Mathematics Teaching In Israel – The Attributes In Teaching In A Post-Primary School Scenario

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Abstract

The study aims at influencing the motivation and willingness of the Mathematics teachers for changing the diversity of the teaching methods involved. The researcher conducts an action research. Fourteen Mathematics teachers from the Junior High Schools (Post Primary Schools) are considered for this research. The study includes fourteen teachers from the post primary schools of Israel. Three questionnaires were used for this research as research instruments. The findings of the research reveal that a considerable number of teachers show willingness towards changing diversity concerned with the teaching methods. In the study fourteen participants were selected who teach Mathematics at a post primary school level. It was found that the motivation towards the willingness in teaching students have increased ever since they have increased their teaching towards the next classes. The most important of them all are the connection towards the motivation, the influences in the diversity with the teaching methods. Hence there arise a need for motivation with respect to the diversification of the teaching methods for encouraging and nurturing the motivation of the teachers. The main conclusion arising out of the research shows that the willingness towards changing is directly influenced by the levels of motivation among the teachers. Motivating the teachers or encouraging them influences the diversification of the teaching methods involved in the study.

Keywords: Mathematics, Teaching, Willingness to change, teaching, Mathematics, Diversified Teaching, Post-Primary School

1. Introduction

In today's world education is of high importance and the educational system in any country is considered with level of carefulness. The educational system is of high value in any country and is of great relevance to the students. This is an area of utmost critical importance to the educators of any country and the policy makers(Zhang, 2010). The educational system of Israel is moving in the twenty-first century with the introduction of different digital technologies which is mainly focussing on the skills, critical thinking,

research works, the strengthening of the digital literacy and the make the education system more convenient to the students(A. Peled & Blau, 2011). The studies require the teachers come under a conceptual transformation taking place from the frontal standard teacher to the form of an online teacher deploying the latest methodologies in teaching(Prensky, 2008). Unlike that of him, the Educational system of the nation focussed on the methodology which was used for the flexibility for enabling the teachers and pupils to study in various modes with reference to their personal tendencies and wishes, mental capabilities and the competence concerned. The concerned ministry frames out a policy regarding the advancement and development of the corresponding teaching and learning processes which is a methodological change. There is always a strong need transformation in different modes of teaching Mathematics. A study conducted on the same came to a conclusion that there is dire need for a good training for teachers in terms of theory and practical owing to the lack of satisfactory linguistic skills especially with those teachers of periphery and those in that of the Arabic sector circle. Hence there arises a need for changing teachers perception towards the usual modes of teaching and those methods of teaching in a new environment(B. Peled & Magen-Nagar, 2012). This study will examine the influence of willingness and motivation to change on the diversifying of teaching instructions of fourteen Mathematics teachers in Post Primary Level Schools of the Israeli Arabic educational system. The findings of this study might shed light on problematic aspects of the subject and help to consolidate alternative teaching methods according to the new program. The findings of the study shows the problematic aspects of the topic and assists in consolidating the alternative teaching methods in the teaching of the Mathematics with reference to the new program undertaken.

2. Importance of research

The researcher investigates the aspect of the problems involved in teaching Mathematics at a high school level after being experienced in teaching in a primary school level. It is essential to understand the relationship between willingness to change among post primary school mathematics teachers and the degree of diversity in teaching methods, the positive relationship between the level of overall motivation of teachers and the degree of diversity in teaching methods and the positive relationship between teachers' overall level of motivation and their willingness to change. The research thereby yields an appropriate result which helps in understanding these contexts and hence a good Mathematics teaching experience for the teachers as well as students in Israel.

3. Theoretical background
Mathematics teachers who handle the primary school are then supposed to handle those in secondary school as well. The teachers when shifted from one level to other, faces a few problems in teaching. The same happens in the classroom in the case of the students as well. They face certain difficulties in understanding the mathematics classes despite being taught by experienced teachers. This makes the necessity for a new study to be conducted on the issue with respect to the particular contextual reference.

In the post-primary school level classrooms, the teaching environment is a heterogeneous one where a particular teaches not only Mathematics but other subjects as well(OECD, 2009). But in the recent years, Mathematics teaching is often dealt with the teachers graduated in the field. The pedagogical knowledge of the teachers is of utmost importance in any field and hence in Mathematics too. This knowledge along with the

motivations of the teachers enhances the diversity in the methods of teaching which is also influenced by the motivational levels of the teachers. The influence of one factor makes major changes in the outcomes related to Mathematics teaching which requires a study to be conducted on the same.

4. Research questions
- What are the factors which influence the motivations of the post primary school Mathematics teachers?
- What affects the influence the diversity of the Mathematics teaching instructions?
- How is the motivational level of the Post Primary School Mathematics teaching staffs regulated?

5. Research Hypothesis/ Objectives

1. There is a positive relationship between willingness to change among post primary school mathematics teachers and the degree of diversity in teaching methods.
2. There is a positive relationship between the level of overall motivation of teachers, and the degree of diversity in teaching methods.
3. There is a positive relationship between teachers' overall level of motivation and their willingness to change.

4. Methodology

In this study, action research is used. The current study will self-report questionnaires from the study participants relating to the teachers in aspects like questionnaire of teachers willing to change, the questionnaires which examine the teaching motivation and those questionnaires relating to the attitude of the teachers towards the diversity of the methods involved in teaching. Figure 1 represents the methodology involved in the study.
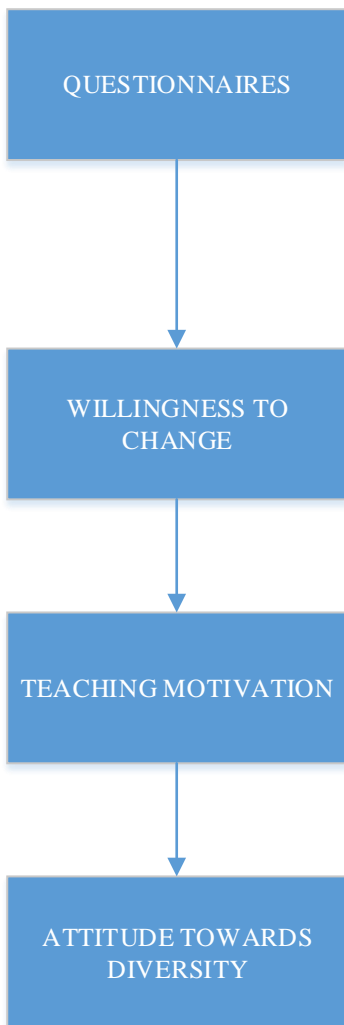
Figure 1 Methodology involved in the study

5. RESEARCH SAMPLE

The sample used in the research is that of 14 mathematics teachers in the middle school of Israel. The research population is the teachers in the Post-Primary School of the Arabic sector. The staffs taught Mathematics in the classroom and they are from Mathematics and Non-mathematics background.

6. RESEARCH TOOL

The research tools used in the study are self-reporting questionnaires which were answered by the research participants who are the teachers themselves. Basically, the questionnaires are divided into three.

1. Questionnaire 1- This examines the willingness of the concerned teachers to change. This was initially designed by the researchers Blau and Antonovsky in their research(Blau & Antonovsky, 2009). This proves to be of significance when deployed in this study. Hence the second part of the questionnaire which deals with the willingness of the teachers to change is used in this study.

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2. Questionnaire 2 – This questionnaire is regarding the examination of the motivation behind teaching. Ryan and Connell researched on motivation towards teaching and deployed a questionnaire which is used in this particular study Ryan & Connell (1989).
3. Questionnaire 3 – This deals with the position of teachers in the cases of diversified modes of teaching. Friedman developed a questionnaire on the positions of teachers with respect to diversified modes of teaching in the year 2009 Friedman (2009). This is used in the current research for measuring the frequency at which high order thinking and teaching strategies are used.

Apart from these, the participants further filled out the basic details for understanding their demography data.

7. RESEARCH PROCESS

Table 1 represents the responses concerned to the attitudes of the Post-Primary school Mathematics teachers towards the different teaching methods.

Table 1 Attitudes corresponding to the various habits of teaching

Sl. No.	Question	No. of Participants	AV
1	I encourage the students to ask questions even if I couldn't complete teaching my material on time inside the class	12	3.19
2	The student must be encouraged to ask doubts entirely about every part of the subject even if he/she is clear with the subject	12	2.75
3	Applying imparting learning skills affects the teacher's ability to finish syllabus and hence teachers must be careful about it	11	2.11
4	Teachers must closely work with the teachers of the particular field so that they can share their ideas with each other at the same time gaining knowledge as well	10	3.21
5	The teachers allot a few minutes for encouraging student curiosity in the students for out of the syllabus topics too which will enhance their knowledge	14	3.29
6	The teacher must allot a certain time in class for improving the thinking skills of the students which enhances the overall thinking skill of the student as an individual	13	1.95
7	The teacher must allot a particular time for the students in every class to give a wide knowledge about the world and the happenings all around it	14	2.97

8	When teachers who have mastered different fields of study, work in correlation with each other, then on each of them if they take the same class, it will confuse the students.	10	2.23
9	Teacher is the source of knowledge from which the ideas are shared to the students. Hence the ideas get transferred from the teachers to the students. This is done in the class during the brain storming sections as well.	8	2.35
10	When students continuously question in class, it stops the continuity in class and hence it must be discouraged	12	1.75
11	A certain time must be allotted in each class for clearing the wrong perceptions and ideas of students regarding the subject taught in class	12	3.1
12	The teacher must focus only on the teaching material and should not divert the class into the questioning of students	12	2.0
13	The instruction in education is to transfer the knowledge from the teachers to the students shaping them as well.	12	2.37
14	The teachers must assess the ability of the students in applying the skills and knowledge taught inside the classroom	8	3.32
15	The teacher must allot time in each of the class to develop the thinking skills among the students thereby improving their ability	9	3.30
16	The students must be designed according to the system of education by the teachers and thereby moulding there ideas	13	2.96
17	A teacher must concentrate only on the particular field of education and should not teach related topics which are out of the syllabus	14	2.22

Table 2 represents the various teaching strategies of the teachers

Table 2 The favourite teaching strategy of teachers

Sl. No.	Question	No. of participants	AV
1	The teacher must encourage questioning of students in the class. This improves their knowledge. Therefore increases the clarity about the subject.	12	3.13
2	The teacher must handle the class with a great sense of humour therefore	9	3.13

	increasing the liveliness of the class as a whole		
3	The teacher must ask the students various questions on the subject to ensure that the students are clear with the subject	7	2.95
4	The teachers consider frontal teaching as a better kind of teaching as compared to the other existing methods	9	3.07
5	By using comparison tables and flow charts the understanding of students of the particular subject is clearly studied giving way for more sessions to be adopted by the Mathematical staffs on the same	6	3.37
6	At the end of the class the teacher gives oral as well as written feedback to the students which are essential for a constructive well-being of knowledge of the students.	8	2.37
7	The teacher must encourage the student to create an environment which is clearly based on questioning section of a class	11	3.07
8	Teacher must compares his/her knowledge with other professionals of the field to ensure that they update themselves with the latest developments for teaching the same to the students	13	3.29
9	The teacher must focus only on the content to be taught leaving behind the questions of the students which otherwise consumes more time	8	3.47
10	Assignment works are given to the students for doing at home and class which gives more knowledge about the subject assisting easy study	13	3.43
11	The teachers must interact with the teachers of other fields as well and gain knowledge regarding the same	14	2.95
12	For an effective flow of class, the teacher should not encourage questioning among the students which otherwise consumes more time	12	2.19
13	Many kinds of sessions are done in a single class for improving the understanding of the subject for students	12	2.81

14	The teachers must encourage the students to improve the thinking skills in the class environment	13	1.79
15	The teacher must examine the ability of the student to think which can help him/her in improving themselves	6	3.31
16	The teacher must check the ability of the students to apply the knowledge learned in class in a practical way	8	2.05

The willingness of the teachers to change are represented in table 3.

Table 3 Willingness of the teacher to change

Sl. No.	Question	No. of participants	AV
1	Teaching a new syllabus different from the existing one	13	1.31
2	Teaching students of a different age group as compared to the ones current taught in classes	12	3.17
3	Shifting to a new field of teaching entirely different from the current field of teaching which is Mathematics	13	3.89
4	Separation from family for professional reasons. For example getting separated from daughter. Living in an isolated way.	6	3.57
5	Changing the profession from teaching to some other field of working	6	3.57
6	Shifting to a completely new locality for the purpose of teaching students	6	3.57

8. DATA ANALYSIS

Diversity in Teaching Methods

The common statements used by the teachers in classrooms showing various attitudes of the teachers are in a post-primary setting are tabulated in table 1. The teachers who participated in the research study, believed that the ability to think is more crucial than knowledge. They support lateral teaching finding a co-ordination between professional method of teaching and normal method of teaching. More than one-third of the teachers compare the teaching in the context of the world. They feel that a whole-lot of time is consumed in constructing a bridge between the knowledge gap of the students. A major

portion of the teachers are also interested in building up curiosity in the students on the out of syllabus subjects too. More than three-fourth of the teachers feel that the shaping of the world views of the students are the responsibilities of the teachers. Around 50% of the teachers felt that the imparting of learning skills spoils out the submission of the goals concerned to the lesson and the material provision hence studied. More than 70% of the teachers indicated that the teachers from the fields of study who are dealing with the same subject create confusion in students. The same rate of teachers felt that the entire source of knowledge is the teachers themselves and their responsibility is to transfer the knowledge to the students. More than 80% of the teachers felt that the questions of students are detrimental to the teaching of lessons in class. But an ideal percentage of them stress that the teachers are supposed to provide necessary information to the students thereby answering them. As a result, it can be understood that the willingness of the teachers are directly connected to the diversity of the teaching modes. The higher the willingness of the teachers towards changing, the higher will be the diversity in the modes of teaching. This is represented in table1.

Preferred Teaching Strategy

The preferred strategy employed by the teachers in teaching are represented in table 2. Around 80% of the teachers felt that encouraging the students to question is detrimental to the material supplied even if the questions are not directly related. The teachers basically use different activities, use humour and even get the students done with assignments. They communicate with the teachers from the other fields and compare their knowledge with that of the teachers. Above 80% of the teachers asked so many questions to make themselves clear that the students are clear about the subject and they don't have any doubt regarding the same. Around 90% for the teachers they train their students to improve their thinking skills giving them appropriate feedback. 60% of the teachers accept frontal teaching as the method deployed in the classes. More than half of the teachers felt that they focussed on teaching without interfering with the teaching content of the staffs. Less than half of the teachers focussed on the thinking skills used. A good proportion of the students stopped their students from asking questions since it delays the time taken by them in taking the class.

Willingness of the teachers to change

The average number of statements examining the willingness of the teachers to change is represented in table 3. The corresponding average number of teachers who are willing to change is relatively very high. The teachers are more willing to change in accordance with the syllabus rather than relocating themselves to a new locality for teaching.

9. FINDINGS

The attitude of the participants regarding the different aspects of teaching are represented in figure 1.
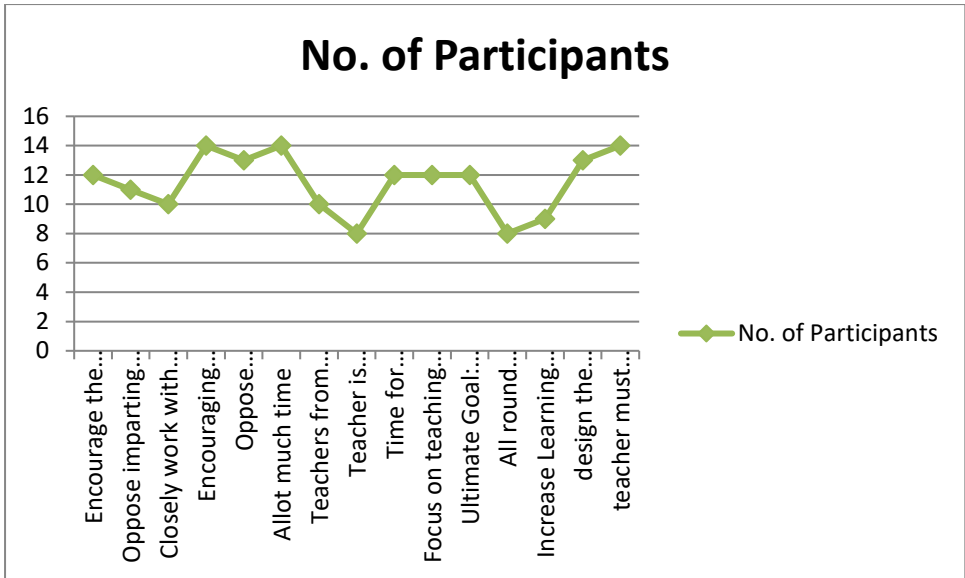
Figure 2 Attitude of the participants regarding the different aspects of teaching

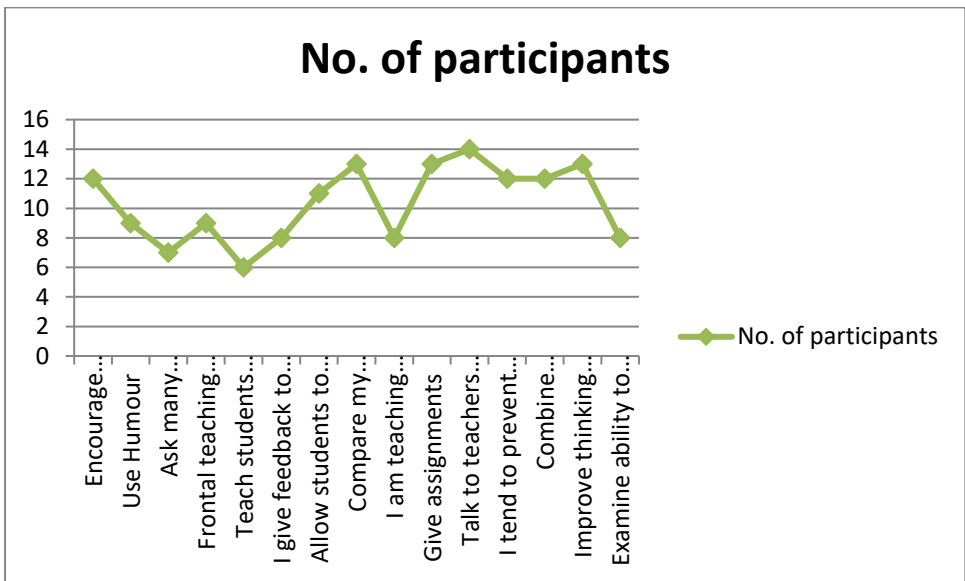The favourite teaching strategies of the teachers are represented in figure 2.

Figure 3 Favourite teaching strategies of the teachers

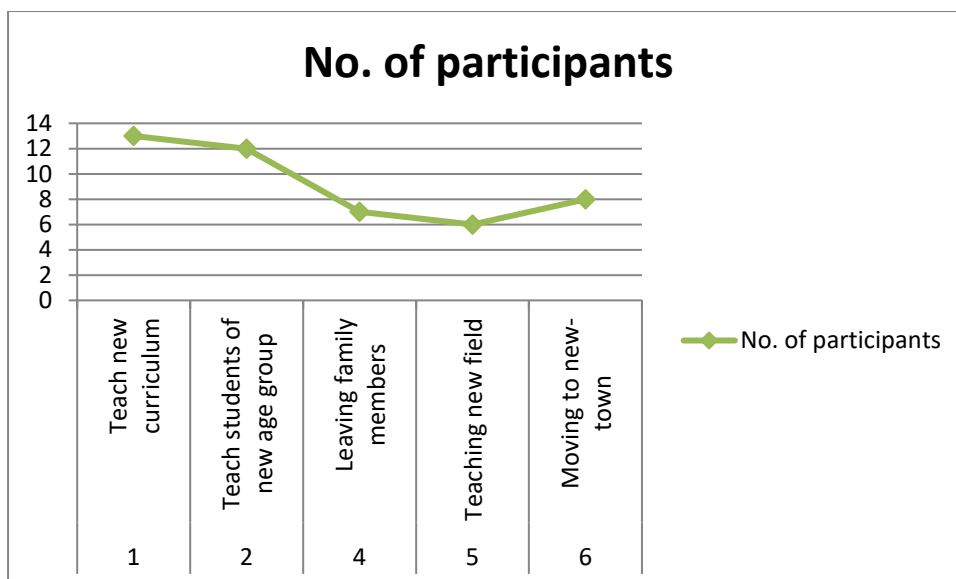Figure 3 represents the responses related to the willingness of the teachers to change

Figure 4 Willingness of Teachers to Change

Table 4 represents the Pierson-Correlation(Djordjević et al., 2021). Here the motivational level of teachers and the diversity in the measures of teaching are the research variables used.

Table 4 Pierson-Correlation between two variables

Significance	Correlation
0.000	**0.885

Motivational Level of Teachers * Diversity measures of teaching

*p<0.05

**p<0.01

***0.001

n=14

With rp=0.885, the results indicate that the willingness to change among the teachers can affect the diversity in the teaching methods to a large extent. Hence the hypothesis tested is significant.

Table 5 represents the Pierson-Correlation between the motivational level of the teachers and the willingness of the teachers to change(Koerner & Zhang, 2017).

Table 5 Pierson Correlation between two variables

Significance	Correlation
0.000	**0.724

Motivational level of Teachers*Diversity of Teaching Methods

*p<0.05

**p<0.01

***0.001

n=14

Here the value of rp=0.724, the motivational level of the teachers is positively related to the diversity in the teaching methods. Hence the hypothesis tested is positive. Hence this supports our assumption that with the increased level of motivation among the teachers, there will be a higher diversity level in the teaching methods.

Table 6 represents the Pierson- Correlation between motivational level of the teachers and their willingness to change(Wan Mohamed Radzi et al., 2019).

Table 6 Pierson Correlation between two variables

Significance	Correlation
0.000	**0.885

Motivational level of Teachers*Willingness of the teachers to change

*p<0.05

**p<0.01

***0.001

n=14

There is significance in the value of general motivational level of teachers in connection to the willingness of the teachers to change. Hence for a higher motivational level, there will be higher willingness to change. With varying levels of motivation among the teachers the willingness of the Mathematics teachers will also change.

10. DISCUSSION AND CONCLUSION

The discussion part of the research focuses on the findings of the research. Here three main factors are examined.

- The first on is the willingness of the teachers to change
- The second one is the motivational level in the teachers
- The third one is the diversity of the teaching methods.

In the case of teaching, there are a number of approaches regarding the willingness of the teachers to change and the case of the diversity among the modes of teaching. According to Fullan, the changes in education are alternative kind of actions which are performed in a particular frame of time(Fullan, 2001). It might be the adapting to something which is very different or any kind of idea of performing something in a different manner in one or more than one component other than kind of way it was previously considered once or the replacement done with constructive or content which is related to the component with another component which is better(Fullan & S. Stiegelbauer, 1991).

Another approach towards education deals with it as a change with the case of patterns of regular behaviour of the school faculty into that of a different kind of new behavioural

patterns. Also as a kind of learning which is centred around the concept of how to make something new(Sarason, 1996).

The results of the study show the willingness among the Mathematics teachers in participating a changing process which can affect the estimation of the modes of teaching.(Midgley et al., 1989) The findings are in line with that of Rogers who argued that the ability to adapt to change is a decision related to a particular individual for utilising the innovativeness as a kind of best mode available(Rogers et al., 2014). Hence there is a possibility that when there is willingness among teachers and they are ready for a change in education, the diversity among the modes of teaching rises to a large extent.

This finding is also supported by the approach of Sharan & Sharan (1991) who perceive change as introducing new elements to the system or (program) with the intention to improve performance to achieve the desired results(Sharan & Sharan, 1991; Škerlavaj et al., 2007).

The second research hypothesis referred to the effect of teachers' motivation diversity of teaching modes. The research findings indicate strong positive connection between these two variables. The findings also indicated that the teachers are aware of the significant effect of motivation on various aspects, including their readiness to diversify their teaching modes. These findings support the observations of some researchers that teachers with high motivation can integrate and make practical usage of various types of knowledge and impart learning content in various modes

The research findings also confirmed that that willingness and readiness to change positively affects motivation. The questionnaire analysis validated, in fact it revealed that all the three variables are inter-connected, and therefore, affecting each other

The need to initiate pedagogical changes to adapt the school to the needs of the 21st century concerns several educators throughout the world(Garrison, 2000). There is an abundance of ideas, initiatives, reforms, innovations, experimentation and technology related developments these findings support several studies in the field regarding the mutual positive interconnection between teachers' motivation, diversity of teaching modes and teacher's willingness to participate in an educational change

11. CONCLUSION

The willingness of teachers to change upon the motivational level and the diversity of teaching modes and willingness is investigated in the current study. In the study, fourteen teachers in the middle school level of a few schools in Israel are considered in the study. The study revealed that there is a strong relation between the three variables. The study shows the positive mutual connection between three variables. The first one is the willingness of the teachers to change which is positively affected by the motivational level of teachers and the different modes of teaching are thereby influenced. The motivational level of the teachers is largely affected by two variables. They are the high level of motivation which is and the diversity among the teaching methods. The results indicate the close relation between each of them.

The study also validates the original model developed by Blau and Antonovsky aimed to understand teachers' position regarding technology usage and reveals connection

between the teachers' willingness to change, the measure of digital media usage and teaching motivation(Blau & Antonovsky, 2009).

The research findings support the approach recognizing the connection between motivation, willingness to change and the measure of teaching modes diversity. The motivation level of the research participants was found to be high – the teachers also recognize the importance of willingness to change and the need to diversify the teaching modes used in teaching Mathematics.

Thus, the main conclusion of this research is that willingness to change, which is connected to motivation, is a factor inviting the teachers to diversify their teaching modes. Therefore, in order to assimilate changes in teachers' working modes, like diversifying their teaching methods or in any other way, there is a need to encourage and nurture their motivation.

The findings indicate that the three variables are interconnected, affecting each other; willingness to change is essential to cooperation among the teachers. Recognition of the need for a change affects teachers' motivation and their willingness to diversify their teaching modes and can be a key factor encouraging teachers to seek professional success(Ames, 1990)

In light of the above, it is recommended to conduct continuing studies that will also look into variables such as: teachers' education, age and gender(Miner & Clarke-Stewart, 2008). It is also recommended to conduct future study on a larger scale and in various populations(Rutkowski & Svetina, 2014).

12. RESEARCH LIMITATION

The research participants are limited to a particular school which restricts the access to a wide acknowledgement of the views of Mathematics teachers teaching at post primary school level. The research doesn't take into account the personal opinions of the teaching staffs in subjects other than Mathematics. The teachers who are experienced for more than 30 years will provide a better vision of the same. But teachers of all experience categories are used in the research.

13. FUTURE RESEARCH

Further researches in future can be conducted taking into account more than 100 samples(Thompson et al., 2007). The Mathematics teachers can be considered from as many as ten schools from the country(Staub & Stern, 2002). The metrics used for the study can be substituted with latest tools used in the study(Aithal & Aithal, 2020). Furthermore research can be done extensively across the entire nation across various schools extending the research to a higher level like university and post university levels of education.

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