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Investigating the Effect of Real Life Knowledge on Mathematical Problem Solving In Grade 7 in the UAE.

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Investigating the Effect of Real Life knowledge on Mathematical Problem Solving in Grade 7 in the UAE

By

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ABSTRACT

This study investigated the effects of real-life knowledge on mathematical problem-solving in grade 7 in the UAE with the aim of discovering why students neglect real-life knowledge while solving mathematical problems. The participants of the study were 101 pupils from grade 7 in one of the Emirates' schools. They were divided into two groups: a control group (n. 50) and an experimental group (n. 51) that received an additional teaching period on problem-solving. Data was collected from tests and interviews and was analyzed qualitatively and quantitatively using the SPSS program. The result showed that students who received a teaching period before the post-test achieved higher scores compared to their scores in the pre-test and compared to the control group.

DEDICATION

This study is dedicated to teachers who are interested in developing ways of solving mathematical problems in a realistic way, seeking to change traditional ways of teaching mathematical problem-solving in schools. Also, it is dedicated to each student who seeks to develop his/her own way of thinking in solving problems realistically without being restricted and closed within a specific framework used in the school environment. I also wish to dedicate this study to everyone who supported me during this work, especially my father Saeed, my husband Salmeen, my daughter Fatima, my brother and sisters, my friends and my Thesis Chair.

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College of Education

THESIS TITLE

INVESTIGATING THE EFFECT OF REAL LIFE KNOWLEDGE ON MATHMATICAL PROBLEM SOLVING IN GRADE 7 IN THE UAE

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CHAPTER 1: Introduction

This chapter gave an introduction of the thesis. It contained a general background on problem-solving and the purpose of this study, which about investigating the effect of real-life knowledge on mathematical problem-solving for 7th grade students and for discovering the reasons that drive students to non-use of their real-life knowledge while attempting to solve real-life situations. Also, this chapter presented a statement of the problem which was the low level of students in solving real-life problems. Moreover, it illustrated the significance of the study for students, teachers, mentors and decision-makers. This chapter also showed the research questions, research hypothesis, definition of terms and limitation of the study.

Definitions of problem-solving

Falling under the general understanding of "problem-solving," there are many definitions of problem-solving depending on didactical theories in different periods. Jonassen (2004) defined two types of problems in mathematics. The first one is a well-structured problem which is routine and less complex to solve; this is the common type in school textbooks. The other type is ill-structured, complex and hard to solve directly with students (Stohl Lee & Hollebrands, 2006). Schoenfeld said that solving problems is a path followed by students to solve non-routine problems where they did not have any strategy to find the solution in the beginning of solving the problem. Willoughby (1990) defined problem-solving as a situation where the student has the knowledge, willingness and material to reach a goal, which is the solution, and it is not necessary for the solution to be correct; the objective is for the student to think and try to solve (Muir, Beswick & Williamson, 2008). Or, problem-solving is, as Cooper (1986) defined, a student attempting to find the solution to a certain problem by doing some operations and procedures to reach the solution which is usually unknown to the student at first glance (Muir, Beswick & Williamson, 2008).

On the other hand, in the French didactical theory, Grugnetti and Jaquet (2005) describe problem-solving as different and more extended than Schoenfeld's identification. A student in this theory is the one who constructs the knowledge, not just memorizes or applies what he/she has learned. When this student tries to solve the problem, his/her prior knowledge collides with the new knowledge of the problem. This process helps the student to construct the new knowledge. A student in this theory is more participative in solving a problem because he/she understands the problem, sets hypotheses, attempts all possible solutions and determines the appropriate solution for the problem.

There are many forms of problem-solving and the most common one is divergent thinking, which encourages students to think about the problem from different sides of different strategies. This is shown mainly by open-ended questions of two types. The first type is to explore the problem and the second one is to solve the problem relating to the real-life aspects (Monaghan, Pool, Roper & Threlfall, 2009).

Skills of problem-solving are important for students not only for their studies but also for their daily lives, as these skills enhance students' abilities to solve problems by considering different factors without being obliged to follow a certain pattern. Problem-solving is a series of steps that must be built on students' prior knowledge along with given factors in order to make suitable choices.

Importance of problem-solving in contemporary curricula

Problem-solving held the largest share in mathematics education research studies in the last few decades. Initially, researchers focused on the instructional field by understanding the nature of problem-solving in order to develop instructional systems in solving problems and put in the place effective programs to help students learn problem-solving. Then they shifted to the use of research in developing students' abilities to construct knowledge by involving them in challenging tasks and investigations (Weber, 2005).

Now, problem-solving has come to the forefront of discussion and is one of the fundamental goals in the mathematics education community. Teachers give great attention to help their students conduct investigations in mathematics successfully. Also, they encourage their students to think and use mathematics in solving problems, taking into account its importance in daily life (Stacey, 2005; Silver, Ghousseini, Gosen, Charalambous & Font Strawhun, 2005). However, Depaepe, De Corte and Verschaffel (2007) found that few teachers are helping their students to understand when to use one strategy over others, because the majority of them teach students routine systematic strategies without imparting an understanding of the reasons for using particular strategies.

In England, for example, they has emerged a situation of dissatisfaction about the quality of mathematics education and the inability of employees in the last hundred years. So, there is now a movement toward reform in teaching mathematics from a traditional way toward a focus on investigation and problem-solving (Monaghan, Pool, Roper and Threlfall, 2009).

Problem-solving is one of the fundamentals of mathematics. It gets students to be involved in a series of actions before they start solving the problem itself, first of all, they must read the problem carefully, and then decide on what is required from them. After that they will consider different strategies that may not necessarily lead to a particular result or answer. The final step is to find the correct answer and approve it. Therefore problem-solving develops upon systematized creative thinking.

Students' difficulty with problem-solving

The ability to solve mathematical problems is the heart of learning mathematics. Many educators believe that solving problems is the most important part in learning mathematics, while others see mathematics as a body which provides students with tools and skills to solve problems (Kaur, 1997). With more emphasis on problem-solving came a new focus on the many difficulties students had in solving problems. Some students hate mathematics largely because of their difficulties in dealing with problem-solving.

Problem-solving is not a clearly delineated topic. It is a broader than that. It is a complex process that needs to involve all skills, experiences and strategies that have been learned in approaching problems and in meeting the demands of novel problems (Kaur, 1997; Tambychik & Meerah, 2010). A misconception of the process of problem-solving is a result of many difficulties faced by students in solving problems, such as an inability in computing, lack of understanding of problems, inability to connect mathematical concepts and transfer word problems into mathematical sentences (Hart, 1996). The main difficulty faced by students with problem-solving is their lack of skills and concepts or non-acquisition skills which would enable them to solve problems successfully (Tambychik & Meerah, 2010). One of the reasons is students' lack of higher-order cognitive abilities. The prior studies in mathematics focused on mathematical thinking before changing their attention to problem-solving. Mathematical thinking is the cognitive ability that is used to think about the strategy and process that lead to the solution, and this is not to think in the mathematics subject (Kaur, 1997). The cognitive ability, according to Tambychik and Meerah

(2010) is divided into three dimensions: knowledge, application and reasoning. While, Kaur (1997) mentioned different categories for cognitive ability, which are: knowledge, metacognition and beliefs that influence students' decisions in solving problems.

Students' weakness in cognitive skills is a serious problem because students cannot walk one step forward if we do not teach them how to acquire, develop and use these skills in problem-solving; and any weakness in cognitive abilities will affect students' mathematical abilities, which automatically and negatively influence students' ability with problem-solving, which turns back again to create mathematical difficulties (Tambychik & Meerah, 2010). Students need to develop some factors that help them with problem-solving such as good concentration, logical thinking and meaningful perceptions. In addition to that, some difficulties are related to students' low ability in understanding the language of problems, losing their attention in solving problems and inability to make visual and auditory perception.

Problem-solving can be divided into two aspects: linguistic problems and non-linguistic problems. Also, solving problems involves two main steps: 1) changing the problems from linguistic or non-linguistic terms into mathematical sentences, and 2) identifying the appropriate operation to solve the problems. Students fail in applying the first step because they do not understand the problem deeply, and are thus unable to effectively translate the problem.

There are many models developed in the field of solving problems effectively such as Polya (4-hierarchy phase), Krulick and Rudnick (5-hierarchy phase) and Zalina (3-hierarchy phase). However, each of these models has three main steps which are: understanding the problem by deep reading and thinking, analyzing the problem by organizing the strategies, and solving and checking the answer.

Students' difficulties can be classified into four skill categories as Tambychik and Meerah (2010) mentioned in their study on 107 students from three different secondary schools. These are: number facts skills, arithmetic skills, information skills and language skills. Each of these categories can be sub-divided into related sub-skills. Number facts skills can be divided into knowing the concepts, ability to read tables and performing calculations mentally. Arithmetic skills focus on using algorithms and procedures. Information skills measure students' ability to formulate connections and mathematical sentences. As for language skill, it can be divided into understanding terms and language of problems. They found that approximately 40% of the students shared all or some of these difficulties. Also, the most common difficulty experienced by students with problem-solving related to the cognitive ability on the level of recalling, memorizing concepts and knowledge and then connecting them according to the particular situations of the problems.

Moreover, Tall and Razali (1993) focused on different thinking as one of the students' difficulties in solving problems. They gathered data from students according to interviews such as "think aloud" and diagnostic test to define their mathematical common errors in general. They found that students with high abilities in thinking and manipulating with symbols and concepts are more comfortable and successful in learning mathematics compared with students with low abilities in organized thinking, who are more anxious to learn and deal with mathematics problems. Moreover, Kaur (1997) mentioned that the main differences between good and poor problem-solvers are: the ability to distinguish relevant and irrelevant information, the ability to determine the structure of the problem, the ability to deal with various new problems by matching the effective skills without using the same strategies to all problems, and the ability to remember information from the problem to recall it later.

Students' poor knowledge of mathematical problem-solving basics such as rules of area and volume, multiplication and division, etc. This is a major cause of students' anxiety when dealing with word problems, which poor knowledge might lead to students who are unable to solve such problems. Another reason why students are not able to solve word problems appropriately is the inability to apply prior knowledge in solving new problems, which is considered a big challenge for math teachers.

Interventions to improve problem-solving

According to Tambychik and Meerah (2010), difficulties in dealing with problem-solving has two sides from students themselves and from teachers. If students have difficulties in some important skills needed in solving problems such as formulating problems into mathematical sentences and concepts, understanding numbers, facts, and analyzing problems, then they will have deficiencies with problem-solving. Educators have to develop programs to develop students' ability to acquire and practice these skills starting with normal and simple problems and ending with complex and novel problems. From another aspect, the difficulties come from teachers and their traditional strategies in teaching students how to solve problems. In this stage, teachers need to identify these misconceptions and to develop programs that meet students' needs.

One way used to improve students' abilities in solving problems that is designed for students with learning disabilities is Solve it! This is an intervention investigation used to develop students' ability toward cognitive skills needed in solving problems. It emphasizes the teaching of cognitive process and strategies for applying it into problems. It starts with teaching students how to read and understand problems deeply, to formulate problems into their own words, to represent problems, to monitor themselves while solving problems and to regulate themselves in writing and presenting their process and solutions (Montague, 2003).

Stacey (2005) suggested that there are many factors that affect problem-solving and make it successful: deep knowledge of mathematics, strong reasoning ability, knowledge of heuristic strategies, self-regulation of metacognitive strategy, contribution of beliefs and thoughts, and ability to work and communicate with others to explore what they found. Heuristic strategies help students in solving problems successfully by suggesting a sequence of solving steps which are: understanding the problem, designing a plan or a way of solving the problem, examining all possible solutions, and checking the final answer (Muir, Beswick & Williamson, 2008; Depaepe, De Corte & Verschaffel, 2007).

In the French didactical theory, Grugnetti and Jaquet (2005) mentioned that when students solve problems, they participate in constructing knowledge from the problem. While he/she attempts to solve the problem, there is a conflict which happens between the prior knowledge that he/she holds and the new knowledge in the task. This sort of confrontation constructs the new mathematics. The trend in contemporary mathematics is to focus on students as a center of learning by placing them in complex tasks which need challenge and use prior knowledge to solve them. Teachers encourage students to pay attention to checking their final solutions, which is an important step after solving problems (Silver et al., 2005).

Developing students in problem-solving varies according to the role and purpose of the problem-solving in the curriculum, whether it is "teaching for problem-solving or teaching about problem-solving or teaching through problem-solving" (Stacey, 2005; Mamona-Downs & Downs, 2005). For example, the focus in Australia's curriculum is on the needs of students and teachers. Anderson and White

(2004) suggested that problem-solving needs to be implemented from the teacher's side in developing and reforming the way of presenting problems. Also, teachers need to improve students' performance in solving different problems by deep understanding and using various strategies to solve problems (Muir, Beswick & Williamson, 2008).

Improving teaching strategies that focus on learners, accompanied by activities and problems from the students' social and cultural environment will encourage students to apply their life skills in problem-solving.

The new trend in mathematics is toward teaching by problem-solving and mathematical thinking by encouraging the application of mathematics problems to real-life issues to develop the process of using beliefs while solving mathematics problems (Depaepe, De Corte & Verschaffel, 2007). That is what the study try to investigate if the students have the ability to use real life knowledge while solving real life problems or not.

Background of the study

Real-life knowledge plays an active role in developing mathematical thinking toward solving problems. This role is not limited just to solving problems mathematically using the classroom context, but extends informal everyday activities (Inoue, 2005). Researchers viewed problem-solving as a sense-making process which involves students in thinking and searching for the effective solutions in formal and informal activities (Li & Silver, 2000). This orientation develops students' mathematical concepts and their abilities in solving mathematical problems (Inoue, 2005). Reusser and Stebler (1997) suggested that a word problem is not just a relation between the language, mathematical process and a way of proving, it is a big relationship which includes the sense and the practice of mathematics in the light of real-life experience. This is a way of mathematilization which means to translate a real-life problem into a mathematical context.

Researchers, in recent years, have called for more emphasis in applying real world knowledge and realistic considerations in solving problems (Cooper & Harries, 2003; Verschaffeli, DE Corte & Borghart, 1997). Educators have stressed the importance of connecting mathematical problems that students learn in school contexts with real life to be more authentic and meaningful for them (Lowrie, 2005). Some researchers have stressed the need for the application of classroom activities to real-life problems, and others have called for a shift in focus to go beyond school boundaries, which is the real life. Palm (2008) suggested that students have to undertake tasks in a social environment that provides real interactive instead of normal mathematics classrooms. Of course, while many educators claim there is a need for removing boundaries between mathematics and other disciplines, some educators see this step as difficult and complex in light of the continuing focus on curriculum outcomes (Cooper & Harries, 2003; Lowrie, 2005). These issues are still under discussion and study by researchers.

Students have a strong tendency to solve word problems in mathematics without taking into consideration real life aspects (Palm, 2008; Verschaffel et.al., 1997). Furthermore, Students have the ability to compute the correct answers of the problems, but they deliberately neglect real-life consideration and the result is an inconsistent solution (Inoue, 2005; Reusser & Stebler, 1997). Many textbooks provide students with problems that require mathematical solutions which consider the real-life situation in the answers (Inoue, 2005). However, students usually solve these problems in a conventional theoretical way. Real-life problems are complex and non routine, , and require skills of heuristics and metacognitive strategies and use of self regulation to organize their ideas and steps in solving problems (Depaepe et.al., 2007).

A student's failure to take realistic considerations while solving problems can be attributed to several reasons. One reason is the method of traditional instruction that students typically experience in the classroom, which negatively affects their thinking about the problems. This approach to learning blocks students' abilities in using higher order thinking, reasoning and the use of daily life experiences (Yoshida et.al., 1997; Verschaffel et.al., 1997). Another related cause are the skills and strategies that students bring from their cultural backgrounds and previous school experiences (Cooper & Harries, 2003; Yoshida et.al., 1997). Still another reason is a misunderstanding of the problem, which leads to unrealistic solutions. This happens, as Reusser and Stebler (1997) argued, as a result of many factors, such as: difficult language in the problem or student misunderstanding of the solution procedure. In addition, another reason is that a student's schemata (or real-life knowledge) may not help them relate to problems or tasks practiced in the classrooms (Verschaffel et.al., 1997).

Yoshida, Verschaffel and De Corte (1997) stated that the focus should be on encouraging students to learn, think and give opinions while solving problems. The focus should not be on mastering specific skills and strategies to solve problems, but should exceed school boundaries into real-life knowledge. Students need to experience non-routine problems, give their beliefs about the solution and compare their mathematical solution with their thoughts in daily life.

Palm (2008) argued that students need to tackle tasks that emulate real-life situations. It is true that transforming a classroom task context to an authentic task context is a hard process. Nevertheless, the school situation and the task can be modified partially to approximate real life and at the same time help students practice real-life experiences and apply knowledge. We have to remove as much as possible the restrictions that hinder students from taking realistic considerations into the process of problem-solving.

Purpose of study

The purpose of the study was to investigate the effect of real-life knowledge on mathematical problem-solving in 7th grade in the UAE and to find out the reasons that led students to neglect their real-life knowledge while solving mathematical problems. Also, this study investigated if an extra period of teaching could help students solve math problems using real-life knowledge.

Statement of the problem

The problem that I experienced in the field was the low level of students' skill in solving problems in real-life situations in grade 7. These skills are considered one of the basic pillars in mathematics. Problem-solving is not solving a particular item only, but it extends to the student's ability to benefit from his/her experience, skills and prior knowledge to solve a particular problem (Kaur, 1997; Tambychik & Meerah, 2010). Also as Tambychik and Meerah (2010) said that difficulties in solving problems stems from a lack in skills and main concepts that help students to solve problems.

Definition of Terms

Problem-solving: as Cooper (1986) defined, this term referred to a student attempting to find a solution to a certain problem by doing some operations and procedures to reach the solution which is usually unknown to the student at first glance.

Real-life knowledge: In this study, it meant all student's experiences, skills and knowledge learned from school or outside school from daily life activities.

Significance of the study

Although numerous studies have been conducted on the side of solving problems, but few of them have been conducted on the effect of real-life knowledge on solving mathematical problems. According to the researcher's knowledge, this study considered the first study conducted in the United Arab Emirates that was held for 7th grade students to investigate the effect of real-life knowledge on problem-solving.

This study was significant to students who need to develop their ability to solve problems and think about problems in different ways, rather than to just follow operations and strategies that may be illogical in problems needing more realistic consideration.

Also, it was significant to teachers who try to increase their student's divergent thinking skills and to give them the opportunity to link their experiences and real-life knowledge to their math problems. Moreover, it encouraged teachers to develop students' depth of thinking while solving mathematical problems and to avoid the stereotypes in solving problems, thus enabling students to base their answers on suitability in real life.

In addition, this study will encourage decision-makers to focus on building a curriculum that strengthens problem-solving skills in students, allow them to be more connected to life surrounding them.

Research questions

The main objectives of the study were to gather data of student's solutions of real-life word problem, to identify students' unrealistic solutions and to examine factors, such as beliefs about separation the knowledge of school from real life, that lead them toward some particular solutions. As a result, the study answered these two questions:

1. Did 7^{th} grade students take into consideration real-life knowledge in solving mathematical problems?
2. Would training 7^{th} grade students with an additional period of teaching improve students' problem-solving ability using real-life knowledge?

Research hypothesis

1. There is no statistically significant difference ($\alpha \leq 0.05$) in post-test math scores of 7^{th} grade students who do not receive any intervention and students who receive an intervention.
2. There is no statistically significant difference ($\alpha \leq 0.05$) in pretest and post-test math scores of 7^{th} grade students who receive the intervention.

Limitations

Since the research applied on UAE for 7th grade students in a female preparatory school in a town near Al Ain, then the results of the study were confined and limited to the sample used in the research and cannot be generalized to all 7th grade students in UAE or to students in other countries. Also, some bias emerged as a result of the participants such as: female gender, particular preparatory school, different classes with different teachers' instructions compared to other schools in Al Ain or other UAE Emirates. In addition, the sample, in each group, was assigned non-randomly to groups. Also, students who interviewed were selected non-randomly according to their unrealistic solution.

Study Rationale

Improving the performance of students in solving mathematical problems in a realistic way using strategies learned in school with the knowledge possessed by the student's life, is the challenge of each teacher at Umm Al Fadhel School /Cycle 2 or other schools in the different Emirates. Also, mathematics teachers suffer from the practice of students' solving mathematical problems in a traditional way, without taking realistic considerations or applying their real-life knowledge and experience.

Abu Dhabi Education Council (ADEC) focuses on the development of solving mathematical problems among students in grade 7 and other grades, where they focus to enhance students' ability in this aspect using investigation and exploration tasks. Moreover, the evaluation tests in each semester have become more focused on explanation and creating solutions. These two standards in correcting tests are of primary importance in evaluating students' performance, in addition to other criteria.

The aim of this study was to investigate the effect of real-life knowledge on mathematical problem-solving and the reasons that led students to solve math problems without considering a real-life situation. Also, from this study I concluded by giving some recommendations and relevant feedback generated from the results and analysis of data, to decision makers, supervisors, directors, teachers, and students and parents.

Organization of the Study

Through this chapter, the purpose of the study was reviewed, regarding the investigation of the effects of real-life knowledge on mathematical problem-solving for 7th grade students and the reasons that drive them to neglect real-life knowledge while solving real life problems. The second purpose was: would training 7th grade students with an additional period of teaching improve students' problem-solving ability using real-life knowledge . Also, the significance of the study was mentioned.

The chapters of the study were listed as follows:

- Chapter I: presented the introduction of the study including the purpose of the study, problem statement, research questions, the significance of the study and the limitations.
- Chapter II: reviewed literature in problem-solving, students' use of real-life considerations and studies conducted on investigating real life knowledge on problems solving.
- Chapter III: presented the design of the study, participants, instruments (the test and the interview), procedure of the study, the validity and reliability of the instruments and the collection and analysis of data.

- Chapter V: reviewed the results of the study, which include quantitative and qualitative data.
- Chapter IV: presented a discussion of the results, summary of the study and recommendations.
- At the end of the study, the references and the appendices were included, which were: the problems of the intervention; the test in two versions, Arabic and English; and questions of the interventions.

CHAPTER II

Literature Review

Students' use of real-life consideration

Palm (2008) stated that there are many reasons which affect students' consideration of real life in solving problems. One reason is the frequent use of strategies that focus on numbers and operations, ignoring the nature of the task. Moreover, in mathematical problem-solving, the continued separation of cultural, social and cognitive aspects, which should be closely related to students' lives, will increase students' tendency to neglect their ability in deep learning and investigation, and will restrict them to traditional problems (Lowrie, 2005). Encouraging students into deep thinking and into building metacognition skills will lead them to be successful in solving mathematical problems because of the essential role which metacognition plays in enhancing efficiency of students in solving problems (Eizenberg & Zaslavsky, 2003).

Reflection, which is the consideration of real-life knowledge and beliefs, is an important skill in solving problems; it is a connection between real-life experience and mathematical problems' context (Hiebert, 2005) that leads to another factor which is students' beliefs about connections between the real-life world and school tasks. This is the most apparent reason that makes students less attentive in working with authentic problems. Schoenfeld (1985, 1987, 1992) determined four factors influencing students' abilities in solving problems: resources, heuristics, control and beliefs, and he included students' beliefs as an important factor that affects students in solving mathematical problems generally, and particularly in considering real-life knowledge and beliefs while solving problems (Stohl Lee & Hollebrands, 2006). Now there is a trend toward changing the focus from computing answers straightforwardly to the practice of problem-solving with real-life considerations (Hiebert, 2005).

The last reason is the lack of problem communications. The communication mainly emphasizes language and ways of formulation problems, which makes the task more difficult. Li and Silver (2000) said that using informal knowledge (Knowledge practiced outside the school) is become a more powerful way for students to understand the real-life world than formal knowledge (that they practice a lot in the school). On the contrary, Palm (2008) said, the increase of authenticity of problems make them more difficult and ambiguous.

Studies conducted on investigating real life knowledge on problems solving

Cooper and Harries (2003) conducted a study among 121 students at the end of their first secondary schooling and 109 students in the final primary schooling in North England. They focused on investigating the willingness of the end primary schooling students to show realistic consideration in responding to some selected word problems, compared with students at the end of their first secondary schooling. The researchers used a paper-pencil test of 10 problems contains of 3 types of problems. Type 1 did not need any real consideration. Type 2 needed partial realistic consideration. An example of this type is the original lift problem in the test: "This lift can carry up to 14 people. In the morning rush, 269 people want to go up in the lift. How many times must it go up? ". The last type is 3, which is the revised lift problem which is not completely different from the original problem, but requires the student to respond to different provided solutions and give convincing reasons about the appropriate solutions. They found that 55 out of 121 students and 54 out of 109 students, answered 20, which is the realistic solution related to the type 2 original lift schools, provide solutions that consist of real-life knowledge. The rest of them solve problems with stereotyped and direct ways. This is a serious percentage. The beliefs that the pre-service teachers hold about realistic problems may affect their teaching strategies in problem-solving. They appear to have a strong tendency to restrict or neglect real-life considerations when solving problems because they believe that the main goal of solving problems in mathematics is to find the numerical solution of the problem and to discover the exact answer. Also, their study provides comparison between first- and third-year student teachers. The third-year teacher has the greatest percentage in considering realistic-ness in the solution, maybe an effect of the courses taken in the training.

However, the mathematics curriculum in Japan focuses on higher order thinking problems that required efforts of foundation students to solve non-routine problems, Yoshida, Verschaffel and De Corte (1997) conducted a study about realistic consideration from another perspective which is realistic consideration and the culture among Japan and Belgium. Their first purpose of the study was to examine the success of Japanese students on the problem items of Verschaffel et al. (1997) test, and to compare their results with the results of Belgian students in Verschaffel study. The second purpose was to investigate the effect of hinting on pushing students toward realistic solutions. The sample was 91 students of fifth grade chosen randomly from Japanese primary school and then divided into two groups of 45. One group received natural instruction and 46 received instructions and warning. The tool in the study was a paper-pencil test consisting of 10 pair problems of standard problems (S-Items) that needed just computation of calculations, and parallel problems (P-Items) which needed realistic considerations in addition to calculations, such as the example:

problem. 74 out of 109 choose 20 as one of the suitable answers in the revised version, meaning that some students recognized the realistic consideration after they read the problem, and changed their answers because of the different options in the problem. In addition to that, they realized that boys and girls seem similar in neglecting realistic consideration in solving problems of type 2. This similarity was again found in secondary schools. That is a result of the increased emphasis on teaching primary students the basic skills, so when they move to secondary school they will be ready to decide and use the appropriate strategy.

The problem in providing unrealistic solutions to authentic problems does not stop with the students in the schools, but extends to include the teachers. This was confirmed by Cai, Mamona-Downs and Weber (2005) who found a strong relationship between teachers' representations and students' representation to the problem. The teacher's pedagogy affects students' dealing with problems to become restricted to the social and culture aspects. This problem does not solve without changing teacher's conceptions about problem-solving in mathematics and its strong connections among real-life experience. Isolation of students in school contexts leads them to ignore life knowledge that they know and practice outside of school and just engage in traditional problem-solving which is sometimes far away from what they know. This disconnection will make students to feel unreal and wrong about what they know in their daily lives, which adversely affects them because it separates them from reality and frustrates their confidence in solving problems in mathematics (Lowrie, 2005).

Verschaffeli, DE Corte and Borghart (1997) reached to the result that only 48% of the pre-service teachers who will become mathematics teachers in primary schools, provide solutions that consist of real-life knowledge. The rest of them solve problems with stereotyped and direct ways. This is a serious percentage. The beliefs that the pre-service teachers hold about realistic problems may affect their teaching strategies in problem-solving. They appear to have a strong tendency to restrict or neglect real-life considerations when solving problems because they believe that the main goal of solving problems in mathematics is to find the numerical solution of the problem and to discover the exact answer. Also, their study provides comparison between first- and third-year student teachers. The third-year teacher has the greatest percentage in considering realistic-ness in the solution, maybe an effect of the courses taken in the training.

However, the mathematics curriculum in Japan focuses on higher order thinking problems that required efforts of foundation students to solve non-routine problems, Yoshida, Verschaffel and De Corte (1997) conducted a study about realistic consideration from another perspective which is realistic consideration and the culture among Japan and Belgium. Their first purpose of the study was to examine the success of Japanese students on the problem items of Verschaffel et al. (1997) test, and to compare their results with the results of Belgian students in Verschaffel study. The second purpose was to investigate the effect of hinting on pushing students toward realistic solutions. The sample was 91 students of fifth grade chosen randomly from Japanese primary school and then divided into two groups of 45. One group received natural instruction and 46 received instructions and warning. The tool in the study was a paper-pencil test consisting of 10 pair problems of standard problems (S-Items) that needed just computation of calculations, and parallel problems (P-Items) which needed realistic considerations in addition to calculations, such as the example:

"Kuniko has bought 4 planks of 2.5m each. How many planks of 1 m can she saw out of these blanks?" Yoshida, Verschaffel and De Corte (1997). The study found that Japanese students shared with the Belgian students a tendency to neglect real-life knowledge in their solutions. The percentage of realistic responses on the P-items from Japanese students in the two types of treatment (condition 1, 2) and Belgium students was 15, 20 and 17. Also, when the researchers provided the students with a little hint in the first paper of the test, which was "The test contains several problems that are difficult or impossible to solve because of certain un clarities or complexities in the problem statement....", they still stayed away from considering real-life knowledge in their answers.

Students, when trying to solve problems, fall between two options: The first option calls them to stay among cultural boundaries of the school and ignore real-life knowledge and informal solutions such that their solutions depend on the framework of the mathematics classroom. The other option calls for taking into account all real life experience factors when understanding and solving the problems (Inoue, 2005). Students need to take into consideration both of these options in solving problems, in order to choose the most realistic solution. Lester and Kroll (1993) provided the factors that affect problem-solving performance. Two of them were beliefs and socio-cultural contexts. Students have to connect their own knowledge and beliefs to the problem situation and their success depends on the strength of the connection between their real-life knowledge and the nature of the problem (Muir, Beswick & Williamson, 2008).

Palm (2008) studied161 randomly selected students in fifth grade from a middle-sized city in Sweden with different socio-economic backgrounds. He conducted his research to answer questions about their willingness to provide real answers and the reasons for solutions that were inconsistent with real life. He used two test version containing seven authentic tasks and straightforward problems. The first straightforward word problem was assigned in the two versions which is "You are buying candy in a candy store. The candy costs 12.50 Kr, and you give the store assistant 20 Kr. How much money should you get back?". Also, The researcher used two types of authentic problems, where the problems of Verschaffel et al. (1994) is called the more authentic while the word problems used from literature are called less authentic. The two versions are different in order of questions but not in the content. Then he conducted interviews with all of the students in the study to investigate reasons for unrealistic solutions. The study analyzed quantitatively and qualitatively to five categories, depending on a student's solution, their comments and interview responses. He found that students in his study shared the same tendency to give unrealistic solutions that was found with different students' in Japan, Switzerland and Belgium. Also, he found that there were many reasons for these unrealistic solutions, such as: frequent indications that students did not understand the appropriate strategies, student's beliefs about mathematics problems that are different and not connected to real-life experience, and students' lack of real-life knowledge.

Inoue (2005) said that although some teachers encourage students to think "realistically" about the problem before starting to solve it, They do not *teach* students to think with different assumptions or to attempt all assumptions in order to find the ones that fit in real life. Additionally, some teachers expressed their own fears in solving non-routine problems, especially open-ended problems, because they felt they were unskilled in solving problems that were based on different assumptions. Also, they may have felt confused about distinguishing the correct thinking between all possible solutions and assumptions provided by students (Fai Ho & Hedberg, 2005).

Subsequently, Inoue (2005) conducted a study focused on students' sense of solving mathematical problems in relation to their everyday experience. The participants of the study were 60 college students from different ethnic groups who were not majoring in math, science or engineering. The researcher chose this group of students because of their many skills and the mathematical knowledge that they practiced, their ability to express their beliefs compared to younger students and the fact that they had not received any mathematics courses in college. He developed a test of 12 mathematical word problems differentiated to four majors depending on the four groups of students who were divided into groups of 15. The four groups were familiar, unfamiliar contents and authentic and ambiguous goals. The researcher started the exploration with two traditional mathematics problems to focus students on a traditional classroom situation. One of the problems was, "Find the value of x if y = 9x-5 and y = 22". Then each group took three types from one major. Here is one of the realistic word problems: "You need to arrive at John F. Kennedy (JFK) International Airport at 7 pm to pick up a friend. At 4 pm, you leave for the airport, which is 180 miles away. You drive the first 60 miles in an hour. Your friend calls you and asks if you can be on time. How would you respond?". Students' answers divided into two correct parts which were: calculation answers and realistic answers. The calculation answer is 180 ÷ 60 = 3 hr. But, the realistic solution is maybe he will not be on time because of traffic jams, weather situation or if the road is working. After that, he interviewed the students about their explanation of their answers and if they could practice it in real life. He analyzed the results qualitatively, depending on their solutions and their interview responses, and organized them into five categories which are calculation, reflecting a shared understanding of reality, reflecting an unanticipated realistic understanding of reality, prompted unanticipated realistic justification and conformist. He found that 30 % of the participants had a shared understanding of reality, whereas 32% of them solved the problems depending on calculation alone.

In some authentic word problems, such as division with remainder, Li and Silver (2000) found that students of grade three has some ability to reach the realistic answer using different strategies. They conducted a study among 14 third grade students from 2 different classes of a private school in the US. The school was associated with a university and enrolled children of the university's teachers. The students in the study did not have any experience with formal division. The researchers developed a task of 8 numerical problems; two of them were division problems and 6 word problems, where 1 of the word problems related to division. The word problem was "Mary has 22 tapes. She wants to buy some boxes to store her tapes. Each box can store 5 tapes. How many boxes does Mary need to buy?". The researchers conducted the study individually for each student without determining a time for their responses. But they told students to think aloud and then write their computations on a paper. The interview was audiotaped and transcribed. They found that the majority of students computed the answers of the 8 numerical problems successfully. But for the 2 division numerical problems, 29% solved both problems correctly, and many of students did not understand the symbols of divisions (÷ , √). According to the division word problem, 11 out of 14 students could answer the problem with 5 which is the realistic solution, and 7 of them used a mental procedure to obtain the answer. Former studies proved students' weakness in solving realistic problems, the use of certain laws learned in math lessons, and the applying of different strategies before being aware of what is required through a careful reading to the question. Moreover, teachers themselves avoided training their students on this sort of problem because there were no particular answers for them, which makes the marking of such questions a hard task.

Similarities and differences between this study and other studies

Similarities:

This study was similar to studies of Inoue (2005), Li and Silver (2000), Palm (2008), Verschaffeli, DE Corte and Borghart (1997) and Yoshida, Verschaffel and De Corte (1997) in investigating the effect of real-life knowledge on mathematical problem-solving. Questions on the pre- and post-test were selected from these previous studies with some modification to be suitable to the United Arab Emirates culture. Also, this study subjected students to the same pre and post-test as most of the studies mentioned above. This study was more like to study done by Palm (2008) in how to analyze students' responses to realistic and unrealistic answers.

Points of difference:

There were points of difference between this study and the studies of Inoue (2005), Li and Silver (2000), Palm (2008), Verschaffeli, DE Corte and Borghart (1997) and Yoshida, Verschaffel and De Corte (1997). This study added two questions to the test which did not use before. Also, in this study the intervention was a period of teaching before the post-test which was different from the previous studies. In addition, the selection of participants was not random as in the previous studies which did random selection of the participants. Moreover, the participant of the study 7th grade female students from the UAE, while the study of Yoshida, Verschaffel and De Corte (1997) conducted on 5th grade students (in Japan), the study of Verschaffeli, DE Corte and Borghart (1997) done on 5th grade students (in Belgium) and 3rd grade students (in Sweden).

CHAPTER III

Methodology

Introduction

This chapter provided information about the method used by the researcher to conduct this research. It explained the research design, research methodology, and the participants of the study. It described the instruments used to collect the data and how they were modified to be valid and give reliable results. Also, it presented the data analysis and the procedure of the study.

Research Design

The researcher used both qualitative and quantitative data. To collect the qualitative data, the researcher used the interviews. Due to the nature of the study and the difficulty of assigning students randomly into two groups to apply the treatment, the researcher choose a quasi-experimental design, precisely the nonequivalent control group design. This design based on the choice of 4 classes from grade 7 of a particular school to undergo a pre-test in December, 2010, followed by treatment or intervention and then a post-test in January, 2011 to determine the effectiveness of the treatment and the reasons that would cause students to exclude real-life knowledge while solving mathematical problems. The pre-test and the post-test were the same. To minimize the external factors that could affect the study and results, the groups were designed to be homogeneous. Thus all subjects were from one school, one environment and had almost the same background. Some individual differences among the subjects could not be controlled within each group or between the two groups.

At the beginning, random groups were assigned to the treatment group or to the control group. The control group consisted of classes 2 and 4. The two classes took the pre-test and the post-test without any intervention. The experimental group consisted of classes 5 and 6, and each of these classes took the pre-test, and then received a treatment that included a one-month period of teaching sessions related to problems that use real-life knowledge , after that they took the post-test.

Participants

For the study, 101 students were chosen from grade 7 from 4 classes from one school near Al Ain. Students were almost all local and had the same socioeconomic background. There were differences in their achievement levels in mathematics. The number of students in the two groups respectively were 51 and 50. The students were aged between 11 to 16 years old. In each class, there were some students with difficulties in computing and solving without using a calculator, so calculators were allowed in the test. Students were divided into two groups (control and experimental) by their classes. The test took 45 minutes, or 1 class period.

Instruments

The researcher used two instruments to collect data, the test and the interviews. The test contained 7 real-life word problems, some of them were taken from previous studies and modified to be consistent with the students' culture. Students were allowed to use calculators to compute answers. On the test, students wrote their answers in the answer boxes. Also, they had to write the steps of solution in the space provided on the test. The same tests were used with students but in Arabic versions, to avoid the barrier of English language in the students. (For the test see Appendices B and C).

The aim of the first question on the test was to know the students' ability in understanding the common elements and relations that occur in our lives. For example, it was not necessary to understand the sentence "How many girlfriends" as an addition problem so much as to understand that there was two girls probably have common friends. Because of this likelihood, 11 was not the only answer, but it was correct only in one case: if the friends of Fatima were different from the friends of Alia. Thus, this answer classified as an Expected answer, but not as a "Realistic" one. A more Realistic answer was "11 or less", depending on the number of common friends between Fatima and Alia. Other students involved 'Fatima and Alia' from the invitees so they got the answer13 and also, it was Expected answer.

As for the second question, it measured the extent of understanding of the meaning of four planks measuring 2.5 m each, and how to get 1 m planks from each which can be done by cutting each plank once to get 8 pieces, and by neglecting the remaining parts that are less than 1m. So, the student should realize to cancel the extra half-meter from each plank and then found the number of possible 1 m planks, which was 8. Most of the students, solved the problem mathematically and got 10 which could be correct if the remaining half-meter parts were fixed. Of course, the answer 7.5 was wrong because the student added all the numbers mentioned in the question without understanding of the calculations required from the question.

The third question was similar to the questions posed to students in the curriculum, and the aim was to round the decimal into whole number after doing the division, because there were no 12.5 buses in the real life. Actually, it should be 13 buses.

The fourth question measured students' understanding of distance and time, such as kilometers and minutes, but also they should understand that humans cannot run at the same speed if the distance was quite long. Although the mathematical solution for that problem was 250 minutes, Mohammed in fact could not achieve such a time. Actually, he needs more than 250 minutes because he will get tired and may suffer from other obstacles that hinder his speed. The other wrong answers involved the using of various unsuitable operations such as addition, subtraction and division to find the answer without understanding the question.

In question five, the aim was to know students' ability to think away from the routine solutions when dealing with something commonly related to their lives, such as the restaurant problem. In this case, the expected mathematical solution was 40 customers. However, this solution was correct only if the customers in the restaurant attended at the same time and all of them ate their food in the restaurant, which did not happen in our real life. Actually, what we recognized from our real life that the number of customers often exceed 40, because the customers arrive at the restaurant at different times, and they did not always eat at the restaurant. This was what we want students to comprehend and use while solving problems.

As for question six, it was designed to identify if students recognized the concept of addition and linked pieces together, so the new length of the rope will be shorter than what they got from collecting small pieces together, so 1.5 +1.5 +1.5 +1.5 or 1.5 × 4 were not equal to 6 cm in real life. Actually the new rope should be less than 6.

In question seven, the goal was to elicit life experience about the elevator to solve the problem and do not solve it mathematically. Although 100 was the expected answer from students who do the division only, but if students linked the answer to their real-life experiences, they will realize that it was impossible for all the staff to ride the elevator at the same time. Some of them will use stairs. Thus, the elevator may used more than 10 times.

The second instrument used in the study was interview. It conducted for 20 students from control and experimental groups, depending on their unrealistic solutions, to provide more details about their answers, beliefs and why they did not apply their real-life knowledge in their answers. The interview in maximum took from 15 to 30 minutes. The interview includes three questions:

1. Do you think that your answer is possible in real life? Why?
2. Why did you separate your real-life knowledge from the solution?
3. If you have a chance to change your answer to fit in real life, what will you add to your solution? Why?

Procedures

Initially, the pre-test was done for all students in the classes in the two different groups on Sunday, December 12, 2010, and the data was analyzed after the test. Then the experimental groups (Classes 5 and 6) took the intervention with various problems associated with real-life situations. Although the problems used in teaching this group were little different from what they faced in the test. They prompted students to think realistically. Students were given 1 to 2 problems in the last 5–10 minutes of their classes over a period of one month. The problems were changed each time with different numbers or situations (see appendix A).

Then, on January 19, 2011, the two groups did the post-test, which was the same pre-test done before without any changing. After this date, interviews for students from the two groups were conducted. Students in the interview were selected according to their unrealistic solutions to problems on the test. They were asked the questions written before in the instrument. Interviews were started from two weeks after the post-test. The interviews took one month because there wasn't enough time to conduct interviews with all of the students at the time of working hours, so just one to two interviews were done every day, depending on the time available.

Validity and Reliability

The validity used for the test was content validity. It assessed by two professors in the Department of Curriculum and Instruction for teaching mathematics. In addition to that, two high school mathematics teachers provided feedback on the Test.

For the reliability of the test, the researcher used test- retest to find the reliability coefficient. Then SPSS version 19 was used to find the correlation between the pre-test scores and post-test scores, then found the T Test (pre-post).

Table (1)

The correlation between the pre-test scores and post-test scores

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Pre-test & post-test	101	.236	.018

From Table (1), it can be seen that the correlation between the pre- and post-tests was 0.24, which mean a positive relationship between the two variables pre- and post-tests, although this relationship was not too strong.

About the reliability of the interviews, the researcher conducted interviews to 20 students and ended with 60 answers from them. Then the researcher asked her colleague (mathematics teacher from high school) to correct the interviews again. The number of common answers between the researcher and the high school teacher was 53 answers, so the percentage of agreement between the researcher and her colleague was 88%. According to literature and expertise educators, this percentage is acceptable to guarantee instrument reliability.

Data collection & Analysis

Data collection and analysis from the Test:

Data were described and analyzed in quantitative and qualitative ways. Students' responses in the two tests were analyzed and interpreted according to their answers in the answer boxes, the steps of their solutions, and their interviews. Students' answers divided into four main categories: Expected Unrealistic Answer (E), Realistic Answer (R), No Answer (N), Other Answer (O). Regarding to the steps of solutions: if the student gave details or steps that indicated reality, then her answer was rated as a Realistic Answer (R). If the student gave some mathematical steps that supported her answer, then her answer was rated as an Expected Unrealistic Answer (E). However, if she provided steps that supported her answer in a different way from Realistic or Expected, then her answer classified as Other Answer (O). If the steps did not explain the solution, the answer was classified according to the first classification of the answer box without relying on the solving steps. Then, we ended to two main categories, which are Realistic Answer (R) and Unrealistic Answer (UR) which include the three types Expected Unrealistic, No Answer and Other Answer.

For each student's response in the pre- and post-test, the correct answer was the realistic answer. If the student gave the realistic answer, it got '1', and if not, she got '0' as it is considered that the correct answer is the realistic answer. Then the frequency of the student's response to each question were organized in table format for the four classifications (Realistic - Expected - Other answer - No answer). Then, the answers were divided into two major categories (Realistic – Unrealistic), where realistic answers fall under the Realistic category only, and the category of Unrealistic answers contain Expected - Other answers - No answer. For analyzing data from pre- and post-tests, the researcher used frequency, percentage, , Mean, SD and ANOVA test .

Data collection and analyze from the interview:

The interviews were conducted during school time and in the Arabic language, and then were analyzed and translated into English. The duration of the interviews differed from one student to another depending on the answers given by each student.

Each interview was recorded, and notes were taken for each question. Then the interviews were transcribed and coded according to the interviewees' names. After that the common themes for each question were identified to get general points about the effect of real-life knowledge in mathematical problem-solving.

CHAPTER V

Results

Data were collected from pre- and post-tests to analyze, compare and determine the effectiveness of the method used in the study to raise the performance of students in solving problems. This analysis answered the two research questions, and in particular the first research question.

Analysis of Research Question# 1: Did 7th grade students take into consideration real-life knowledge in solving mathematical problems?

To answer the first question, students' responses in the pre-post-tests in the two groups were classified in Table 2 and Table 3. Table 2 presented the categorization of answers which were Realistic (R), Expected (E) --which was in fact the mathematical solutions--, Other answers (O) and No answers (N). The classification of the questions accords with that mentioned in the previous studies (Reusser & Stebler1997), except questions 5 and 7 which were written and completed as the previous questions. Also, the third column in Table 2 was for the answers on tests that could not be sorted into Realistic (R) or Expected (E), but were random solutions arrived by doing operations on the given numbers, but without any understanding of the nature of the problem.

Table (2)

The seven questions and category of the responses (Realistic, Expected, Other answers and No answer) for each problem

Real-life problems	*Realistic answer (R)*	*Expected answer (E)*	*Other Answer (O)*	*No Answer (N)*
1. Fatima has 5 friends in grade 7 section (A) and Alia has 6 friends in the same class. Fatima and Alia decided to make a party and invite their all friends. All the friends came to the party. How many friends came to the party?	At most 11	5 + 6 = 11	5 × 6 = 30 5 + 6 + 2 = 13	
2. Mariam needs planks of 1 m. She has 4 planks of 2.5 m each. How many planks of 1 m can she get out of these 4 planks?	2 × 4 = 8	2.5 × 4 = 10	2.5 + 4 + 1 = 7.5	
3. 450 baseball fans will go to the stadium by bus. Each bus can hold 36 fans. How many buses are needed?	450 ÷ 36 = 12.5 = 13	450 ÷ 36 = 12.5	450 - 36 = 414 Or 12	
4. Mohammed's best time to run 1 km is 5 min. How long will it take him to run 50 km?	More than 250 min	5 × 50 = 250	50 – 5 = 45 50 ÷5 = 10 50 + 5 + 1 = 56	
5. A restaurant has 10 tables and each table can accommodate 4 customers. How many customers can the restaurant receive every day?	More than 40 customers	10 × 4 = 40	10 + 4 = 14	
6 Sarah has 4 pieces of rope of 1.5 cm each. She ties all the pieces together to get one long rope. What is the length of this rope?	Less than 6	4 × 1.5 = 6	1.5 + 4 = 5.5	
7. 100 employees work in a building that has one lift. How many times a day will the lift move, if the maximum capacity is 10 people?	More than 10 times	100 ÷ 10 = 10	100 × 10 = 1000	

Table 3 showed the frequency of students' responses in pre post tests for each question in the control and experimental groups, and it was clear from the results of this table that in the pre-test students had the tendency to give mathematical answers which were not based on real life knowledge (note the Expected column). In the pre-test, students gave unrealistic answers (Expect) in the two groups but this number decreased in the experimental group after giving them a period of teaching. This intervention increased the number of students who answered realistically on all questions and specifically in questions 3, 5 and 6. While it was an increase in the number of students who answered un-realistically (Expected answer) in the rest of the questions. In the control group, it can be seen that the number of students who answered unrealistically increased in the post-test, especially in questions 1, 3 and 7. Also students answered questions 2, 3 and 4 in unrealistically way (Expected answer) and they did not use their prior knowledge or skills learned in solving problems. They just deal with numbers and operations without understanding the problems (see Table 3).

Table (2)

The Frequency of students' responses in both pre and post tests for each question in the control and experimental groups

		Q1				Q2				Q3				Q4				Q5				Q6				Q7			
		E	R	O	N	E	R	O	N	E	R	O	N	E	R	O	N	E	R	O	N	E	R	O	N	E	R	O	N
Control Group	pre	50	0	1	0	17	2	29	2	10	5	30	6	18	0	29	3	35	0	11	4	25	0	17	9	30	0	13	7
	post	51	0	0	0	20	2	26	2	19	8	15	0	28	0	23	0	29	0	12	0	32	5	19	0	41	0	8	0
Experimental Group	pre	46	0	4	0	13	2	32	2	22	6	21	0	17	0	34	0	38	0	12	0	29	0	19	1	37	0	12	0
	post	38	7	5	0	23	8	17	1	12	15	20	2	18	8	24	0	28	15	6	1	19	21	8	1	26	13	10	1

Table 4 illustrated the numbers of realistic and unrealistic solutions for the seven questions among the control and the experimental groups in pre posttests, where the researcher considered the Expected answers (E) and the Other answers (O), which are displayed in Table 2, as Un Realistic answers. Because some Expected answers considered wrong or only correct in one case, not in all situations. It could not prove that the student used the real-life knowledge in solving the problem. Also, we noticed that all the groups got '0' in most of the questions on the pre-test, which indicated that the students in the two groups began from the same level, except the third question, where 5 students from the control group and 6 students from the experimental group answered this question correctly. So, it was clear that some students have prior knowledge in how to use real-life experience in solving this type of problem. Also, after conducting interviews with the students about this question, they said that they encountered them in the curriculum. Furthermore, Table 4 showed an improvement in the performance of students in all the questions after the teaching periods, and the number of realistic answers increased from 0 in most of the questions in the pre-test to 7, 9, 15, and 21 in the post-test. This indicated a clear effect of the role of teaching on enhancing students' ability to think and solve in realistic way.

Table (4)

The number of realistic and unrealistic answers in the pre-test and post-test for each question in the control and experimental groups

Questions		Groups			
		Control Group		Experimental Group	
		Realistic	Unrealistic	Realistic	Unrealistic
Q 1	Pre-test	0	51	0	50
	Post-test	0	51	7	43
Q 2	Pre-test	2	49	1	49
	Post-test	2	49	9	41
Q 3	Pre-test	5	46	6	44
	Post-test	6	43	15	35
Q 4	Pre-test	0	51	0	50
	Post-test	0	51	6	44
Q 5	Pre-test	0	51	0	50
	Post-test	0	51	15	35
Q 6	Pre-test	0	51	0	50
	Post-test	0	51	21	29
Q 7	Pre-test	0	51	0	50
	Post-test	0	51	13	37

Table 5 showed the frequency of realistic and unrealistic solutions in the pre-posttests in the groups, where Table 6 displayed the number of realistic and unrealistic answers in the two groups in the pre- posttest in percentage. Table 4 showed a high number of unrealistic answers in the pre-test in the two groups, while we noticed a clear reduction in the number of unrealistic answers and a high number of realistic answers in the experimental group after the treatment compared with the control group, which it was no clear improvement in the number of realistic answers.

Also, from tables 5 and 6, the number of unrealistic answers in the pre-test was the highest in both the control and experimental groups compared to realistic answers, which were 7 and 6 (13.7% and 12%) for the two groups respectively, while this number decreased in the post-test in the second group to 40 (80%).

Table (5)

The frequency of realistic and unrealistic solutions in the pre-test and post-test for each question in the control and experimental groups

	Groups			
Type of	Control Group		Experimental Group	
Solution	Pre-test	Post-test	Pre-test	Post-test
Unrealistic	44	41	44	10
Realistic	7	10	6	40

Table (6)

The percentages of realistic and unrealistic solutions in the pre-test and post-test for each question in the control and experimental groups

	Groups			
Type of	Control Group		Experimental Group	
Solution	Pre-test	Post-test	Pre-test	Post-test
Unrealistic	86.30	80.40	88	20
Realistic	13.70	19.60	12	80

Table 7 showed the mean and standard deviation in the pre-test and post-test for each question in the control and experimental groups. The results indicated that the mean for all questions in pre-test and post-test in the control groups was 0.00 except in questions 2 and 3 where the mean score was 0.04 in question 2 for the two tests and 0.10 in question 3. For question 3, it happened because there were 5 students who answered this question realistically in the pre-test and this number increased to 42 students as shown in Table 3, So, the mean increased to 0.18. Therefore, the standard deviation for question 3 reached 0.38 in the post-test, which indicated heterogeneity of students' answers in this question. However, the standard deviation in the control group for the other questions was 0.00 in almost all questions, which gave a hint that students' answers on the two tests in this group were close to each other. As for the experimental group, the mean score for the pre-test was 0.00 for almost questions but this number changed in the post-test to more than 0.10 in all questions. Furthermore, the standard deviation increased in the post-test to more than 0.30 in all questions, which mean that students' answers in experimental group where more different and various after period of teaching, which led us to answer our second research question.

Table (7)

The Mean and Std. Deviation in the pre-test and post-test for each question in the two groups

Questions		Groups			
		Control Group		Experimental Group	
		Mean	Std. Deviation	Mean	Std. Deviation
Q 1	Pre-test	0.00	0.00	0.00	0.00
	Post-test	0.00	0.00	0.14	0.35
Q 2	Pre-test	0.04	0.19	0.02	0.14
	Post-test	0.04	0.19	0.18	0.38
Q 3	Pre-test	0.10	0.30	0.12	0.32
	Post-test	0.18	0.38	0.30	0.46
Q 4	Pre-test	0.00	0.00	0.00	0.00
	Post-test	0.00	0.00	0.12	0.32
Q 5	Pre-test	0.00	0.00	0.00	0.00
	Post-test	0.00	0.00	0.30	0.46
Q 6	Pre-test	0.00	0.00	0.00	0.00
	Post-test	0.00	0.00	0.42	0.49
Q 7	Pre-test	0.00	0.00	0.00	0.00
	Post-test	0.00	0.00	0.26	0.44

Table (8)

The ANOVA test in the post-test for each question in the two groups

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q1RPost	Between Groups	.49	1	.49	8.13	.005
	Within Groups	6.02	99	.06		
	Total	6.51	100			
Q2RPost	Between Groups	.50	1	.50	5.32	.023
	Within Groups	9.30	99	.09		
	Total	9.80	100			
Q3RPost	Between Groups	.38	1	.38	2.12	.148
	Within Groups	17.91	99	.18		
	Total	18.29	100			
Q4RPost	Between Groups	.36	1	.36	6.81	.010
	Within Groups	5.28	99	.05		
	Total	5.64	100			
Q5RPost	Between Groups	2.27	1	2.27	21.42	.000
	Within Groups	10.50	99	.10		
	Total	12.77	100			
Q6RPost	Between Groups	4.45	1	4.45	36.20	.000
	Within Groups	12.18	99	.12		
	Total	16.63	100			
Q7RPost	Between Groups	1.70	1	1.70	17.56	.000
	Within Groups	9.62	99	.09		
	Total	11.32	100			

In Table 8, which used the ANOVA test to calculate the significance in the two groups for each question in the post-test. It noticed from the table that the f value of question three (2.12) was not significant. It means, on bus problemthere was no significant differences in students' responses in the control and experimental groups in question 3. However, in the other six problems all differences between experimental and control groups were significant. The following points made as a general overview from Research question# 1 which was: Did 7th grade students take into consideration real-life knowledge in solving mathematical problems?, and the first research hypothesis which was: There is no statistically significant difference ($\alpha \leq 0.05$) in post-test math scores of 7th grade students who do not receive any intervention and students who receive an intervention. Most of the students' answers were unrealistic (Expected answers) although there were a few realistic answers on certain problems.

1. There was a tendency of the participants to solve problems in a non-realistic way by using mathematical solutions without referencing the answers to real-life to make sure that the solution applies in it or not.
2. There were more realistic answers on the bus problem, which was exposed to them in the curriculum.
3. The number of realistic answers increased in the post-test in experimental group after the intervention.

It noticed from the data analysis of pre- and post-tests that there was a significant difference in students' scores in the experimental group compared to the control group, which denies the research hypothesis.

Analysis of interviews

Interviews were audiotaped and analyzed qualitatively to answer interview questions which were:

- Do you think that your answer is possible in real life? Why?
- Why did you separate your real-life knowledge from the solution?
- If you have a chance to change your answer to fit in real life, what will you add to your solution? Why?

The interviews were conducted after the post-test, and the students were selected according to their unrealistic answers on the post-test. 8 students were selected from the experimental group while 12 students were selected from the control group.

For the first question in the interview which was: Do you think that your answer is possible in real life? Why? All students agreed that they would use their answers in real life, except for the problems (runner-lift-bus). In the bus problem, the student AS said, "There is no half bus", and this was confirmed by all students in their interviews, as well as in the lift problem where they said that the answer does not apply in our real life. Regarding the runner problem, the student HM said, "I think runner needs more than 250 min because he will be tired in the race and will need a time to rest", while the student FA said, "the time depends on the runner. If he runs fast then he will need less than 250 min while if he run slow, he will need more time," and the student AA stated that she did not understand what was required from the problem and she said, "I added 5 with 50 and the result became 55." 5 students said that they didn't understand this problem. Also, when I asked the students, in the interview, if they could imagine the long of the distance 50 km, most of them said that they did not know how long it was in real life. Student EK said, "I do not know what 50 km means, and another student said, "I saw the numbers and I chose the operation without concern for the unit in question)." For the lift problem, most of the students said that the answer did not apply in our real world, and the student SA said, "the lift will move more than 10 times, but I did not concentrate when I solved the problem."

To answer the second question of the interview which was: why did you separate your real-life knowledge from the solution?, the student NH reasoned why she didn't use the real-life information: "I did not think in the problem very well," while student MA said, "you did not ask us in the test to give our opinion," and this is what the two students KR and HM said as well. As for the rope problem, student MS said, "I never thought that I could add my opinion," and this was confirmed by the student AF. Student SM insisted on her answer 40 for restaurant question and considered it a realistic answer because "the restaurant cannot accommodate more than 40 because I used a drawing and came up with 40," and student RA said, "I thought the answer of the restaurant question meant at one time and not in the daily sense of the word," and student LS stated, "we do not get used this kind of questions whose answers do not need arithmetic operations."

The third question of the interview was: If you have a chance to change your answer to fit in real life, what will you add to your solution? Why?. The student AF said she could adjust the runner problem to get the realistic answer ("more than 250 minutes, because the runner could be tired and need more time"), and the student SM confirmed her where she said, "long distance will require time more than 250 minutes," but for the friends problem, AS said, "the number of friends is 11 or less," but for the runner problem, student NH stated, "the answer in fact is 250 minutes or more." For the restaurant problem student MS said that "visitors of the restaurant can be 40 or more or less depending on the times of week," while the student HD said, "I think the answer is more than 40, and some of them can sit outside the restaurant." For the rope question, student MA said, the link will take part of the rope and the answer will be less than 6 or maybe 5 or 4," while for the lift problem, student HM said, "the lift will move more than 10 times because it could not hold 10 people each time when it moves up or down."

Analysis of Research Question# 2: Would 7^{th} grade students be able to take real-life knowledge into consideration after a period of teaching?

To answer this question, returned back to Table 3, which showed the number of realistic and unrealistic solutions in the pre- posttest for each question in the two groups. It became clear that the number of realistic solutions in the post-test, after period of teaching, was increased in all questions. It raised to more than 10 Realistic answers to the questions 5,6 and 7 while, there were 6 to 9 Realistic answers in the other questions. Moreover, the results presented in Table 5 showed that there was a change in the number of Realistic answers (R) after a period of teaching, as it increased sharply from 6 in the pre-test to 40 in post-test.

Turning back to Table 3, it showed that in the experimental group the number of Realistic answers was 0 for all questions except for questions 2 and 3 which were 2 and 6. But after applying the treatment, the number of Realistic answers increased on all questions and reached 15 in two questions.

The following points made as a general overview from Research question#2 which was : Would 7^{th} grade students be able to take real-life knowledge into consideration after period of teaching? and the second research hypothesis which was: There is no statistically significant difference ($\alpha \leq 0.05$) in pretest and post-test math scores of 7th grade students who receive the intervention.

1. There was an increase in the number of students who gave Realistic answers in experimental group compared to the control group who did not receive any treatment

2. Students have the ability to link and use real-life knowledge in solving mathematical problems or real-life situations.

3. From the ANOVA test, it was a significant difference in students' scores in the experimental group between pre-test and post-test scores, which denies the second research hypothesis.

CHAPTER IV

Discussion and recommendations

In this chapter, you found a summary of the problems that students faced in 7th grade. For instance, they showed a tendency to ignore their own real-life knowledge when solving mathematical problems. Additionally, conclusions and the recommendations.

Furthermore, this chapter provided decision-makers with recommendations to serve the development of mathematics teaching in general, and the development of problem-solving skills in particular. In addition, it listed suggestions for changing the teaching methods at the same time, which helped students in solving math problems.

Comparing what happened in the control and experimental groups, and after the completion of interviews, it was clear that 7th grade students have the tendency to give unrealistic solutions and avoid the use of real-life knowledge, and this tendency was not due to the students' lack of real-life knowledge, but it was a result of a lack of deep understanding of the problems or because of the different nature of the problems from what they were given in the schools. In the end, three major reasons emerged to explain what drives students to give answers inconsistent with real-life knowledge while solving mathematical problems:

The first reason was the lack of attention and deep understanding of the problems before solving, and just focus on using only the numbers in problems according to certain strategies that were learned in the school to reach the solution, without taking into account whether the answer is consistent with real-life knowledge or not.

Also, it can be seen from Table 3, which about the classification of students' answers in pre- and post-tests, that there was a significant number of students who gave unrealistic answers in the pre-test in both the control and experimental groups. This number decreased in the experimental group after the treatment. However, the number of students who gave unrealistic answers (Expected) still increased in the two groups in questions 1, 3 and 7, as students showed the lack of deep understanding of these problems (as students said in interviews). Thus, they just used the numbers to do different calculations to give the answer. This point was confirmed by Palm (2008) in his study where he stated the reasons that affected taking real-life knowledge into considerations when solving problems, including the frequent use of strategies based solely on numbers and operations and ignoring the nature of the task, which must be linked to students' culture and their experiences. As a result of a lack understanding of the problems, students' selected the wrong strategies or used one strategy in all problems, regardless of whether it gave a realistic solution or not. This tendency can be traced to the traditional methods used by teachers in teaching students certain strategies (Tambychik & Meerah, 2010).

When I asked one student in the experimental group about whether her answer to the bus problem is 12.5 was a real answer, she said, "My answer is unrealistic and I did not pay attention to the question that asked about the number of buses and in fact there is no half bus and I know that". While another student from the control group said, "My answer is realistic because the result of dividing 365 over 36 is 12.5."

Another reason factor was the lack of knowledge of real life that we need to understand in order to solve these problems. This became clear in the problem of the running, when I asked a student from the experimental group about whether her answer was real or not, and she replied "Yes", and when I discussed with her the distance of 50 km and how it far from her city, she answered: "I did not know that the 50 km is a long distance, and it is impossible for Mohammed to run this distance in 250 minutes and he will need more time because he will tired". Another student from the same group said, "The answer is more than 250 minutes because he will not be able to maintain a constant speed in running this long distance". Poor cognitive skills do not help in developing their abilities to solve different problems (Tambychik & Meerah, 2010).

A third factor, which was mentioned by one student in the control group is, "I did not know that it was permissible to write my opinion while solving the problem". This indicated that students stay within a certain framework that has been practiced in the school and which has confined them certain strategies that require them to give one answer without showing their beliefs and opinions from their real-life world. This became clear in the elevator problem when a student from the control group said, "I know that the elevator would actually move more than 10 times but I did not know that it is permissible to write this thing". Also, the rope problem, where another student, when I discussed the problem with her, said: "sure the rope would be less than 6, but you did not ask us to write this in the answer". Another student said: "I am not accustomed to such problems in the school".

These responses reflected what Lester and Kroll (1995) mentioned in their study that there are two factors affect the success of student in solving problems: beliefs, and culture. A students' performance develops according to their ability to connect their knowledge and beliefs to the problem situation. Also, Lowrie (2005) admitted that success lies on the strength of this link. Also, the repetition of problems separate from real life led to reduced ability of students to link problems and develop this skill.

Other reasons were also observed from the students' answers in the tests and interviews, such as: lack of understanding of the problems because of the language, or being distracted when solving problems. Tambychik and Meerah (2010) also found that almost 40% of the students showed the presence of difficulties in areas such as: fact numbers skills (which are concepts and mental processes)-Arithmetic skills - information skills (the ability to link mathematics and construct math sentences)–or linguistic skills.

Table (9)

Percentage of Realistic Answers: The results of the study and the previous studies of experimental groups

Groups				
		previous studies		
Word Problem	This study	Reusser, K and Stebler, R. (1997)	Yoshida, H., Verschaffel, L. and De Corte, E. (1997)	Verschaffel, L., De Corte, E. and Borghart, I. (1997)
Probem1: Friends	14.00	10.5	13	29
Probem2: Planks	18.00	13.5	0	64
Probem3: Buses	30.00	49.3	62	90
Probem4: Runner	12.00	4.5	7	31
Probem6: Rope	42.00	--	2	37

The following table showed the percentage of Realistic answers in this research and the previous studies that dealt with the same questions. The first column showed the five common problems with the previous studies, while the second column shows the results of this research. The last three columns were the results of the previous studies, where the first study was conducted on the 5th graders in Belgium and the second search was conducted on the 5th graders from Japan and the last study was conducted on the pre-service students-teachers in the first and third year. The results were shown in Table 7.

In the Verschaffel et.al. (1997) study, it can be seen that the percentage of realistic answers was very high on the problem of buses (90%), which was the highest percentage obtained compared with the results from this research or previous studies, while the percentage of students in this study who answered this problem in a realistic way was 29%.. Borghart (1997) in his research said that there was a little attention to teaching students the applications of division with the reminder and there was an absence of modeling reality, and this was one of the reasons for the low of percentage in the other questions, especially the question of runner, where this study got the lowest percentage compared to the two first studies. The results of this research were gentle increase compared to studies of Reusser and Stebler (1997) and Yoshida et.al. (1997), which indicated an improvement in the performance of students after treatment. Perhaps the different treatment from research to another was one main reason for the difference in the results between this research and the previous studies. In the first research, there was a test only, while the treatment in the second research was a hint at the top of the test to draw student's attention to think realistically. In the third research, the treatment was a test. I think the difference of the treatment used in the study, the nature of the questions that are different from the nature of the curriculum taught in the United Arab Emirates and how to link the word problems to real life, in fact have a role in the tendency of students to take realistic considerations or not.

Summary

7th grade Students were suffering from a tendency to neglect their real-life knowledge while solving realistic problems, as confirmed by the results of a pre-test which proved the inclination of students to solve realistic problems in specific mathematical ways learned in school. The research indicated that the students tended to not take realistic factors into consideration while solving problems for three reasons which are: lack of focus and understanding of the question; poor knowledge; and repeated lack of such problems in school. If not treated, this problem adversely affects the results of students in mathematics, where problem-solving skill is one of the important pillars underlying mathematics in particular, and in other scientific fields as well.

Therefore, the researcher did a study on this problem. The number of participants was 101 students from seventh grade. She had one experimental group and one control group. The technique that was used to solve this problem was to link the problems and how to solve them with the students' life. Therefore, the researcher took 5-10 minutes from the end of class to discuss one problem each day from the students' life and to address different solutions that corresponded with their life and solutions that contradicted their experiences. Through this discussion, the researcher tried to change the student's way of thinking commensurate with the life skills that they know and experience in reality. Pre- posttests were conducted, and the post-test followed the teaching of the experimental group.

The validity of the test was content validity and the test was modified by two professors at UAE-University and two teachers from Umm Kulthum Secondary School to assure the appropriateness of the questions and their suitability for 7th grade students. Data were collected from the tests (pre- posttests), interviews and then analyzed. Descriptive statistics were used to find the mean and standard deviations for all the questions in the pre- post tests.

Conclusion and recommendations

Analyzing students' post-test results indicated that the mean scores increased significantly after teaching students problem-solving using their life knowledge. In contrast, students who did not get training in solving problems had their results stay constant at 0.00 except that questions 2 and 3 rose in order to 0.04 and 0.18. Interviews and results of post-test showed marked improvement in students' ability to think in a realistic manner as students used diagrams and words that indicated the links. Also, a link to real life appeared in the runner question: "In reality this distance is too long to be run in 250 minutes". Modifying problems to be more realistic and encouraging students to change their thinking style about problems led to higher achievement results in the post-test. It also shows that teaching students how to solve problems with a realistic method has a positive effect on improving their performance in those skills.

General findings from Research question# 1 which was : Did 7^{th} grade students take into consideration real-life knowledge in solving mathematical problems?

- Most of the students' answers were unrealistic (Expected answers) and also there were a small number of Realistic answers on certain problems.
- There was a tendency of the participants to solve problems in a non-realistic way by using mathematical solutions without referencing the answers to real-life to make sure that the solution applies in it or not.

- More Realistic answers were offered for the bus problem because it had been exposed to them in the curriculum.

- The Realistic answers increased in the post-test in the experimental group after the intervention.

General findings from Research question# 2 which was : Would 7th grade students be able to take real-life knowledge into consideration after a period of teaching?

- There was an increase in the number of students who gave Realistic answers in the experimental group, compared to the control group who did not receive any treatment.

- There was improvement in the ability of students to link and use real-life knowledge in solving mathematical problems or real life situations.

Through this study; researcher reached to the following conclusions:

1. Grade 7 students tended to neglect using real-life knowledge when solving mathematical problems.

2. A lack of the deep understanding of the problems keeps students locked in a certain style of problem-solving and leads them to ignore real-life knowledge.

3. A change of teaching style and an attempt to start solving problems with brainstorming and giving students the opportunity to employ what they know and experience they have gained, encourage students to think about problems in a realistic manner.

Firstly, teaching students how to solve problems by linking them with real life helps them to develop and find a lot of possible logical solutions, and reduces their dependence on one mathematical solution which might be wrong.

Secondly, teaching students in this realistic way allows them to be independent in looking for answers, and not stuck in the traditional studying circle. Rather, it will help them to understand or gain new knowledge by reading, practicing, interacting with people or using another ways.

Therefore, the recommendations are as follows:

Teachers need to use realistic problems during math classes if they want to relate mathematics with the surrounding environment. This will be achieved through offering a rich environment through classroom activities. For instance, using carefully selected materials can give students the chance to experience the difference between realistic and unrealistic solutions expected from them.

Students' skills in searching for information should be enhanced such that they are able to understand the problems before solving them. For example, teachers can encourage them to look through a variety of sources such as different multimedia.

Tests should be modified to make students to think and express their opinions and connect their own reality to theoretical knowledge, without ignoring the perspective of the student's solution to support their self-confidence.

Abu Dhabi Education Council, Al Ain Educational Office, and Supervisors need to focus on this issue because of the importance in building students' thinking. This can be accomplished through workshops designed and specified in presenting problems to students. Although it is not as difficult as teachers thought, the process of assessing solutions is the point of debate. Therefore, teachers need to develop a standard to assess the issue and create different answers.

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APPENDIX A:

The problems done in the classes were as follows:

1. Mohammed bought 5 types of candy from the green market and Ali bought 3 types of candy from the same market. How many different types of candy were bought by the two boys?

2. Sameer has 4 pipes, each of which is of 4.5 m in length. He wants to get pipes that are 2 meters long from each pipe to make a link for his kitchen. How many pieces can he get?

3. Fatima has 17 balloons. If she wants to give her 3 daughters these balloons equally, how many balloons will she give to each daughter?

4. Rabbit can run a distance of 65 kilometers per hour. How much time can the same rabbit run in 260 Kilometers?

5. A shopping center has 4 cinemas. If each cinema has a capacity of 100 spectators, how many spectators are there in 4 cinemas every day?

6. The sport group has 7 colored pieces of fabric with length 3 meters for each. If this group links the pieces together to get one long piece that they can use to make a section for the celebration, what will be the length of this piece?

7. The public bus can take 30 passengers at a time. If the number of people waiting at the station was 120 passengers, how many times will the bus move?

APPENDIX B:

أجب عن الأسئلة التالية موضحاً خطوات الحل:

١. لدى فاطمة 5 صديقات في الصف السابع (أ)، ولدى علياء 6 صديقات في نفس الصف، قررت فاطمة وعلياء إقامة حفلة ودعتا إليها جميع صديقاتهن، فحضرت جميع المدعوات، كم عدد الصديقات اللاتي حضرن الحفلة؟

الإجابة هي: ......

اشرح خطوات الحل:

٢. تحتاج مريم ألواحاً من الخشب طول كل منها 1 m، فإذا كان لديها 4 ألواح بطول 2.5 m لكل منها، كم لوحاً بطول 1 m بإمكانها الحصول عليها من هذه الألواح الأربعة؟

الإجابة هي: ......

اشرح خطوات الحل:

٣. انطلق 450 مشجعاً من مشجعي كرة القدم إلى الملعب بالحافلات، فإذا كانت كل حافلة تتسع لـ 36 مشجع، فكم عدد الحافلات اللازمة لنقلهم إلى الملعب؟

الإجابة هي: ......

اشرح خطوات الحل:

٤. أفضل وقت حققه محمد في العدو لمسافة 1 كم هو 5 دقائق، فكم سيستغرق من الزمن لقطع مسافة 50 كم؟

الإجابة هي: ......

اشرح خطوات الحل:

٥. مطعم فيه 10 طاولات تتسع كل منها لـ 4 زبائن، كم زبوناً يمكن أن يستقبل المطعم يومياً ؟

الإجابة هي: ......

اشرح خطوات الحل:

٦. لدى فاطمة 4 قطع من الحبال بطول 1.5 cm، قامت فاطمة بربط الحبال مع بعضها البعض، فكم سيكون طول الحبل الذي ستحصل عليه؟

الإجابة هي: ......

اشرح خطوات الحل:

٧. يعمل 100 موظف في بناية فيها مصعد واحد، كم مرة سيتحرك المصعد يومياً إذا كانت سعته القصوى 10 أشخاص؟

الإجابة هي: ......

اشرح خطوات الحل:

APPENDIX C:

1. Fatima has 5 friends in grade 7 section (A) and Alia has 6 friends in the same class. Fatima and Alia decide to make a party and invite their all friends. All their friends came to the party. How many friends came to the party?

   Answer is: ....

   Explain you answer:

2. Mariam needs planks of 1 m. She has 4 planks of 2.5 m each. How many planks of 1 m can she get out of these 4 planks?

   Answer is: ....

   Explain you answer:

3. 450 baseball fans will go to the stadium by bus. Each bus can hold 36 fans. How many buses are needed?

   Answer is: ....

   Explain you answer:

4. Mohammed's best time to run 1 km is 5 min. How long will it take him to run 50 km?

Answer is: ....

Explain you answer:

5. A restaurant has 10 tables where each table can accommodate 4 customers. How many customers can the restaurant receive every day?

Answer is: ....

Explain you answer:

6. Sarah has 4 pieces of rope, each of which is1.5 cm long. She ties all pieces together to get one long rope. What is the length of this rope?

Answer is: ....

Explain you answer:

7. 100 employees work in a building that has one lift. How many times a day will the lift move, if the maximum capacity is 10 people?

Answer is: ....

Explain you answer:

٢. يجب أن يتم تحسين مهارة الطلاب في البحث عن المعلومات قبل محاولة حل المشكلات لتكون لديهم الخبرة الكافية قبل حل المشكلة.

٣. الاختبارات يجب ان يتم تعديلها بحيث يمكن للطالب تضمين رأيه وأفكاره بالإضافة لخطوات الحل حتى يمكن ربط ما توصل اليه الطالب حسابياً مع ما يمتلكه من معرفة واقعية.

ملخص الرسالة

تهدف هذه الرسالة إلى التحقيق في أُثر المعرفة الواقعية على حل المسائل الرياضية للصف السابع في دولة الإمارات العربية المتحدة مع البحث عن الأسباب التي تجعل الطلاب يتجنبون استخدام المعرفة الواقعية وخبراتهم في الحياة عند حل المسائل الرياضية، فيعمد الطلاب لحل المسائل الرياضية مستخدمين قوانين الرياضيات دون الانتباه ما إذا كان الحل ينطبق على الواقع أم لا.

ولقد كانت عينة الدراسة عبارة عن 101 طالبة من الصف السابع من إحدى مدارس مدينة العين في دولة الامارات العربية المتحدة، وتم تقسيم العينة إلى مجموعتين: مجموعة ضابطة (عددها 50 طالبة) ومجموعة تجريبية (عددها 51 طالبة) حيث تلقت المجموعة التجريبية فترة زمنية اضافية من التدريس متركزة على استخدام المعرفة الواقعية والمهارات والخبرات التي تمتلكها الطالبات في حل مسائل رياضية حياتية مختلفة. البيانات تم جمعها عن طريق الاختبارات والمقابلات وتحليلها كمياً ونوعيا وباستخدام برنامج SPSS. أظهرت النتائج أن الطالبات اللواتي حصلن على فترة تدريسية إضافية قبل الامتحان البعدي حققن درجات أعلى من نتائج الامتحان القبلي وأعلى من درجات طالبات المجموعة الضابطة.

وعلى ضوء النتائج التي تَوصلت إلىها الدِراسَة قدمت البَاحثة عدداً من التوصيات وأهمها:

١. على مدرسي الرياضيات استخدام مشاكل واقعية حتى يسهموا في ربط المادة بالبيئة المحيطة بالطلاب.

UAEU College of Education

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عنوان الرسالة:

التحقيق في أثر المعرفة الواقعية على حل المسائل الرياضية للصف السابع في دولة الإمارات العربية المتحدة

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رسالة مقدمة من الطالبة

لطيفة سعيد محمد المرشدي

إلى جامعة الإمارات العربية المتحدة

استكمالاً لمتطلبات الحصول على درجة الماجستير في التربية

المناهج وطرق التدريس- رياضيات

ديسمبر 2013