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**The Impact of Graded Cognitive Based Assignments on
Mathematics Performance of Arab Middle School Students
in the North of Israel**

Ph.D. Abstract

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Abstract

Since the mid-1950s, students have been required to do homework. Literature research shows the importance of homework to teachers, parents, and students on one hand, and on the other, it exposes the emotional, social, and family problems caused by large, unintentional quantity of homework, difficult tasks, a lack explanation from the teacher and the type of parental involvement (Coutts, 2004). The objective of the present study from the importance of math homework and the achievements of students in this very field. One of the main goals of education systems across OECD countries is developing independent learners who are able to direct themselves. This issue was expressed mainly in doing homework preparation. Doing homework independently is a skill required of the student throughout his or her years of studying (Hong, Milgram, & Rowell, 2015). This study aims at exposing and examining the attitudes of Arab Middle School students in Israel towards the use of homework associated with mathematics and the effect of using accompanying home exercises to raise the educational attainment of mathematics in Arab schools in northern Israel.

The researcher based his study on the '**mixed method**' model, applying the convergent parallel design, in which the quantitative and experimental methodologies are equally prioritized.

The current study was including two samples they take part in this research: (a) 500 students were a representative sample based on a proportionately and randomly selected sample to examine the attitudes of Arab Middle School students in Israel, towards the use of homework associated with mathematics they were chosen from junior-high schools in northern Israel. And (b) 180 students were form a representative sample based on a proportionately and randomly selected sample half of them is an experimental group and the other half is a control group to examine the effect of using homework to raise the educational attainment

The finding of the study show that most parents and students identify the goals and importance of homework. However, among the barriers that limit parents and students in doing homework is the length and amount of homework. Homework influence the interaction of the triangle parent-student-teacher relationships. The research suggests the parents and students' solutions to promote the students in three levels: educational, interpersonal, social and educational spheres and the student learning Pattern. This study raises several dilemmas between the existing and desired according to students and parents' opinions.

Keywords: Homework, Mathematics, Attitude, Educational Attainment.

I. Introduction

Homework is one way of applying the material taught in class and reviewing the information acquired at school. Homework is a very significant issue in education that has occupied scholars for ages, specifically concerning its quantity, quality and level of difficulty. No matter what the level of cognitive skills (knowledge, understanding, application, etc.) that homework is based upon, it can turn into a burden on the students' learning process. Unless teachers take into consideration the students' abilities, capabilities and stages of development, the level of homework can negatively influence the student's interaction with it, especially in mathematics.

Heyd-Metzuyanin (2015; 2016) talked about the negative impact of homework on students and its dimensions, and the reasons for the fear of mathematics in students. She also touched on the impact of homework on the pattern of study, procedural learning, or conceptual learning, and what affects the student and his tendency to learn mathematics. Modern educational philosophy focused on the learner as the axis of the educational process, and practical teaching must take into account the overall benefit for learners and give consideration to personalities and individual differences (Hong, Mason, Peng, & Lee, 2015).

Following the foregoing, the researcher deems it necessary to study the impact of homework on the syllabus for students in the upper basic stage of mathematics because of their importance in educational achievement. The significance of this research on the most important topic that affects learning and teaching mathematics is that teachers who help their students to develop their minds must take into consideration their orientation and desires and know the impact of homework on the students. They must make teaching a process that is characterized by excitement and participation and cooperation between them and their students.

II.1. Statement of Research Problem

The weakness of school students in mathematics is a real issue for both students and teachers, and also affects the family and society. It is an old problem that has persisted for years despite the efforts of the educational providers and their solutions that attempt to minimize the impact of this problem which is manifested in the final

examinations of the students. The researcher noted that there was a clear problem in the education of students in mathematics, and his remarks were based on following up on problems impeding the educational process in students at the upper basic stage, problems that hinder the course of the mathematics teaching process. The best way for the student to understand and grasp the subject of mathematics in general is to perform a lot of mathematical exercises repeatedly and to solve the questions and examples related to these topics. The researcher also observed that the majority of students neglected and did not perform the accompanying home exercises assigned to them by the teacher at the end each lesson, which deprives them of important experience in dealing with and solving the exercises and performing the assignments associated with mathematics. The researcher therefore found it necessary to look into the problem in terms of its causes and consequences for the subject of mathematics among students at the upper basic stage.

II.2. The Objectives and The Significance of the Study

The purpose of this study is to identify the impact of the use of the taxonomically graded task assignments homework among students in Arab Middle Schools in northern Israel and their attitudes towards mathematics, and to examine at what levels of thinking (according to Bloom taxonomy) it will be effective, and whether it improves their achievements in mathematics.

The importance of the study stems from the importance of home exercises in the educational process, and in helping students to perform these exercises in the following ways:

1. To enhance students' self-learning abilities. The teacher cannot complete the course of study through the lessons given, but by increasing the ability of self-learning they can give students a greater opportunity to deepen their understanding of the material, which will increase their confidence in themselves and their abilities.
2. To improve the level of achievement and increase it, by supplementing and illustrating what is presented in class and by improving and upgrading their abilities through giving them tasks that will raise their level of thought and understanding.

3. To fulfill the objectives of the lessons on mathematics and to assign more exercises on the educational materials and understanding of the subject because the syllabus in mathematics is large and extensive and needs to be supplemented by additional study.
4. To highlight the individual differences among students in terms of weaknesses in performing their homework and discovering the educational difficulties and common mistakes they have.
5. To identify the reasons why students neglect homework in mathematics and learn about the impact of this neglect on the student group.

II. Literature Review

Homework can be considered as a means of strengthening the education and measurement of educational resources based on evaluation. The student's progress and the growth of his level of education depends on the variety of homework that the teacher assigns to his students to perform outside the classroom (Cooper et al., 2006) Homework is defined as tasks assigned by teachers to their students to be completed after school.

For decades, educators have found that it was impossible to teach everyone the basic elements in a particular area of knowledge during the years of formal education. They then turned to focus on teaching students how to teach themselves and to develop a method of problem solving and creative thinking (Walk & Lassak, 2017).

These developments have been reflected on curricula and teaching mathematics. Recently there has been a special interest in learning mathematics and teaching it to make students aware of the process. It has been observed that by changing the method of teaching this materially exclusively providing information and imparting mathematical skills to students, the attention of teachers is now focused on developing the students' abilities to face problems and on creating situations that provoke thinking and the recollection of past experiences and it reflect in doing homework (Núñez, et al., 2015).

According to Trauwein and Koller, (2003), Homework links several active sides together, parents, students and teachers. It serves different goals such as enhancing student performance, developing thinking, as well as solving problems, which definitely affect the course of the lesson in regard to discussing homework, solving it and checking student's understanding of the material. Homework includes different

levels of challenge and different types of questions, starting from simple tasks to the most complex ones; consequently, this shows the importance of researching homework. Researchers classify homework as an interesting issue due to its implications and influence on the student's relationship with the subject matter, in terms of its types, ways of presentation to students, and how often it should be given to students on a weekly basis. The researcher pointed out that homework is based on three main axes: teacher, student, and the learning environment. Homework should contain clear and meaningful goals that aim to promote greater understanding of the material and increase the student's motivation to get closer to the subject. (Catherine M. Scott and Nelda Glaze, 2017).

Homework is one of the principles of teaching. It is considered as a process of evaluating the objectives of the lesson and their achievement. Homework helps the teacher to identify the weaknesses of the students and thus addresses those weaknesses or reinforces the strengths of the students. Despite the importance of homework in improving and enriching the educational process, students do not always give it enough attention and they view it as unnecessary. As a result, homework loses the purposeful role for which it is given, causing students to develop undesirable habits such as cheating or counting on others, by copying homework from their classmates, or dropping out of lessons and developing all kinds of misbehavior to hinder the teaching-learning process in the class.

The importance of homework in helping the learners improve in math because it is both a continuation and review for the instruction that is done in class. Decision makers in the ministry of education in Israel also focuses on the parents' role in helping and motivating their children to do homework. Therefore, for a wider understanding of the concept of homework, it would be beneficial to define it and shed some lights on the benefits of giving home work.

II.1. Homework Quality

Astleitner H. (2007) noted that homework is a set of tasks that supports learning. It reminds the students of prior knowledge of the subject matter and increases the

understanding of the material. Therefore, accuracy in selecting and designing homework is required (Astleitner, 2007).

Kunter & Baumert (2006a) added that homework tasks which require low levels of thinking aim at reminding the student of taught material, whereas the complex ones aim at increasing the students' levels of thinking. The main problem is that research focuses on the quantity of homework, not on its quality, despite the importance of adjusting homework to the students' levels of thinking (Kunter & Baumert, 2006a).

Trautwein, & Lüdtke (2007; 2009) found a positive relationship between the level of homework, the preparation of that homework by the teacher before being given to the students, the preparation of the questions level, the quality of the questions, the suitability between the level of questions and the students' levels and strengthening the status of the homework for students and the effort needed to be done. It is worth mentioning that there is a negative incentive for doing unguided homework, which was not suited to the level of students' thinking. The issue of adjusting homework assignments to the students' thinking level is very meaningful for enhancing the students' relationship with homework and the teaching material (Trautwein & Ludtke, 2007; 2009).

For any homework to be qualitative, teachers have to take into consideration the level of homework as opposed to the level of the learners' thinking. Adjusting homework to the level of the learners and considering the quality of the homework content rather than the quantity of the exercise, could motivate the learners to work it out and achieve the teachers' goal from giving homework. Besides the aspect of quality, there also the educational standards that teacher should consider before giving homework.

II.2. Problems related to homework

Some students get involved in all sorts of bad habits that prevent them from doing their homework, such as watching TV shows or playing video games or mobile games and shows. Some of the students, especially in elementary level, work hard to do their homework, while others skip it for doing sports and playing. Moreover, there are students who simply prefer playing to doing homework when they realize that the homework they supposed to do is challenging. Therefore, if parents organize the time of the activities their children enjoy doing and help the teacher in raising their children's

efforts in doing homework they will improve the educational level of their children remarkably. Lots of students work hard to get high grades in order to satisfy the teacher, or parents or to be admired by their peers, whereas few strive for the sake of the professional future, acquiring knowledge or attending college, therefore they blame themselves if they do not achieve their goals. Consequently, parents should be aware of these conducts and do their best to improve their children's performance. Parents should find a way to convince their children to do their homework accurately. However, parents should be moderate with their demands because children see their parents' pressures as threatening their independence; the more the pressure the parents use, the more resistant the children will be. Low grades at school is the children's best way of showing their independence from their parents, thus parents should be careful with their persistence. The parents' continued assistance in their children's homework for many years after the children grow up causes low achievement at school (Xu, Fan, & Du, 2017).

The research that Burriss Kathleen and Donald Snead (2017) carried out, aims at understanding the students' view of homework and the role of homework in the teaching process. The sample consisted of 506 students from junior-high who share their perceptions and ideas regarding the effectiveness of homework.

The students identified a number of educational and non-educational reasons for doing their homework assignments, parent and teacher pressure including memorizing and understanding the material and promoting educational material, reward and punishment and a lack of interior motivation.

The research also addressed the issues related to doing homework tasks from the point of view of the student. The students talked about their negative feelings towards homework and just have an external motivation; they addressed the teacher's motives and his exploitation at the end of the school day which increases their pressure. They also complained of the vague homework that are not checked by the teacher neither they provide efficient learning (Kathleen & Snead, 2017).

One of the reason for not doing homework is the students engagement with playing. Some students choose playing because it is less demanding than doing homework and some choose playing because homework looks challenging for them. Here comes the role of the students who have the responsibility to make a sort of order to their kids daily activities and most important trying to understand what their sons reject doing that and then provide the assistance to prevent more excuses from their children.

Getting the children to do their homework does not mean that they will do it properly. The following part will present a number of behaviors that indicate the students' failure in doing their homework properly.

The objective of the present study from the importance of math homework and the achievements of students in this very field. One of the main goals of education systems across OECD countries is developing independent learners who are able to direct themselves. This issue was expressed mainly in doing homework preparation. Doing homework independently is a skill required of the student throughout his or her years of studying (Hong, Mason, Peng & Lee, 2015).

Homework links several active sides together, parents, students and teachers. It serves different goals such as enhancing student performance, developing thinking, as well as solving problems, which definitely affect the course of the lesson in regard to discussing homework, solving it and checking student's understanding of the material. Homework includes different levels of challenge and different types of questions, starting from simple tasks to the most complex ones; consequently, this shows the importance of researching homework (Trautwein & Lüdtke, 2009).

This study aims at exposing and examining the students' perceptions of mathematics toward homework in junior-high schools (7th-9th grades) in the Arab population in northern Israel, and their impact on raising student achievements in mathematics.

II.3. Questions of the Study

To answer the problem of homework in the study of mathematics, we are addressing two main questions:

1. What are the attitudes of Arab Middle School students in Israel towards the use of homework associated with mathematics?
2. What is the effect of using accompanying home exercises to raise the educational attainment of mathematics in Arab schools in northern Israel?

III. Method

The researcher based his study on the '**mixed method**' model, applying the convergent parallel design (Creswell, 2007), in which the quantitative and experimental methodologies are equally prioritized. In this design, the quantitative and experimental data are collected concurrently during the study, are analyzed separately, and the results are merged during interpretation. In this 'Mixed Method':

- (1) The researcher used the quantitative approach which aims to examine the attitudes of Arab Middle School students in Israel towards the use of homework associated with mathematics.
- (2) And the researcher used the experimental approach with both pre- and post-semi-experimental design for two experimental groups (Experimental Group and Control Group), (Campbell & Stanley, 1972), which aims to examine the effect of using Graded Cognitive Based Assignments on Mathematics Performance of Arab Middle School Students in the North of Israel.

III.2. The Study sample

The study population consists of Arab students in junior-high school (7th, 8th, 9th grades) from the north of Israel, with a total number of 26,643 students, and about 8,800 students in each grade, (2019-2020).

The current study was including two samples they take part in this research:

- (a) 500 students were a representative sample based on a proportionately and randomly selected sample to examine the attitudes of Arab Middle School students in Israel, towards the use of homework associated with mathematics they were chosen from junior-high schools in northern Israel. It should be emphasized that none of the math's teachers in the control group were exposed to the PISGA¹ training program, applying Bloom's graded cognitive skills in teaching and math assignments' selection.
- (b) 180 students were form a representative sample based on a proportionately and randomly selected sample half of them is an experimental group and the other

¹ Professional Development Centers (PISGA) for teachers training in Israel.

half is a control group to examine the effect of using homework to raise the educational attainment in the first three graded cognitive levels of Bloom's Taxonomy: knowledge, comprehension and application in mathematics in Arab schools in northern Israel. The experimental group use Graded Cognitive Based Assignments reflecting the taxonomy of Bloom in each lesson, addressed and administered by the specifically trained PISGA math teachers.

The table (2) below sums up the two research questions, the sample, the research tools employed and the data analysis.

III.3. The Study Tools

III.3.1. The First Research Question

To achieve the first objective of the research, to determine the different attitudes of Arab Middle School Students in northern Israel towards the use of homework associated with mathematics, the researcher will administer a questionnaire (see Appendix A).

Questionnaire

After studying the demands of the current research and the previous studies related to the subject of the study, the researcher designed a questionnaire to be handed to junior-high students (The questionnaire is available online in due course).

The items of the closed Attitude Questionnaire reflect three categories: - Motivational, Behavioral and Cognitive Characteristics, it consisting of 49 statements which were composed by the researcher to examine the attitudes of Arab Middle School Students in Israel towards the use of homework assignments with mathematics.

The five-point Likert scale of the responses available is used for ranking the items of the questionnaire i.e. Always (5), Often (4), Quite Often (3), Rarely (2) and never (1), where '5' is the highest score (Always) and '1' is the lowest score (never).

III.3.2. The Second Research Question

To assess the effect of the PISGA training of maths teachers in Bloom's graded cognitive Thinking and in homework assignments selection and performative feedback techniques, an official standardized examination will be administered by the academic year- 2020, online.

The researcher passed a Pre- Test to check that the control and experimental group are equal in terms of achievement.

And a Post-Test to examine the effect of the experiment and the second research question is designed to re-inforce the assumption that the experimental group will perform significantly better in the standardized state exams- RAMA and the math's Inspectorate of the Ministry of Education, Than the Control group.

PRE-TEST

After choosing the participates in the experience. with the help of their teachers, the participants were assessed by an exam (the same state standardized tests of RAMA and the Inspectorate of maths (Ha'MAFMAR)), which includes 9 questions according to the following division (3 questions based on knowledge, 3 questions based on comprehension and 3 questions based on application) and it will be 60 minutes long, which contain materials students were learn to in the previous year.

The results of the tests showed that both groups: Experimental group and Control group have the same level of thinking according to Bloom.The researcher carried out the Exam (pre-test) for both groups before starting the experiment. After being processed by SPSS, there were no statistical significant differences between the averages of both groups concerning their thinking levels before conducting the experiment (Table 8).

The findings are presented in Table 1 below:

Table 1: Pre-test results in general.

	Control group N=90	Study Group N=90	t(179)
Mean	74.33	74.38	-0.06
Std. Deviation	6.53	5.98	

The findings of the statistical treatment indicate that there is no significance difference between the control and research groups ($t(179) = -0.06, p > 0.05$).

The Experimental Program

The researcher delivers complementary course to teachers in professional development in mathematics at the Center for teachers' Professional Development (PISGA). 31 mathematics teachers participated in the course. Those teachers teach in 8 Arab junior-high schools in the northern of Israel. All teachers have a mathematics teaching certificate to teach in a junior-high school. All of them have teaching experience of four to twenty years. The average seniority of all teachers participating in the course is 9 years. The average number of math hours that teachers teach per week, is five hours per class. The complementary course is 30 hours, divided into 10 sessions, each one is 3 hours.

Sakhnin PISGA is responsible for activating the complementary course, which took place in the Elbatof Juinior-High School in the Arabi village in northern Israel.

Using graded cognitive based assignments is an essential part of the course syllabus.

Program Content

The researcher will be using the Rectangle unit for the seventh grade, the Similarity of Triangles unit for the eighth grade and the Quadrangles unit for the ninth grade of mathematics from the official syllabus in mathematics. These are the approved program of the Israeli Ministry of Education which will be used in the current research

The lessons will be held over a course of 12 weeks, with one lesson of 45 minutes every week.

POST- TEST

The comparative maths assignments reflect the official state geometry syllabus of grades 7, 8 and 9. A specialist team of Mathematicians and Testiologists experts were select the relevant exam questions to meet the graded cognitive based assignments and guarantee their Logical Validity.

It should be pointed out that none of the maths teachers in the Control group were taking part in the PISGA training program.

The researcher classified the questions of the tests reflecting Bloom's taxonomy, taught in 12 lessons divided into different topics, which includes 9 questions according to the following division (3 questions based on knowledge, 3 questions

based on comprehension and 3 questions based on application) and it was a 60 minutes long, which contain materials students were exposed to in the program

Table 2: sums up the two research questions, the sample, the research tools employed and the data analysis

Research Questions	sample	Research tools	Data analysis methods
What are the attitudes of Arab Middle School students in Israel towards the use of homework associated with mathematics?	junior-high schools from the north on Israel. N=498,	Questionnaire on 1 to 5 Likert Scale.	Quantitative Methods: Mean and Standard deviation. Frequency Tables.
What is the effect of using accompanying home exercises to raise the educational attainment of mathematics in Arab schools in northern Israel?	junior-high school students from northern Israel. N=180 N=90, Experimental group, and N=90, control group.	State designed official comparative exams.	T- test of the differences between the Experiment and Control groups.

IV. FINDINGS

the research findings:

Finding of the first research question:

- Preparation of homework among junior high pupils is influenced both by internal motivational factors and by the external motivational factors of parents and teachers. At the same time, intrinsic motivation is more significant than external motivation by teachers or parents.

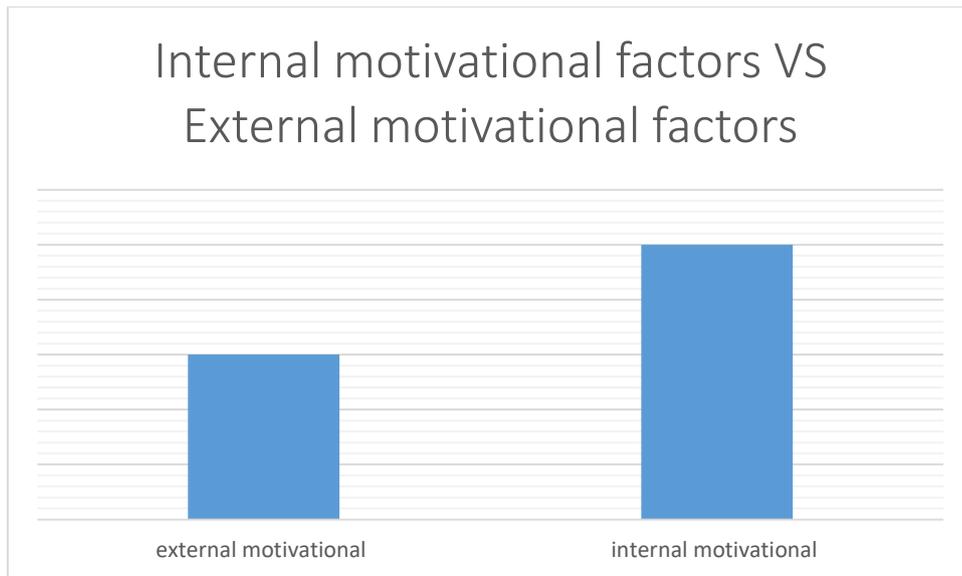


Figure 1: Internal motivational factors VS External motivational factors

- Changes exist in the force of internal and external motivational factors as the pupils grow up, and there are also gender differences. However, these differences are not consistent and can be considered more as achievement characteristics, more typical of pupils at a higher level and less typical of youth in Arab society in general, among whom there is a significant decrease as they grow older in the perception of achievement and in the importance of learning.

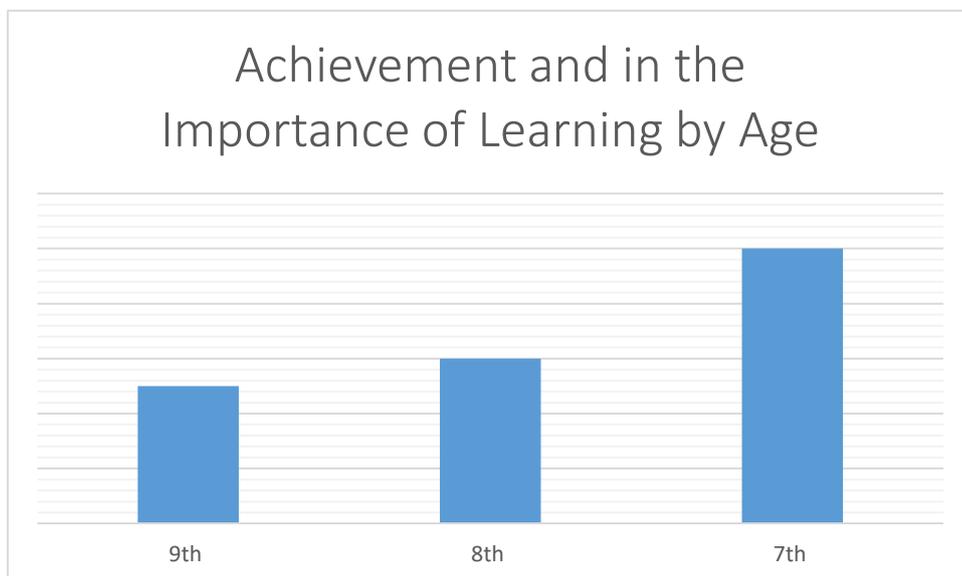


Figure 2: Achievement and in the Importance of Learning by Age

- The most influential dimension on homework preparation is consistency in diligence. This pattern is highest among young pupils (Grade 7) and declines

with age. There is a positive link between this characteristic and the factors of internal and external motivation, which expresses a greater readiness to prepare homework and to spend hours in homework preparation.

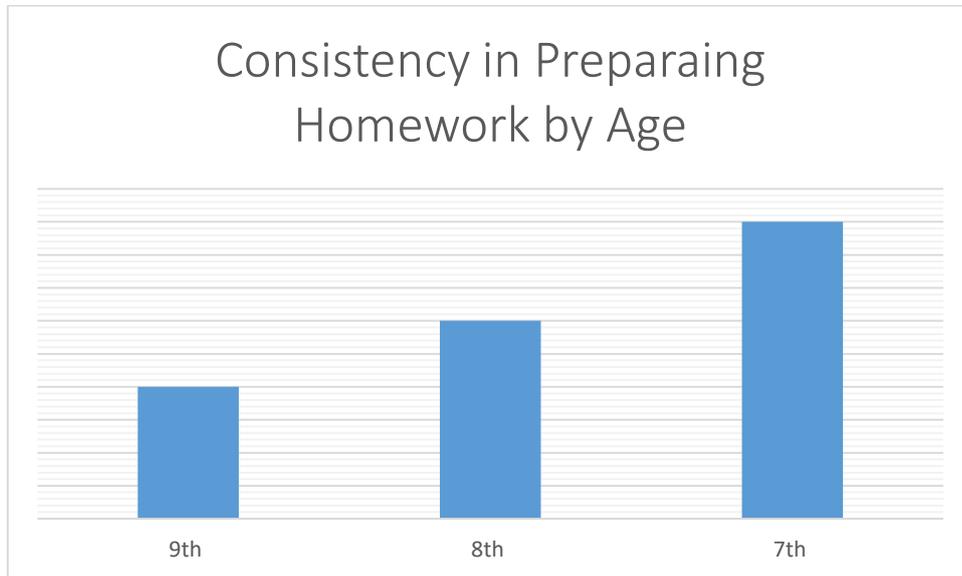


Figure 3: Consistency in Preparing Homework by Age

- Another prominent dimension in the preparation of homework is personal responsibility, and it was found that it is highest among girls. It also changes with age, as well as being linked with internal motivation, but not with external motivations for homework preparation.

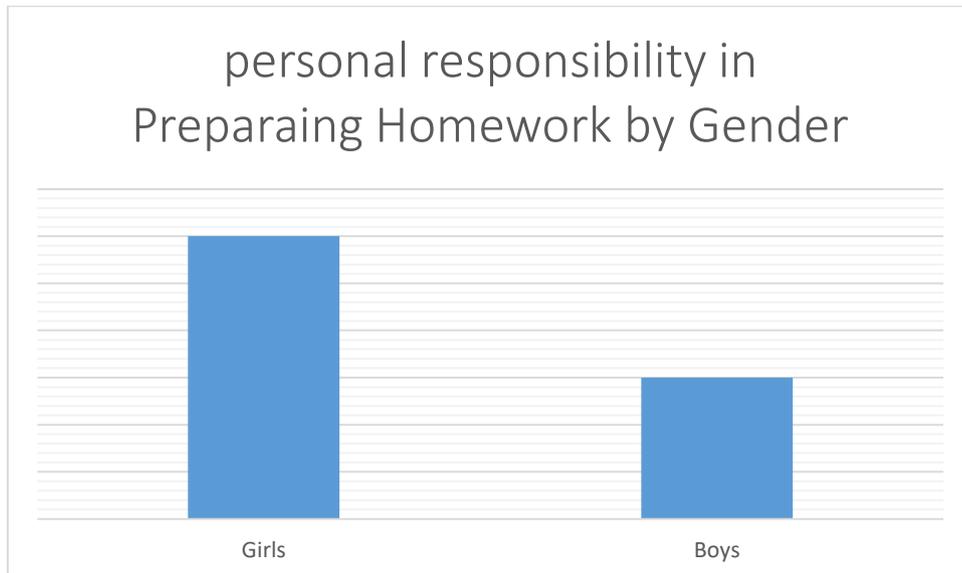


Figure 4: personal responsibility in Preparing Homework by Gender.

- The recognition that the homework preparation contributes to the development of order and organization is more characteristic of girls than of boys, and

declines with age. This pattern is also linked mainly with the external motivation of parents in homework preparation.

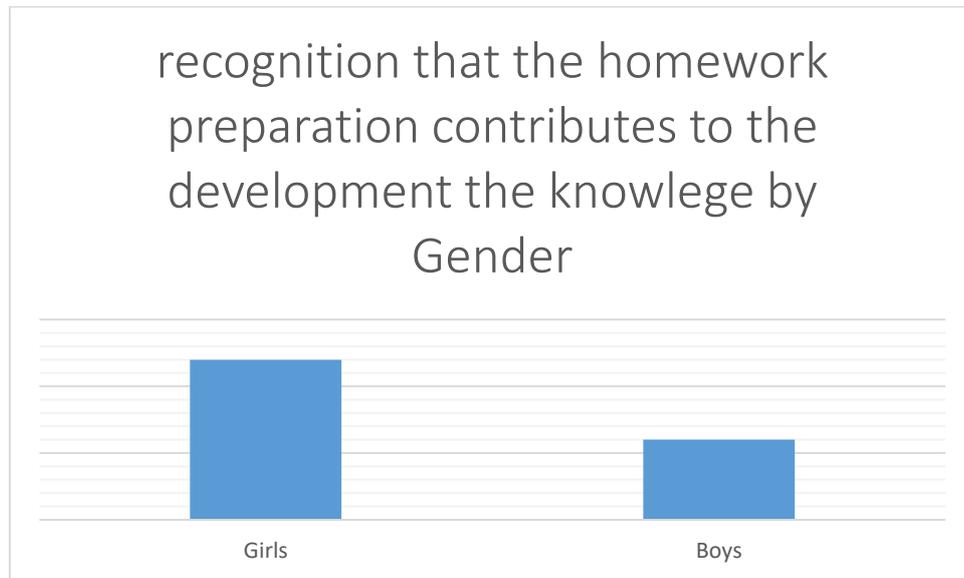


Figure 5: recognition that the homework preparation contributes to the development the knowlege by Gender.

- Other patterns for homework preparation are to prepare homework with friends or to do so in the presence of an authoritative person. These patterns are more frequent among younger pupils and lessen as they grow older. The research findings indicated that learning in the presence of an adult has a bad effect on the development of personal responsibility, while group learning is not connected with personal motivation for homework preparation.

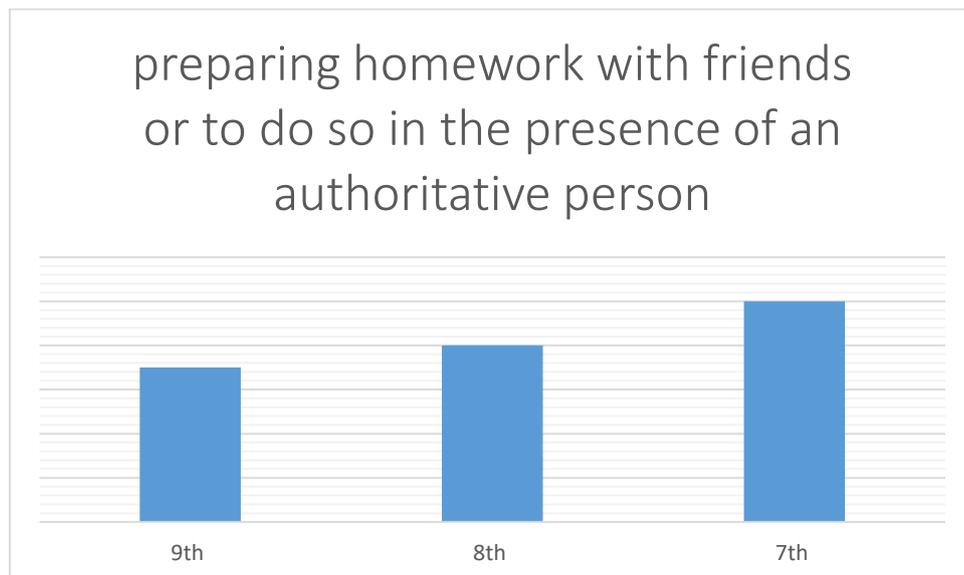


Figure 6: preparing homework with friends or to do so in the presence of an authoritative person

- Girls recognize the contribution of homework for the advancement of knowledge more than boys, and this recognition is connected in a similar and positive manner with all the patterns of homework preparation and the different motivational dimensions.

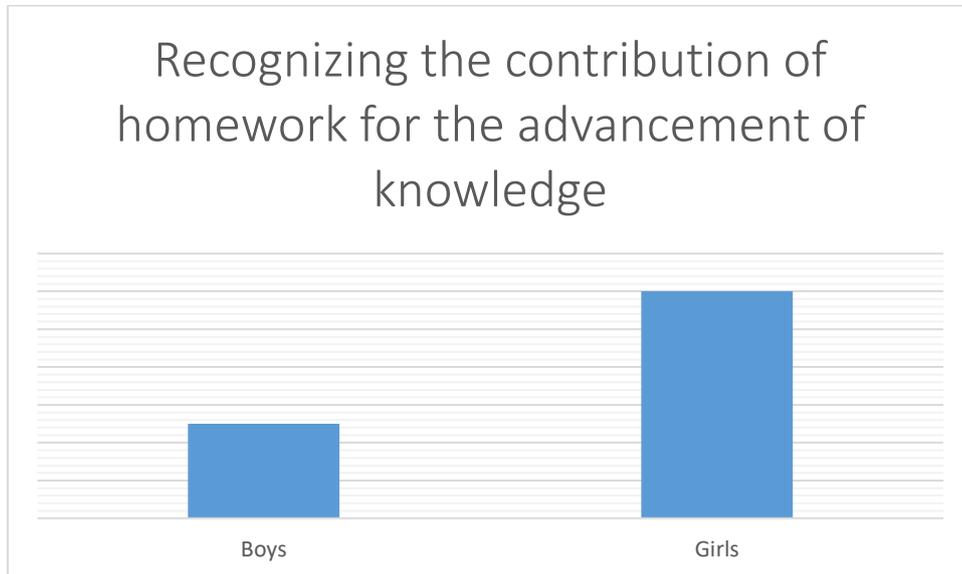


Figure 7: Recognizing the contribution of homework for the advancement of knowledge.

Finding of the second research question:

- In addition, it is clear through this that a suitable intervention program can help to change this trend and improve the level of knowledge among the pupils, the level of understanding, and the usages of mathematical knowledge learnt by the pupils.

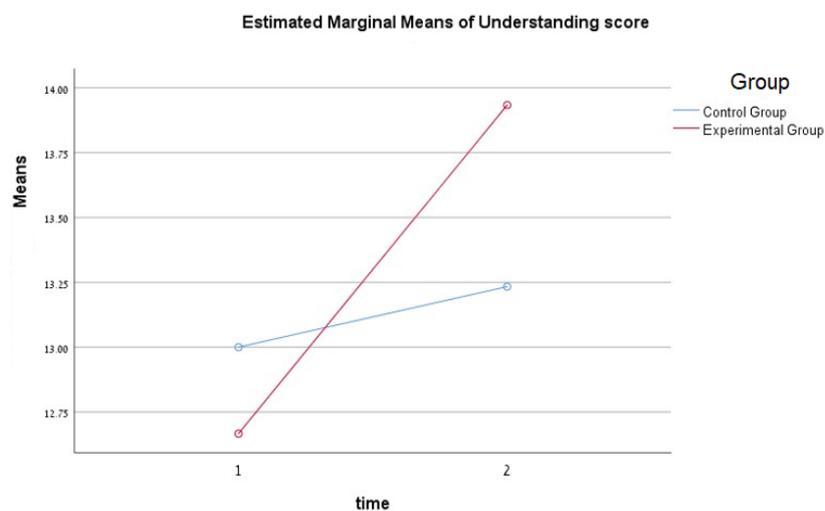


Figure 8: Intervention Program can Help to Change this Trend and Improve the Level of Knowledge.

- The contribution of such a program for the improvement of academic achievements and the expansion of mathematical knowledge is more prominent for pupils at a higher age level at which the erosion in homework preparation is more significant.

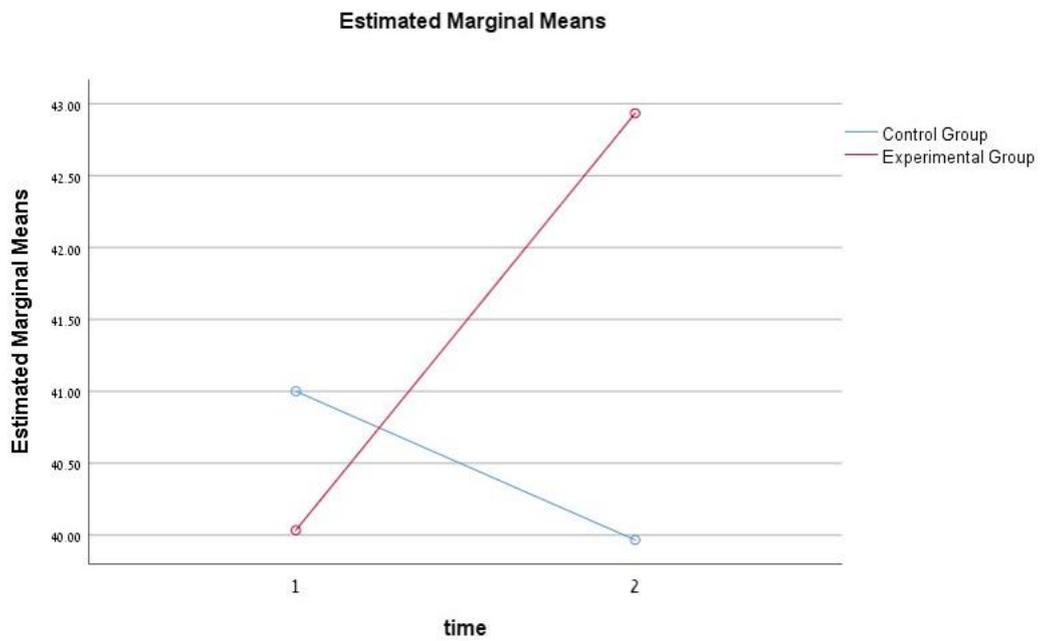


Figure 9: Improvement of Academic Achievements

V. CONCLUSIONS

A number of applicable **conclusions** result from the research findings:

Preparation of homework among junior high pupils is influenced both by internal motivational factors and by the external motivational factors of parents and teachers. At the same time, intrinsic motivation is more significant than external motivation by teachers or parents, it may be learnt from the findings that the leading factor in homework preparation is the pupil himself. As claimed by Cosden et al. (2011) and Suárez-Álvarez et al. (2014), the main motivation derives from the rationalization of the pupil at his level of thought, and the way in which he perceives homework as the direct continuation of his studies in the classroom (Goodwin, 2017).

Changes exist in the force of internal and external motivational factors as the pupils grow up, and there are also gender differences. However, these differences are not consistent and can be considered more as achievement characteristics, more typical of pupils at a higher level and less typical of youth in Arab society in general, among whom there is a significant decrease as they grow older in the perception of achievement and in the importance of learning. as shown in the publications of the National Authority for Measurement and Evaluation in Education (RAMA, 2017). They attribute better performance and achievements for girls than for boys.

The most influential dimension on homework preparation is consistency in diligence. This pattern is highest among young pupils (Grade 7) and declines with age. There is a positive link between this characteristic and the factors of internal and external motivation, which expresses a greater readiness to prepare homework and to spend hours in homework preparation.

Another prominent dimension in the preparation of homework is personal responsibility, and it was found that it is highest among girls. It also changes with age, as well as being linked with internal motivation, but not with external motivations for homework preparation. It is important to emphasize that the intention here is not that external motivation by parents is liable to cause a low level of responsibility in the child, as may be inferred from the findings of Goodwin (2017) or Núñez et al. (2015), but that motivation by teachers or parents to do homework neither contributes to or harms the development of personal responsibility.

The recognition that the homework preparation contributes to the development of order and organization is more characteristic of girls than of boys, and declines with age. This pattern is also linked mainly with the external motivation of parents in homework preparation. This corresponds to findings that have already been documented by Gu et al. (2015) in connection with teachers, and by Pope (2015) in connection with parents.

Other patterns for homework preparation are to prepare homework with friends or to do so in the presence of an authoritative person. These patterns are more frequent among younger pupils and lessen as they grow older. The research findings indicated that learning in the presence of an adult has a bad effect on the development of personal responsibility, while group learning is not connected with personal motivation for homework preparation. This means that social learning and the 'supervision' of an adult can contribute to better order in the preparation of homework (Goodwin, 2017), but at the same time, it delays and even harms the development of a perception of personal responsibility. Similar findings were also documented by Gecer Adam et al. (2012).

In addition, it is clear through this that a suitable intervention program can help to change this trend and improve the level of knowledge among the pupils, the level of understanding, and the usages of mathematical knowledge learnt by the pupils.

The contribution of such a program for the improvement of academic achievements and the expansion of mathematical knowledge is more prominent for pupils at a higher age level at which the erosion in homework preparation is more significant.

The researcher attributes these differences in favor of the experimental group to the effectiveness of the use of homework in mathematics and the impact of this on increasing the academic achievements of male and female junior high school pupils in the levels of knowledge, understanding and application according to Bloom's taxonomy. The researcher also explains that homework helped to link students to the subjects they studied by recalling, understanding and applying what they had previously learned in the classroom, which helps them to stabilize learning and increase achievement. The results of this researcher in the current study were consistent with some of the results in studies such as Glaze (2017) and Abu Awad (2008).

The researcher built a model (Homework Cycle) on the impact of homework on achievement in mathematics such that the students who have a habit of doing homework due to external social pressures (extrinsic motivation - teacher or parent) tend to do

homework with their friends, yet they do not insist on doing it thoroughly and only invest in doing that with the presence of an adult. These learning habits drag students into a ritual learning style even if they are aware of the importance of homework, because of the social pressures (teachers or parents) and this leads to difficulties in math and fear of math, and also causes less good achievements.

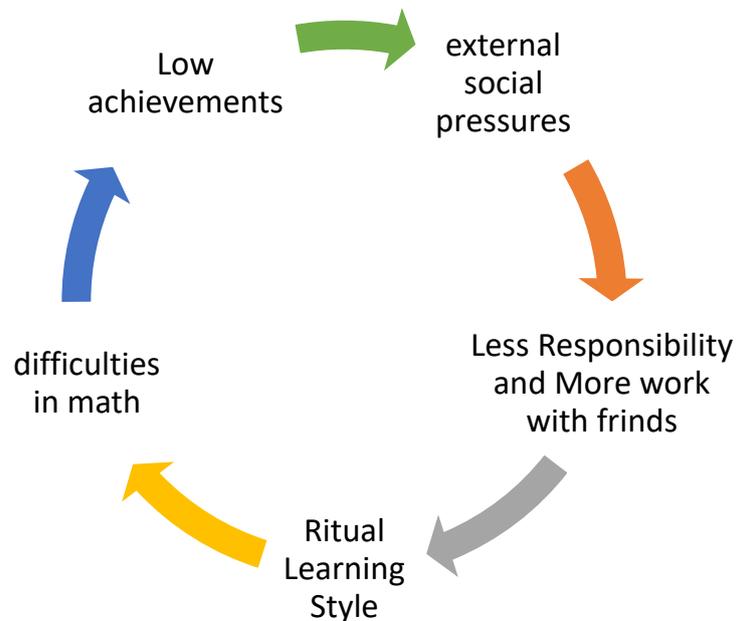


Figure 10: Homework Cycle

VI. RECOMMENDATIONS

In view of the findings in the present research, the following recommendations were formulated:

- Importance should be given to the use of homework in mathematics in order to raise the level of achievement among pupils in this subject. It is necessary to cope with the duration of the time needed in homework preparation in correspondence with the frequency of assigning homework.
- Homework should be balanced in order to encourage and improve learning and to strengthen it.
- The aims of homework should change from one age level to the other. At the level of Grade 7, it is necessary to strengthen positive attitudes towards

mathematics, to develop learning habits according to personal variables, such as personal responsibility and conceptual teaching.

- Teachers should develop estimation skills in identifying personal preferences in homework preparation, with the aim of coordinating teaching methods, the level of the study material, and the level of homework. Teachers must conduct research and planning in advance of preparing the material studied in the classroom and adjust homework assignments to the level of the material and the level of the pupils.
- Teachers and parents must be made aware of the personal differences among the pupils, make sure that learning and the study environment are suited to them, and that homework is focused on the individual pupil and his cognitive abilities.
- Further research in this field should be made (see the heading for additional research suggestions).

VII. Limitation of the Current Research

The findings of the first research question identified the main motivations in homework preparation, the patterns of homework preparation, and the perceived contribution of homework among pupils. These findings reflect the regular tendencies in Arab society towards a decrease in the perception of the necessity and contribution of homework in mathematics as pupils grow older, especially among boys. The findings correspond to trends in the level of achievement among pupils in Arab society in this field. However, the problem of pupil achievements in this connection was not included in the framework of the present research, and there is a need to deepen the existing knowledge about the connection between the motivation for homework preparation, the patterns of homework preparation, and the perception of achievement in mathematics by the pupils themselves.

In addition, a number of methodological limitations may be indicated in this research. this research is based on the quantitative system of research which makes use of closed and dated questionnaires from which it is difficult to learn about the process itself and its significances. In order to attain greater depth in the research subject, it is recommended to make use of a combination of quantitative and qualitative research systems, as for example through interviews or observations.

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