skills in motivating students to develop interest in mathematics based on gender, type of school and school location.
- Research should be conducted to find out how the use of various motivational skills will help influence the achievement of learning goals and attention span with respect to teaching and learning different mathematics topics in the secondary school.
- Teachers should identify and intensify effort at devising and using new motivational skills that tend to promote and heighten the interest of students in mathematics.
- The government should emphasize training of teachers, through workshops and seminars, to update their knowledge and experiences on effective teaching of mathematics including the development of motivational skills towards effective implementation of the new secondary school mathematics curriculum.

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