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Investigation of Self-Regulated Learning Strategies and Motivational Beliefs in Mathematics Achievement

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INVESTIGATION OF SELF-REGULATED LEARNING STRATEGIES AND MOTIVATIONAL BELIEFS IN MATHEMATICS ACHIEVEMENT

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Abstract

This study aimed to investigate how mathematics achievement can be explained in terms of motivational beliefs (intrinsic goal orientation, extrinsic goal orientation, task value, control and learning beliefs, self-efficacy for learning and performance, and test anxiety), cognitive and metacognitive (rehearsal, elaboration, organization, metacognitive self-regulatory, time and study environment, effort regulation, peer learning, and help seeking). In addition, it sought to investigate any statistically significant differences between male and female students on motivational beliefs, self-regulated learning (SRL) strategies, and achievement in mathematics. The study was conducted in Al Ain, with 402 students of 12th scientific stream grades (199 males, 203 females) from 6 public schools. In this study, an adapted version of Motivated Strategies for Learning Questionnaire (MSLQ) that was developed By Pintrich, Smith, Garcia, and Mackeachie (1991) and the mathematics final test of the first term of academic year 2011-2012 were used as measuring instruments. Independent sample t-test was applied to examine the two means of males and females at an alpha level of .05 to determine any statistical significance between them on motivational beliefs, SRL strategies, and achievement. Additionally, Pearson correlation was applied to investigate the relation between motivational beliefs and self-regulated learning strategies. There was no statistically significant mean difference between males and females with respect to all motivational beliefs. Nevertheless, it was found that there are statistically significant mean differences regarding the effort regulation strategy in addition to mathematics achievement in favor of females, and peer learning in favor of males. Additionally, multiple linear regression analysis was used to determine which of the motivational beliefs and SRL strategies can be considered as good predictors of mathematics achievement. The results showed that

there were five significant predictor variables of students' mathematics achievement including: self-efficacy, extrinsic goal orientation, effort regulation, time and study environment, and peer learning. The most important educational implication of the current research results is that it is important to teach learners how to engage in self-regulation and how to improve their motivational beliefs. This kind of teaching could improve the students' mathematics achievement. Additional research on the students' motivational beliefs and SRL strategies in other subjects is recommended to get results that can be generalized for the UAE.

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DEDICATION

To the best educators I ever met; my great parents

To my husband and my lovely children,

To my brothers and sisters,

And their children.

CHAPTER ONE

INTRODUCTION

Background of the Problem

In the international education systems, grade twelve can be considered of varying importance as a conversion point from high school to university level. The Arab world and the Gulf region specifically, is not departing from this conversion threshold and accordingly this benchmark is considered of great importance in the region.

The United Arab Emirates (UAE) education system and the current educational culture heritage pay high attention to the exiting high school grade (Grade 12). Consequently, grade 12 students in UAE are of special importance for parents and teachers who give them more attention than other year groups. The future of the students' study at university depends on their achievement in grade 12, the higher the score they obtain the preferable the chances they can get at university.

All subjects are important but mathematics is a key subject since in the contemporary UAE, students are encouraged to engage in science related subjects because of the greater emphasis on industrial and technological development. One subject that is essential to all the sciences is mathematics. It can be clearly noticed that mathematics is crucial for the economic development of any country. In the competition towards the scientific and technological development, nothing less than strong understanding and good achievement in mathematics is required especially for the scientific stream students.

In a country like the UAE where centralized (national) examinations are experienced in grade 12, teachers tend to be excessively focused on academic achievement and supporting students with directions to obtain higher grades. There is a tendency to focus on drill and practice as the main activity in the class which is an extensive focus before the exam, while paying less attention to how students learn mathematics effectively, and what factors affect their learning.

Over the past 20 years, learning has gradually shifted from teacher-centered approach to student-centered approach where students are active in their learning and no longer passive learners (Romberg & Kaput, 1999; Schoenfeld, 1992). Kilpatrick, Awafford and Findell (2001) call for different roles for teachers and students. They view the teacher as a model and a facilitator rather than one who transfers information. In fact, students can be responsible for their own learning; the teacher can help them by using different methods in teaching mathematics, such as: using investigations, problem solving and cooperative learning.

Similarly in UAE, all schools under the umbrella of Abu Dhabi Education Council (ADEC) have moved towards the Comprehensive New School Model (NSM) which is accompanied by different teaching and learning fundamentals. The NSM is a seven-year plan aiming at elevating the teaching and learning process to international standards. One of NSM objectives is to "foster a child-centered learning environment which is supported by families, teachers, and community"(p.2). The current reform movement also focuses on having self-regulated learners that must be supported by school learning programs including mathematics programs. This type of learning provides the students with multiple opportunities to take responsibility and control their learning. As it is clear from

the NSM 7th foundational belief on teaching and learning in grades 1, 2 and 3 that the students should take responsibility for their own learning.

Knowing the factors that influence secondary students ' achievement is necessary to improve their learning. Various factors have been studied previously such as poor facilities, equipment and instructional materials for effective teaching (Odogwu, 1994) and the use of traditional chalk and talk methods (Edwards & Knight, 1994).

Earlier perspectives on mathematics education have generally focused on mathematics content. Piaget and other developmental researchers lighted the way for mathematics educators to change their focus from only mathematics content to the students' learning. Heaton (2000) described the current perspective to school mathematics as "dynamic, constructed, and reconstructed through an ongoing process of sense making by the learner" (p.4). In the same line, Cheng (2011) claimed that teaching has another role not less important than providing students with knowledge which is helping students to develop their intrinsic motivation and self-efficacy and enhance their learning values. These non-cognitive factors do not receive the appropriate attention. For example, in mathematics education there is little work on motivation (Evans &Wedey, 2004; Hannula, 2006).

The problem of having little work on motivation, is considered significant for the National Council of Teachers of Mathematics (NCTM) as it made the motivational domains *Learning to value mathematics* and *Becoming confident*
two of its foremost goals for students as an attempt to change the nature of school mathematics (NCTM, 1989). Moreover, self-regulatory skills are considered as an

important goal that should be included when mathematics programs are created. NCTM (2000) states:

> "A major goal of school mathematics program is to create autonomous learners, and learning with understanding supports this goal Students learn more and learn better when they can take control of their learning by defining their goals and monitoring their progress. When challenged with appropriately chosen tasks, students become confident in their ability to tackle different problems, eager to figure things out on their own, flexible in exploring mathematical ideas and trying alternative solution paths, and willing to preserve. Effective learners recognize the importance of reflecting on their thinking and learning from their mistakes. When students work hard to solve a difficult problem or to understand a complex idea, they experience a very special feeling of accomplishment, which in turn leads to a willingness to continue and extend their engagement with mathematics." (p.21)

Teachers are expected not only to provide the students with the learning material but also to motivate them to take responsibility of their own learning (Zimmerman, 2005). Furthermore, Patrick and Middleton (2002) pointed to the students' being active in their learning and interacting with peers and teachers as one of the important aspects of educational psychology. Educational research indicates that independent learners reveal motivation by insisting on what they are doing in the best way and are confident that they are going to succeed; also they attribute their performance to factors within their control. Additionally, they show a high level of self regulation that includes complex interactions among students' cognitive processing, motivational beliefs, and metacognitive thinking (Pintrich & Linnenbrink, 2000; Schunk & Zimmerman, 1997). For example, to solve a mathematical problem, students need more than just having the knowledge of mathematical concepts. More important is their capacity to plan out how to solve the problem, monitor their progress, and finally evaluate or check their work. In other words, it requires the use of self-regulation. Consequently, researchers give more attention to the

components of self-regulated learning (SRL), because teachers need to teach both knowledge and skills to promote students' ability in learning to learn (Cheng, 2011).

Schunk (2005) confirmed that SRL requires the students to control their motivation, behaviors, cognition and actions by setting goals, monitoring and regulating learning strategies, and finally evaluating the final result of a task. On the other hand, many students find it very hard to achieve these tasks which have been revealed the need for educational researchers to tackle "how students become masters of their own learning process" (Zimmerman, 2001, p.1).

The integrated importance of the motivational and the cognitive components of classroom learning was the focal point of the current research on self-regulation. SRL is a comprehensive framework that describes how students can be active in their own learning. Even though there are different models for SRL, there is an agreement that it involves cognitive, affective, motivational, and behavioral components to make it possible for the students to set their goals and control actions to achieve the result with consideration to their environment (Boekaerts, Pintrich, & Zeidner, 2000; Zimmerman, 2008). Research by Boekaerts (2010) suggests that there is a complex relationship between motivation and self-regulation which can be described as "close friends".

Statement of the problem

Mathematics is a hard subject to study for most students owing to problems they face while studying its diverse areas. The problems related to the content received a lot of attention where teachers and educators spend a lot of time to solve these problems. However, there is more than teaching the content in the class. By the 1980s, researchers had realized that it is not sufficient for students to be strategic to know methods and the

procedures to implement them. As learners they should be aware of their strategic knowledge. Moreover they had to know when to use and how to organize, monitor, and control their cognitive actions (Mayer, 1998; Schoenfeld, 1992).

The researcher has noticed that the students do not show the adequate awareness to their potential in their ability to take responsibility of their learning. It is important to say that ADEC in NSM guidelines (2010), stated that one of its foundational beliefs on teaching and learning in grades 1, 2, and 3 is that "Students take responsibility for their own learning, with support from parents, community, and school staff" (P.13). If this is the case for young students, then it is more urgent for students in higher grades to be self-regulated learners. Therefore, in order to increase the students' mathematics achievement, effects of some psychological variables such as motivational beliefs and the use of learning strategies should receive more attention with the purpose of identifying the factors that impact students' achievement.

In other words, this study aims to investigate how mathematics achievement is affected by factors such as ; motivational beliefs (intrinsic goal orientation, extrinsic goal orientation, task value, control and learning beliefs, self efficacy for learning and performance and test anxiety); self-regulated learning (cognitive strategy use and self-regulation). In addition, it intends to investigate the relationship between motivational beliefs and use of learning strategies. Furthermore, the study investigates the differences of these factors due to gender. Gender was mentioned in previous research as another important variable in mathematics achievement. For that reason it was considered in the present study.

Theoretical Framework

Based on social cognitive theory, there are different models for self-regulated learning which suggest different constructs and conceptualizations (Boekaerts, 1997; Pintrich, 2000; Winne & Perry, 2000; Zimmerman, 2000). However, most models agreed that using the various cognitive and metacognitive strategies to control the learning process is the most imperative aspect of the self-regulated learning. Above and beyond this, is the learners' own motivation to use these strategies to regulate their learning and effort (Pintrich & DeGroot, 1990; Pintrich, 1999).

According to Bandura (1997, as cited in Zimmerman, 2000), social cognitive theory assumes reciprocal interactions among personal process, environmental and behavioral factors. The interaction of these three factors influences three cyclical phases of self-regulation: forethought, performance control, and self-reflection (Zimmerman, 2000). In social cognitive theory, there is a relationship between the individual and the environment, but distinct from one another. Similarly, Meyer and Turner (2002) and Pintrich (2000) claimed that the significant importance is given to how students regulate their cognition, motivation, and behavior, and how environmental factors might help them to build up essential skills.

Self-regulated learning can be defined as being metacognitively, motivationally, and behaviorally active to achieve one's own goals in his/her learning (Eccles & Wigfield, 2002). Put it differently, according to Credé and Phillips (2011), these students monitor their learning and they are capable of setting goals by themselves which provides them with the ability to reflect on the effectiveness of their learning process (i.e., metacognition). Besides, they tend to value and are intrinsically interested in their task

while having high levels of self-efficacy (i.e., motivation). Additionally, they highly persist with learning behaviors that maximize the level of learning transpire (i.e., behavior).

All three components of self-regulated learning (metacognitions, motivations, and behaviors) are supposed to be significant determinants of learning; hence academic performance, even though the consequence of metacognition and motivations on academic performance are seen as being mediated through learning behaviors (Duncan &McKeachie, 2005). Such that metacognition and suitable motivation lead to the use of proper learning strategies that sequentially have a positive impact on academic performance.

Most research shows that students' motivational beliefs and self-regulated learning are directly linked to their academic performance (Pintrich & de Groot, 1990; Zimmerman & Martinez-Pons, 1986; 1990). Accordingly, motivational beliefs and self-regulated learning components will be the focus of the present study.

The Motivated Strategies for Learning Questionnaire (MSLQ) was used in this study. The MSLQ was built up depending on a social-cognitive view of motivation and self-regulated learning (Pintrich, 2003). In Pintrichs' model, students' motivation is directly related to their ability to self-regulate their learning activities.

In this framework, motivation and learning strategies are assumed not to be static traits of the learner, but rather that "motivation is dynamic and contextually bound and that learning strategies can be learned and brought under the control of the student" (Duncan & McKeachie, 2005, p. 117). This means that the students' motivations change from course to course. For instance, depending on their interest, efficacy for performing

in the course may vary and their learning strategies, relying on the nature of the course, vary as well

Purpose of Research

The purpose of this research study is to investigate the level of students' of motivational beliefs and their use of self-regulated learning strategies for the scientific stream of grade 12 in Al-Ain city. In addition, this study aims to investigate the relationship between the students' motivational beliefs, their use of self-regulated learning strategies, and their effect on students' achievement in mathematics for the scientific stream of grade 12 in Al-Ain city. Pintrich and DeGroot (1990) indicated that cognitive and metacognitive skills have a little value if the students are not motivated to use them. This is why self-regulated learners who are active in their learning are likely to achieve better than the students who are passive and dependant on their teachers to adjust their learning (Risemberg & Zimmerman, 1992). Thus, more specifically, this study aims to examine the relationship of students' math motivational beliefs and their use of self-regulated learning. In addition, it aims to explore the extent to which students' motivational beliefs and self-regulated learning affect their mathematics achievement.

Analyzing the relationships between students' motivation to learn mathematics and self-regulated learning will provide a better understanding of which motivational factors influence the use of learning strategies more. Besides, analyzing the effect of motivation and self-regulated learning on mathematics achievement will help the stakeholders to pay more attention to these factors.

Research Questions:

This study aims to investigate the relationship among students' mathematical beliefs, their use of self-regulated strategies, and their mathematical achievement. More specifically, this study aims to examine the impact of the students' motivational beliefs on their use of self-regulated learning strategies. In addition, it aims to explore the extent to which motivational beliefs and self-regulated learning affect the academic achievement. The following questions are tackled:

1- What is the level of motivational beliefs of the12th grade scientific stream students in Al-Ain city?

2- What is the level of using self-regulated learning strategies of the 12th grade scientific stream students in Al-Ain city?

3- Are there any statistically significant differences between male and females students from the 12th scientific stream grades on the following variables:

A) Motivational beliefs?

B) Self-regulated learning strategies?

c) Achievement in mathematics?

4- What is the relationship between motivational beliefs and self-regulated learning strategies among grade 12th scientific stream students in Al-Ain city?

5- To what extent do motivational beliefs and self-regulated learning strategies predict achievement in mathematics among grade12 scientific stream students in Al-Ain city, and what are the best predictors?

Significance of the study

Studying the strategies the students use in and out of class, whether self-taught or learned from a teacher, is important in determining what factors influence mathematics achievement.

Many studies such as this are conducted to contribute to enhancing mathematics education. Identifying the factors that are not working well is a crucial issue to improve the UAE's education. When identified, they can support the policy makers and educators to make the proper changes to reform mathematics teaching and learning the best way.

Students' achievement in mathematics is vital for both students and their teachers. Educators and teachers always focus on finding ways to enable students to understand mathematics, and hence to increase their achievement. On the other hand, self-regulated learners who are aware of their responsibilities in their learning, could plan for their tasks and spend more effort to achieve their goals. Consequently, self-regulated learning could be a way to improve students' understanding of mathematics, and hence increase their achievement.

Institutions of higher education may use the findings to design high-quality learning environments through early intervention in advance depending on such research.

A huge body of research has been established about self-regulated learning in many countries; however there is a little research done in UAE. One of these studies has been conducted on undergraduate students in Al Ain University (Al Khatib, 2010). The current study, aims to fill the gap in the literature because of its focus on grade 12 scientific stream students. This study gains its importance from the need to examine the

factors that make the students more self-regulated learners which is not necessarily similar in all countries because of the different values and beliefs about education in each country. Moreover, the students' use of self-regulatory skills may vary even for different courses depending on the nature of the academic tasks (Duncan & McKeachie, 2005). Consistent with this idea, the current study aims to investigate which factors of self-regulated learning are related to the mathematics achievement of the scientific stream students of grade 12 in Al Ain. Additionally, this study can be considered the start to further research on different subjects.

Limitations of the study

This study has the following limitations:

- This study was limited to the scientific stream from grade 12 in the secondary schools in Al Ain city.
- This study was limited to mathematics subject.
- Teaching styles of teachers were not measured during the study. There was no opportunity to modify or experiment with different teaching styles.
- As with any study that relies on a questionnaire for data collection, some students refused to participate in addition to a number of unfilled questions in the questionnaire, which were very few.
- Even though collecting data through written response to self-report instrument provides some understanding of student cognition and motivation, it may not reflect all complex internal processes.
- A major assumption regarding this study is that the students answer all questions honestly and to the best of their knowledge throughout the study.

Definitions of key terms

In this study, mathematics achievement is measured by Mathematics Achievement Test (MAT) for the first semester from 2011/2012 for 12th scientific stream in UAE. This test is applied to all UAE schools; expert math teachers and supervisors shared writing this exam following a table of specifications. In addition, it is revised by many experts and administered in similar conditions in all schools.

To study the effect of some psychological variables on mathematics achievement, defining some variables is necessary too. These definitions are based on the work of Pintrich, Smith, Garcia, and McKeachie (1991).

1- Self-regulated learning (SRL): Self-regulated learning is the thoughts and feelings generated by the students and their actions that cause them to accomplish their learning goals through a cycle of actions such as: setting goals, maintaining motivation and persistence and evaluating progress.

2- Intrinsic Goal Orientation (Intr): Goal orientation refers to the reason behind someone's participation in a task as a whole. It is about the degree the students consider themselves to participate in the task for reasons such as challenge, curiosity, and mastery. In other words, having intrinsic orientation means that the student engages in the task for its sake and sees it as an end not as a means to the end.

3- Extrinsic Goal Orientation (Extr): Extrinsic goal orientation attention is to issues not directly related to participating in the task itself, the reasons for students studying on a task are because of grades, rewards, evaluation by others and competition. According to the students, learning task is a means to an end.

4- Task Value (Taskva): Task value refers to students' thinking of a task such as how important, interesting, and useful the task is. In other words, the task is considered by the students depending on its interest, importance and usefulness.

5- Control and learning beliefs (Contro): Control and learning beliefs refer to students' beliefs about their effort to learn which will lead to reach positive outcomes. They think that by trying hard, they will reach positive outcomes.

6- Self-efficacy for learning and performance (Selfef): Self-efficacy is about self-appraisal students' own ability to master a task. It includes completing a task judgment and performing a task confidence.

7- Test anxiety (Testan): Test anxiety has two components; cognitive component represented by worry connected to test situation and an emotionality component that refers to affective and physical reaction when students face a test situation.

8- Rehearsal Strategies (Rehear): Rehearsal strategies involve repeating and naming items to be learned. They are important for attention, encoding process, and activating the information in the working memory, but they do not help students integrate the information with prior knowledge.

9- Elaboration Strategies (Elab): These strategies comprise paraphrasing, summarizing, creating analogies, and generative notes. They are important for storing the information in the long term memory, connecting information with prior knowledge.

10- Organization Strategies (Organ): Organization strategies help learners to select appropriate information and make connections among information, they include: clustering and selecting the main idea from the texts.

11- Metacognitive Self-Regulation (Meta): Metacognitive self-regulation refers to the peoples' knowledge about the way they think and understand, or the factors that affect their learning. It holds two aspects; the awareness of and knowledge about cognition, and control and regulation of cognition.

12- Time and study Environment (Time): Time and study environment refers to managing the time and environment of studying. Students should plan to use study time and environment effectively.

13- Effort regulation (Effort): It is about the students' capability to complete their goals and control their efforts in front of difficulties

14- Peer Learning (Peer): Peer learning refers to collaborating with ones' peers. It is important because it can help students achieve better, and positively affect their achievement.

15- Help Seeking (Help): Help seeking is about students support by others such as their peers and instructors. Good students know when to ask for help.

Organization of the study

This research study was presented in five chapters. Chapter 1 included the background of the problem, the purpose of the study, the statement of the problem, the research questions, importance of the study, definitions of key terms, and the organization of the study.

Chapter 2 clarified the theoretical framework of the study besides the reviewed related research and literature. The research methodology and the design used in the study were outlined in Chapter 3.

Chapter 4 summarized the findings of the study. Chapter 5 provided the discussion of the results, conclusions, recommendations for further research, and implications for practice.

CHAPTER TWO

LITERATURE REVIEW

Theoretical Perspective of SRL in the present study

Self-regulated learning received a lot of attention in the last two decades (Trigano, 2006). The framework of understanding the psychological foundation of learning has gradually changed from teacher centered method to a student- centered method. The students are seen as the key of their own learning. The perspective of SRL has replaced the Information Processing perspective, which is considered too limited and not reflective of current theory and research (Pintrich, 2004). Particularly, the SRL perspective gives comprehensive focus on student learning to include not only cognitive, but also motivational and affective factors, and social contextual factors as well (Pintrich, 2000).

The social cognitive perspective is distinctive in viewing self-regulation as an interaction of personal, behavioral and environmental triadic processes (Zimmerman, 2000). Moreover, Bandura's social cognitive theory (SCT) is noticeable in the self-regulated learning (Zimmerman, 2000, 2001, 2002). This kind of learning refers to the degree that individuals are "...metacognitively, motivationally, and behaviorally active participants in their learning" (Zimmerman, 1990, p. 4). Zimmerman (2005) pointed to metacognition as the awareness of learners to their academic weakness and strengths in order to regulate their way in learning and their outcome.

According to the framework of SCT, the student who can be classified as self-regulated must use specific strategies (such as: goal-setting, planning, organizing and transforming, rehearsing and memorizing, record-keeping and self-monitoring) to achieve academic goals based on self-perception (Schunk & Zimmerman, 1994). In other words, according to Credé and Phillips (2011), these students monitor their learning and they are

capable of setting goals by themselves which provides them with the ability to reflect on the effectiveness of their learning process. Besides, they tend to have high levels of self-efficacy and see the learning task as intrinsically interesting and valuable. Moreover, they highly persist with learning behaviors that maximize the level of learning.

Several studies in the literature found that the use of self-regulating learning strategies allow students to process information actively, which influences their mastery of material and their academic achievement (Pintrich, Smith, Garcia, & McKeachie, 1993). Additionally, Pintrich and De Groot (1990) in their study highlighted that self-regulated students not only have cognition (knowledge to build upon) and metacognition (the knowledge and monitoring of learning strategies), but are also motivated to use their metacognitive strategies to build upon their understanding.

Pintrich and Schunk (2002) clarified motivation as the process where the students initiate and sustain goals that direct their activities. Boekaerts (2010) described motivation and self-regulation as "two close friends" that are complicatedly related. Also, from the social cognitive perspective, motivation and cognition are continually considered as interconnected (Garcia & Pintrich, 1995; Pintrich & De Groot, 1990), and presently SCT known in the field of learning and cognition as it considers both cognition and motivation as components of academic performance (Garcia & Pintrich, 1994).

Research about SRL provides the focus to the importance of combining motivational and cognitive components of classroom learning. Theories of self-regulated learning underline that such learning is not a mental ability (ex: intelligence) or an academic performance skill (ex: reading proficiency), it is a self-directive process that learners transform their mental abilities into academic skills (Schunk & Zimmerman, 1997). Learning is viewed as an activity that students do for themselves.

The concept of SRL is as an inclusive framework serves for understanding the practices and processes that play a part in making the students active in their own learning. Even though there are various models suggested for self-regulated learning which suggest different constructs (Boekaerts, 1997; Pintrich, 2000; Zimmerman, 2000), there is an agreement among them that it involves cognitive, affective, motivational, and behavioral components that make the students able to adjust their goals and actions to achieve preferred results, in accordance with changing environments (Zeidner, Boekaerts, & Pintrich, 2000). To rephrase, nearly all models suppose that the central aspect of self-regulated learning is the students' using of various cognitive and metacognitive strategies to direct and adjust their learning and their motivation to use these strategies and regulate their cognition and effort (Pintrich & DeGroot, 1990; Pintrich, 1999).

Pintrich (2004) indicated that there are four assumptions that most SRL models share. Firstly the active constructive assumption (learners are viewed as active participants who are able to construct their own meanings, goals). Secondly, potential of control assumption (learners can potentially monitor, and regulate aspects of their own cognition, motivation, or behavior and some features of their environment). Thirdly, the goal, criterion or standard assumption (comparison should be made in reference to criterion to decide if learning process should continue in the same way or some changes are needed). The last assumption is that self-regulatory activities are mediators between personal and contextual characteristics and actual achievement or performance (individuals self-regulation of their cognition, motivation, and behavior mediate the relations between the person, context, and achievement).

According to Zimmerman's model, self-regulation is defined as self-generated thoughts, feelings and actions that are intended and regularly modified to achieve

personal goals (Zimmerman, 2000; 2005). Bandura's triadic theory of social cognition formed a base for Zimmerman to explain self-regulated learning. Bandura pointed to self-regulation from the social cognitive perspective as interaction of personal, behavioral and environmental triadic and at the same time cyclic processes (Bandura, 1986 as cited in Zimmerman, 2000). Personal processes include students' knowledge, metacognitive processes, goals and affect. Behavioral processes include self-observation, self-judgment, and self-reaction, while environmental processes involve enactive outcomes, modeling, and verbal influence.

These self-regulatory processes and associated beliefs, based on social cognitive theory, can be classified into three cyclical phases: forethought, performance or volitional control and self-reflection (Zimmerman, 2000).

Forethought phase refers to the processes that occur before in place of acts and set stages for it. It includes two categories that are task analysis and self-motivational beliefs. Task analysis has two forms which are goal setting and strategic planning. Goal setting can be defined as setting particular and challenging outcomes of learning. While strategic planning refers to having methods that are suitable for the task to be mastered in a skill (Zimmerman, 2000). The second category of this phase is self-motivation beliefs. It includes four parts which are self-efficacy, outcome expectations, intrinsic interest/value, and goal orientation. Pintrich and De Groot (1990) defined self-efficacy as students' beliefs about their own ability to accomplish a task. Outcome expectations are defined by Zimmerman (2000) as beliefs about the maximum level of performance. The intrinsic interest/value and goal orientation basically focus on the students' reasons for doing a task (Pintrich & De Groot, 1990; Zimmerman, 2000).

Performance or volitional control phase can be described as the processes taking place during motoric efforts and actions. This phase includes two categories which are self-control and self-observation (Zimmerman, 2000). Self-control can be described as regulatory processes such as self-instruction, imagery, attention strategies to help the students to focus on the task. The second category is self-observation that includes monitoring strategies such as self-recording (realizing something) and self-experimentation (Zimmerman, 2000).

Last of all, *self reflection phase* in which the students evaluate the outcomes of their effort. It includes two categories which are self-judgment and self-reaction. Self-judgment includes self-evaluation (compare self-monitored information with a goal) and causal attribution (about the results). Self-satisfaction is the second category of this phase, which refers to awareness of satisfaction or dissatisfaction that affect ones' performance.

In short, when a student responds to an experience the forethought involves processes that occur before paying efforts to act while self-reflection involves processes that come after performance efforts and affect. Zimmerman's phases and categories are given in Table 2.1.

Table 2.1

Three Phases and Categories of Self-Regulation According To Zimmerman

Phases	Forethought	Performance/Volitional Control	Self-Reflection
Categories	Task Analysis - Goal setting - Strategic planning	Self-Control - Self-instruction - Imagery - Attention focusing - Task strategies	Self-Judgment - Self- evaluation - Causal attribution
	Self-Motivation Beliefs - Self-efficacy - Outcome expectations - Intrinsic interest/value - Goal orientation	Self- Observation - Self-recording - Self-experimentation	Self-Reaction - Self-satisfaction/ affect - Adaptive /defensive

Parallel to Zimmerman, several up to date articles on self-regulated learning cite a definition by Pintrich (2000) which describes self-regulated learning as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features of the environment" (Pintrich, 2000, p. 435). Schunk and Ertmer (2000) indicated that self-regulation research supports long-standing actions to prompt students to take responsibility for their own learning. Choice and control are essential to self-regulated learning: learners are seen to be self-regulated learners only if they have the opportunity to choose and control aspects of their learning.

In this framework, learners do not have static traits for motivation and learning strategies, but " motivation is dynamic and contextually bound and that learning strategies can be learned and brought under the control of the student" (Duncan & McKeachie, 2005, p. 117). For example, depending on the students' interest in the course, motivation changes from course to course. In addition, students may use different learning strategies to each course depending on the nature of the course.

As mentioned before, various self-regulated models were developed in the last two decades. These models may differ in the number of phases in each cycle, however, in general there are three or four phases (Steffens, 2006). Pintrich's model (2000, 2004) of self-regulated learning is also inspired by the social cognitive theory.

Schunk (2005) stated that Pintrich formulated a conceptual framework (2004) for studying self-regulated learning including phases (forethought, planning, activation; monitoring; control; reaction, reflection) and areas for self-regulation (cognition, motivation, behavior, context). *Forethought phase* include goal setting, prior content and metacognitive knowledge activation, efficacy judgments, time and effort arrangement, and perception of task. *The monitoring phase* refers to metacognitive awareness of different aspects of self and task or context while the *control phase* entails the selection and adaption of cognitive strategies for learning, motivation and affect, besides regulation of effort and task or context. Finally, cognitive judgment, affective reactions, making choices, and evaluation of the task are the components of the *reflection phase*. It is important to emphasize that regulation of cognition, motivation and affect, behavior, and context are included in each phase of self-regulatory activities. Summarized phases are provided in the following table 2.2 (Schunk, 2005).

Table 2.2

Four Phases of Self-Regulation According To Pintrich.

Phases of Self-Regulation	Areas For Self-regulation
Forethought, planning, activation	Cognition
Monitoring	Motivation
Control	Behavior
Reaction, reflection	Context

Based on the social cognitive theory, Pintrich and Zimmerman defined self-regulation as a goal-oriented process, starting from forethought phase through self-monitoring and self-control and ending with self-reflection (Puustinen & Pulkkinen, 2001). As a result, it can be said that the two models are similar regarding their background theory and definition of self-regulated learning. In addition, both models consider students as active participants in their learning, having the ability to set goals and evaluate their progress.

Moreover, Pintrich and Zimmerman conducted similar empirical studies to investigate students' motivation and in relation to their use of learning strategies and academic achievement (Puustinen & Pulkkinen, 2001). For example, Zimmerman and Martinez-Pons (1986) conducted a predictive study of the effect of the students' gender, socio economic status, and self-regulated learning strategies on academic achievement. In the same way, Pintrich, Smith, Garcia, and Mckeachie (1993) defended that students' motivation, their use of different cognitive and metacognitive strategies, and their achievement are all related to each other.

The previous models are not identical. Even though these models have similarities, there are differences between them. For instance, Zimmerman's model gives attention to the cyclic nature of the phases: forethought, monitoring, control, and reflection, while in Pintrich's (2000) model of self-regulated learning the main focus was on the role of goal orientation in self-regulation. In addition, Pintrich focused on the regulation of cognition, motivation and affect, behavior and context in the previous phases. According to Pintrich framework for self-regulated learning, in the forethought phase, regulation of cognition is involved in the activation of prior knowledge or metacognitive knowledge. Motivational processes consist of goal orientation, self-

efficacy, and task value. Behavioral regulation involves time and effort planning and planning for self-observation. The final phase is contextual regulation which includes the student's perceptions of task and context (Schunk, 2005).

Briefly, both models put emphasis on the role of motivation in regulating behavior intended for getting a task done. When students engage in a task, they set goals, monitor their behaviors, evaluate their work, and respond to the outcomes to regulate what they do (Eccles &Wigfield, 2002).

In the present research, the researcher aimed to study aspects of SRL namely: motivational beliefs and the use of different learning strategies. Depending on the work of Pintrich and DeGroot (1990), self-regulated learning touches three major constructs: (a) cognitive strategies that include students use to learn, remember, and understand the material, (b) students' metacognitive strategies for planning, monitoring, and regulating their cognition, and (c) students' management and control of their effort on classroom academic tasks. Research conducted on self-regulated learning shows a strong relationship between students' use of self-regulated learning strategies and their academic achievement (Zimmerman & Martinez-Pons, 1990).

In this research, an adaptation of the general expectancy-value model of motivation is the theoretical framework for conceptualizing student motivation (Pintrich, 1990). The model suggests that there are three motivational components. These three components concerning students' motivational beliefs are: value components that include goal orientations and task value (reasons for choosing to do a task), expectancy components that include self-efficacy and control beliefs (the students' capability to perform a task) and the affective construct of test anxiety.

The final version of Motivated Strategies for Learning Questionnaire (MSLQ) was developed in 1991 by Pintrich, Smith, Garcia, and Mckeachie to assess the college students' motivational orientation and their use of different learning strategies for the college course with an ultimate goal of helping students to improve their learning (Garcia & Pintrich, 1995; Pintrich et al., 1991; Duncan & McKeachie, 2005). MSLQ is developed based on the social cognitive theory and the information processing perspective of self-regulation. This model of MSLQ assumes that students' motivation is directly linked to their ability to self-regulate their learning activities (Pintrich, 2003). In fact, MSLQ which was developed over 10 years reflects the aspects that the researcher wanted to study. MSLQ involves five scales as indicators of cognitive regulation by students which are: rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation (the researcher excluded the critical thinking in the present study).

Concerning the regulation of motivation and affect, The MSLQ does not hold any scales to assess the use of related strategies (positive self-talk, promising extrinsic rewards), the motivation items only focused on measuring students' motivational beliefs for the course, but not any strategies the students may use to control their motivation in the course (Pintrich, 2004). There are six scales to assess the students' motivational beliefs toward a specific course, which developed to capture three components of motivation: Value beliefs which consist of intrinsic goal orientation, extrinsic goal orientation, and task value that provide information about the reason of doing a task; Expectancy-value which compounds of self efficacy for learning and performance, and control beliefs that provide information about the students ability to do a task ; and the affect which include only the test anxiety (Credé & Phillips, 2011). Regarding the regulation of behavior, the questionnaire (MSLQ) which involves three scales measuring

the students' regulation of their effort when they face uninteresting and difficult tasks, manage their time and study environment, and ask someone to provide help. The last area is the regulation of context MSLQ involves two scales that are: peer learning, and time and study management, that provide a measure of how much the students manage their time and study environment (Pintrich, 2004). Scales of MSLQ are presented in table 2.3 according their area of regulation.

Table 2.3

Scales of MSLQ According Their Area of Regulation

	Scale	Area of regulation
Motivation	Intrinsic goal orientation	Motivation /Affect
	Extrinsic goal orientation	Motivation /Affect
	Task Value	Motivation /Affect
	Control of learning Beliefs	Motivation /Affect
	Self-efficacy for learning and performance	Motivation /Affect
	Test anxiety	Motivation /Affect
Strategy Use	Rehearsal	Cognition
	Elaboration	Cognition
	Organization	Cognition
	Metacognitive self-regulation	Cognition
	Time and study management	Behavior & Context
	Effort regulation	Behavior
	Peer learning	Context
	Help seeking	Behavior

Pintrich and DeGroot (1990) indicated that if the students are not motivated to use the cognitive and metacognitive skills, then they are of little value. This is the reason behind self-regulated learners who are active in their learning, are likely to achieve better than the students who are passive and dependant on their teachers to adjust their learning (Risemberg & Zimmerman, 1992).

RELATED STUDIES

The researcher reviewed the related literature in accordance to the purpose of the study and four parts were figured out; the first is characteristics of self-regulated and the second is studies on motivational beliefs, where as the third one is about studies on self-regulated learning strategies, and finally the fourth is gender differences related to self-regulated learning.

Characteristics of self-regulated learners

Many studies tackled the characteristics of the self-regulated learning students. Recent Research in the field of self-regulation like: Aksan (2009), Ning and Downing (2010) revealed that successful and self regulated students have same characteristics such as: intrinsic motivation and self-satisfied beliefs. More cognition and meta-cognition strategies are used and they trust their own abilities and use more resources for accomplishing their goals and show better efficiency.

Zimmerman (2001, 2002) suggests that these students are active participants in their learning from the metacognitive, motivational and behavioral viewpoint. This is seen to be coexisting to the high performance students while low performance students show a deficit in these variables. In the same line, Corno (2001) agrees with Zimmerman's work regarding the characteristics that distinguish the self-regulated learning students. These students have common characteristics such as: They are familiar with cognitive strategies and they know how to use it. Additionally, they lean to plan, control, and direct their mental processes to achieve their personal goals (Metacognitive strategies). Also, they demonstrate a set of motivational beliefs such as a high sense of academic self-efficacy. They plan and control their task time and effort to be used.

Besides, they care about their learning environment such as studying in a suitable place and ask for help when needed.

Studies on motivational beliefs

Motivation and self-regulation has been described as "two close friends" that are complicatedly related (Boekarets, 2010). Examining student motivation and self-regulation is an important responsibility because these processes have repeatedly been shown to predict adaptive classroom and academic outcomes (Eccles & Wigfield, 2002; Graham & Harris, 2005). This relation is reflected through Zimmerman's (2008) definition of SRL which stated that setting goals requires an active and constructive process, and then monitoring, regulating, controlling motivation, and behavior are needed. Depending on this view, motivation is among the components of SRL (wolters, Pintrich, & Karbenick, 2005). Another study considered academic motivation as a powerful factor for students according to doing their homework and making them more interested in learning (Artino & Stephens, 2009). This describes the difference between students' efforts regarding doing homework.

Motivation does not have a distinct definition, while the previous views combined motivation with inner forces, and focused only on whether a person is going to choose a course of actions or another (Maeher, 2005). The focus of the current view is on beliefs, thoughts, and emotions which are related to motivation. Consequently, motivation according to the cognitive focus, it is seen as processes that are accounted for the learners' level of motivation or goal-directed behavior (Pintrich & Schunk, 2002). Task choice, level of engagement and persistence are influenced by the learners' motivational beliefs (Pintrich & De Groot, 1990; Pintrich, Roeser & De Groot, 1994).

Goal orientation and their relation to academic achievement become the interest of the motivation researchers (Pintrich, 2000; Eccles & Wigfield, 2002). Goal orientations take care of the purpose for involving in achievement behavior (Ames, 1992). There are a number of different goal orientations related to academic achievement (Pintrich & Schunk, 2002). In the present study, the researcher focus will be on intrinsic and extrinsic goal orientation.

Intrinsic goal orientation refers to the focus on learning and mastering the task. Ames (1992) claims that intrinsic goal orientation will hold the students to focus on the mastery of their learning, which will lead to value their efforts, and to see their self-efficacy judgments as the reason of their success and mastery. For these students, intrinsic goal orientation will have positive impact on the students' self-efficacy, and reduce the feeling of test anxiety.

The focus of extrinsic goal orientation is on acquiring skill or ability and how it will be judged relative to others, for example, to best others and looking for public appreciation of high performance levels (Ames, 1992). Additionally, Ames also noted that the extrinsic goal orientation is connected to extrinsic rewards and grades more than interest in learning. So, this goal orientation makes getting good grades and pleasing others the central criterion for judging success. According to Ames (1992), students who adopt a performance goal orientation are assumed to be focused on their performance relative to others, to be concerned about demonstrating their ability, and to be centered on their self-worth.

Researchers confirm that intrinsic goal orientation is better than extrinsic goal orientation in leading to better performance (Miltiadou & Savenye, 2003). The findings of

the literature reviewed indicated some interesting results, for example: Pintrich and Schunk (1996) indicated that there is a positive relationship between the intrinsic goal orientation and some motivational and cognitive processes. This in turn is supposed to impact positively the performance outcomes. On the other hand, an extrinsic goal orientation can produce negative motivational and cognitive processes, combined with negative performance outcomes. Similarly, Pintrich (1999) found that intrinsic goal orientation is positively related to cognitive, self-regulatory strategies and actual performance. Conversely, extrinsic goal orientation is negatively related to self-regulated learning and performance. The literature suggested that intrinsic goal orientation would be positively related to self-efficacy and task value beliefs while negatively related to test anxiety (Yumusak, 2007).

Regarding self-efficacy, Bandura (1997) suggested that "perceived self-efficacy concerned not with the number of skills you have, but with what you believe you can do with what you have under a variety of circumstances " (p.37). So, it concerns the students' beliefs if they can accomplish a task successfully or not. Furthermore, it is associated with the students' choice to the activities positively, as well as setting the goals for these activities and finally their persistence to complete them (Yumusak, 2007). According to the social cognitive theorists, the key for motivating the efforts of the students to learn is their perception of self-efficacy (Zimmerman and Martinez, 1992).The results from Pajares and Graham's (1999) study showed that, for average-achieving and gifted middle school students, mathematics self-efficacy was the unique factor to predict mathematics performance among the motivational variables. Moreover, the students with high level of self-efficacy were found to be more accurate in mathematical computations and their persistence on difficult items than students with low level of self-efficacy. In addition,

students' motivation and learning were found to be influenced by their self-efficacy beliefs (Pintrich & DeGroot, 1990).

Task value refers to the student's belief of the importance and usefulness of the task. When students highly value a task, this should lead to more involvement in their learning. Pintrich (1999) signified in his research that task value beliefs were correlated positively to performance. Though, these relations are weaker than self-efficacy. Carol VanZile-Tamsen (2001) studied the predictive power of expectancy success and task value for self-regulated strategy use. The researcher examined 216 undergraduates from midsize regional state university using MSLQ. His research showed that expectancy success and task value are positively related to the self-regulated learning strategies.

Control of learning beliefs concerns about the students ' beliefs that their effort will lead to positive outcomes. When students believe that their effort will affect their learning, they are more likely to study strategically and effectively (Al Khatib, 2010). Skinner, Zimmer-Gembeck, and Connell (1998) studied the development of the control beliefs over the school year and the way their teachers treated them. They found that children develop more positive sense of their control over outcomes when they believe their teachers were warm and supportive. Pintrich (2003) generally confirmed that the more the students believe in their personal control of their learning and behavior, the more they are likely to achieve at high level. Moreover, Crede and Phillips (2011) proposed that Self-efficacy and Control believes both capture the degree to which students believe that they have control over their level of achievement in a class.

Test anxiety includes two main components: cognitive components and emotionality components (Zeidner, 1998). Worry is cognitive suffering connected to test

situation; it consists of negative performance expectations such as worry about the test situation and about being unable to finish the test. Emotionality is the affective dimension which is the physical reaction of students when they face test situation. Some students can be nervous or feel fear and physical discomfort.

Researchers have investigated the negative effect of test anxiety on students' academic performance. Many studies revealed that higher levels of test anxiety have been associated with lower classroom achievement (Pintrich & De Groot, 1990). For Example: Jo-Ann Reteguiz (2006) has examined the test anxiety of 150 medicine students using the Spielberger test attitude inventory through the clerkship. The results of the study revealed that students with low levels of test anxiety achieve higher scores on multiple choice question examinations than those with high anxiety levels. The same study also found that female students have been seen to have higher test anxiety levels than male students. In Morocco, Benmansour (1999) applied another study on high school mathematics students. He found that students who are strongly oriented to getting grades had high levels of test anxiety and use passive learning strategies more than active learning strategies. Regarding intrinsic motivation, he found a negative relation with the test anxiety and greater use active learning strategies. In the same study, it has been found that girls had a greater level of test anxiety than boys.

There are several studies in the literature that investigated the relationships among motivational variables and achievement as well as cognitive variables. Pintrich and De Groot (1990) guided the way through their research. They conducted a study on 173 seventh graders in science and English. They used the MSLQ to examine the relations among self-regulation (use of metacognitive and effort management strategies),

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motivation for learning and their performance in a class, in addition to cognitive strategy use (rehearsal, Elaboration, and organizational strategies). The results of the research showed that self-efficacy, intrinsic value (interest in and perceived importance of the learning), cognitive strategy use, and self-regulation were positively correlated and predicted achievement, while test anxiety related negatively to self-efficacy. Regression analyses were used and showed that self-efficacy, self-regulation, and test anxiety predicted performance, whereas intrinsic value have no directly effect on performance.

In similar results to the previous study, Pintrich, Roeser, and De Groot (1994) used MSLQ to assess motivational beliefs (intrinsic value, self-efficacy, and test anxiety) and self-regulated learning (cognitive strategy use and self-regulation) on seventh graders. They also assessed the students' perception of classroom experiences. The results of their research revealed that intrinsic value was related to classroom experience especially later in the school year. Self-efficacy, cognitive strategy use, and self-regulation were positively related to the classroom experience. The results of the study supported the complex reciprocal relation between motivation and self-regulated learning (Schunk, 2005).

Moreover, Pintrich, Anderman, and Klobucar (1994) worked with fifth-grade students. Children with learning disabilities, as they were identified by the school system, showed lower metacognitive knowledge and reading comprehension, while they did not differ from students without learning disabilities on measures of self-efficacy, anxiety, or intrinsic orientation. Students with learning disabilities were more likely to attribute success and failure to external causes (luck, task difficulty, teacher assistance) more than students without disabilities. Low intrinsic motivation is shown by about equal numbers

of students with and without learning disabilities but average metacognition, attributional style, and comprehension.

In more recent study, LIU and LIN (2010) noticed that Taiwan students perform very well in mathematical international exams but they have low confidence in learning mathematics well. So, the researchers in their study draw attention to understanding senior high and vocational school students' mathematics learning motivation and strategies in Taiwan. For this purpose, the researchers developed two questionnaires about motivation and learning strategies based on MSLQ. The Mathematics Motivational Strategies for Learning Questionnaire (MMSLQ) was distributed to 1,282 participants whose age was ranged from 17 to 19 years old. The researchers found that, generally, in learning mathematics in Taiwan, students lack motivation and have weak rate in using learning strategies. More specifically, the students who went to cram school used learning strategies better than the students who didn't go to cram schools. Regarding the gender the results showed that male students showed higher motivation for learning mathematics, and also used learning strategies better than female students.

Cheng (2011) in another study established a model of self-regulated learning consisted of four dimensions: learning motivation, goal setting, action control and learning strategies. Depending on his model he was trying to explore the relationship between students' self-regulation ability and their learning performance. For this purpose, a questionnaire was distributed to 6524 secondary students from 20 aided secondary schools in Hong Kong. The researcher found that students' learning motivation, goal setting, action control and learning strategies played a major role in their learning performance.

For increasing the students' engagement with the task and achievement, knowledge of cognitive and metacognitive strategies is usually not sufficient. Motivational orientations and beliefs about learning are seen to play an important role in the students' use of cognitive and metacognitive strategies (Linnenbrink &Pintrich, 2002; Pintrich & De Groot, 1990). In examining the relationships between motivational beliefs and use of cognitive and SRL strategies, Pintrich and De Groot (1990) asserted that performing good or bad learning strategies will be triggered by the intensity of an individual's motivation (LIU & LIN, 2010).

On the other hand, acquiring the learning strategies is seen to be vital for maintaining the motivation on. According to the longitudinal study of Ning & Downing (2010), students' self-regulation predicts their following motivation. Aksan (2009) also recognized that weakness in self-regulation skills causes lower motivation and hinders learning.

In the next section, studies that concerning self-regulated learning strategies will be discussed. Self-regulated learning strategies include the cognitive strategies, metacognintive strategies, and resource management strategies.

Studies on self-regulated learning strategies

Garcia and Pintrich (1994) stated that learning strategies refer to cognitive processes and behaviors that students use to accomplish tasks. SRL strategies were described by Zimmerman and Martinez-Pons (1986) as "actions directed at acquiring information or skill that involve agency, purpose (goals), and instrumentality self-perceptions by a learner" (p.615). Many studies in the literature on learning strategies have shown significant relation between learning strategies and academic performance

(e.g. Pintric & De Groot, 1990; Zimmerman and Martinez-Pons, 1986). These studies suggest that assets of a skillful learner are effective, appropriate, and independent strategy use.

There are a number of different SRL strategies, but the focus of this study is given to cognitive strategies, metacognitive strategies, and behavioral strategies.

Cognitive strategies: Cognitive strategies are seen to impact learners' processing of information that includes rehearsal, elaboration, and organization strategies (Pape & Wang, 2003; Pintrich, 1989; Pintrich & DeGroot, 1990; Pintrich et al., 1993; Weinstein & Mayer, 1986; Zimmerman & Martinez-Pons, 1986, 1988, 1990).

Rehearsal strategies basically involve reciting or naming the information to be learned. According to Weinstein and Mayer (1986) rehearsal strategies are generally associated with repetition, copying information, and underlining textbooks. Rehearsal strategies are not effective in helping students to construct relations among pieces of information or relate the new information to the prior knowledge, but they are supposed to help students deal with, select, and obtain information (Pintrich et al., 1993). So, dealing passively with information such as underlining, highlighting, or copying unconsciously can be considered rehearsal strategies.

The strategies that help the students incorporate and bond new information with the prior knowledge are called elaborative strategies (Weinstein & Mayer, 1986). Elaborative strategies include paraphrasing information, summarizing ideas and making connections among them, creating analogies, taking notes by reorganizing and connecting ideas, explaining the ideas to someone else, and asking and answering questions. Research supports the effectiveness of elaboration as a strategy. Johnsey, Morrison, and

Ross (1992) found from their research results that adult learners who had the chance to create their elaborations for the material are better than students who were provided with elaboration from external sources such as teachers.

Similarly, organization strategies help students in their choice to suitable information and build relations among them. Examples of organization strategies include grouping information, organizing information into meaningful categories, selecting main ideas from text, and outlining a concept map. Organizational strategies can be used when the learner wants to construct connections among information to be learned (Weinstein & Mayer, 1986).

Elaborative and organization strategies are more effective in accomplishing tasks when comprehension of material at a deeper and more conceptual level is required (Garcia & Pintrich, 1994; Weinstein & Mayer, 1986). Zusho and Pintrich (2003) examined 458 students enrolled in introductory collage chemistry classes, to investigate the relations between the motivational and cognitive components and achievement. For this purpose, the researchers used a self report instruments three time points over the course to assess the students' motivation and strategy use. Results of the study revealed that using rehearsal strategies was positively related with achievement. Also, significant positive correlations were found between cognitive strategy and final course grades. In addition, the results showed that students with higher self-efficacy, task value, and intrinsic goals tend to use more deeper-processing cognitive strategies such as elaboration and metacognitive.

Metacognitive strategies: In addition to cognitive strategies, metacognitive strategies play a crucial role in students learning and performance (Garcia & Pintrich,

1994; Pape & Wang, 2003; Pintrich, 1989; Pintrich & DeGroot, 1990; Pintrich et al., 1993; Zimmerman & Martinez-Pons, 1986, 1988, 1990). Metacognitive refer to the people knowledge about the way they think and understand, or the factors that affect their learning. Generally, metacognitive strategies hold two aspects; the awareness of and knowledge about cognition, and control and regulation of cognition (Pintrich, Wolters & Baxter, 2000 as cited in Yumusak, 2007).

Metacognitive strategies in most models include planning, monitoring, and regulating. They are actions which are shown as effort to regulate cognition include planning the way to complete a task, selecting appropriate cognitive strategy, monitoring the effectiveness of the strategy used, and modifying or changing the cognitive strategies when the student face problems (Pintrich et al., 2000 as cited in Yumusak, 2007).

In planning strategies, in order to organize and understand the material easier, students need to activate their prior knowledge related to the task. This can happen by analyzing the task then setting goals to be achieved. Monitoring strategies help students to carry on their attention and integrate the material with its prior knowledge of the task. Some of these strategies are: self-testing; tracking of attention. Regulating strategies are seen to be closely related to monitoring strategies (Pintrich & Schrauben, 1992). Regulating strategies require adjustments of cognitive activities depending on the information obtained from monitoring strategies. Regulating strategies are important to improve the students learning through helping them to check and correct their learning actions. These types of monitoring and regulating activities are applicable to all content areas (Linnenbrink & Pintrich, 2003).

Research has shown that students who described as metacognitive in their learning are more actively and cognitively engaged in their learning (Weinstein & Mayer, 1986). Moreover, Pintrich (1989) examined a sample of college students in English, biology, and psychology classes using items from Motivated Strategies for Learning Questionnaire (Makeachie, Pintric, Lin &Smith, 1986). Pintrich found significant relationships between scores on the metacognition subscale measuring planning, monitoring, and regulating strategies and exam and final course grade.

In mathematics education domain, strategic behavior is essential to mathematical learning and problem solving (Pape & Wang, 2003). Studies indicate that the reason of the unfavorable students' performance in mathematics is their insufficient cognitive and metacognitive strategies. Strategy use and metacognition are mutually dependent. Development of metacognitive skill may support enhanced strategy use (Carr, Alexander, Folds-Bennett, 1994). It is expected that mathematical strategy use may be affected by the work of both motivation and metacognition.

Resource Management Strategies: Students can gain greatest benefits from their study skills when they are skillful in management of their resources. Resource management strategies are related to many strategies that students use when they want to manage their environments and resources within the environment. These strategies are general strategies to help students to manage their time and study environment, effort, and support from others such as: peers or instructor (Pintrich, Smith, Garcia, & MaKeachie, 1991).

Managing the students' time is one of the most important resources of management. Students must learn how to use their time effectively. For example, they

should know how to schedule, plan, and manage their study time in order to assure enough attention is paid to their study. Zimmerman, Greenberg, and Weinstein (1994) found that the students' GPA has improved when their training on time planning and management helped them to better self-regulate their study time. Furthermore, Garcia-Ros, Gonzalez, and Hinojosa (2004) used an adaption of the Time Management Questionnaire to evaluate the management skills of 350 Spanish high school students. The result of their study showed that time management was good predictor of the academic performance of these students. Puteh and Ibrahim (2010) explored the students learning strategies. They found that most students revealed practicing the resource and management strategies. More specifically, there is an agreement on using time and study environment and help seeking strategies, while, they do not agree with peer learning and they lack of effort regulation.

Effort regulation or management can be defined as the learners' ability to try hard even when work is difficult (Pintrich & Johnson, 1990). Learners who monitor and manage efforts are aware of their persistent through uninteresting tasks as well as distractions from those tasks. Effort and management is considerable because it is a sign of goal commitment and regulates the continuous use of learning strategies (Pintrich & Johnson, 1990). For instance, Lee (1997, as cited in Yumusak, 2007) in his research found that effort regulation was strongly predicting academic success. Pintrich and De Groot (1990) used the MSLQ to examine the relations among self-regulatory skills (metacognitive, effort management strategies, cognitive strategy use, and motivation for learning) and performing well in class among seventh graders in science and English. They found that intrinsic value, cognitive strategy use, self-efficacy, and self-regulation

which are effort management and metacognition were positively correlated and predicted achievement.

When the students prepare for the class, they need to find a place which is free from distracters in order to concentrate on their study. In this regard, Zimmerman and Martinez-Pons (1986) found that high achievers make use of environment management more than low achievers, and self-regulated learners were likely to reorganize their environment to meet their needs.

Furthermore, Students use a variety of strategies to control their effort and attention and to get support from others (Garcia & Pintrich, 1994; Pape & Wang, 2003; Pintrich, 1989; Pintrich & DeGroot, 1990; Pintrich et al., 1993; Zimmerman & Martinez-Pons, 1986, 1988, 1990). Help seeking strategies involve managing time and sources such as people for support and help. Classroom studies of help seeking shows that students with low level of achievement are less expected to seek help. This finding of research was supported by Zimmerman and Martinez-Pons (1986). They found that high achiever students use external resources more considerably than low achiever students. Analyzing the results showed that high achievers reported seeking peer help and teacher help twice as often, and other adult help four times as often as low achievers.

Zimmerman and Martinez-Pons (1986) developed a structured interview method to evaluate the presence or absence of 14 categories of self-regulated strategies within six learning scenarios that may face students in real classroom contexts. These 14 categories of strategies were self-evaluation; organizing and transforming; goal setting and planning; seeking information; keeping records and monitoring; environmental structuring; self-consequences; rehearsing and memorizing; seeking peer assistance; seeking teacher

assistance; seeking adult assistance; reviewing tests; reviewing notes; and reviewing texts. The researchers interviewed 40 high and 40 low achieving high school students. The researchers found that high achievers showed using all SRL strategies significantly more than low achievers excluding self-evaluation. Additionally, there was a significant positive correlation between students' self-report of SRL strategies and students' performance on standardized academic tests. The only significant factor that predicted students' English and mathematics scores was the use of SRL.

Zimmerman and Martinez- Pons (1988) conducted another study that supported the finding of their previous study. Different from the previous study, observation from three teachers were used as "a performance based criterion" of SRL to validate their model of SRL developed in 1986. Similar to the previous study, high achieving students significantly used more SRL strategies and leaned to seek help from teachers more than low achieving students. Also, there was a significant positive correlation between students' reports of the use of SRL strategy and teachers' ratings of students' SRL behaviors.

Zimmerman and Martinez-Pons (1990) also interviewed 45 boys and 45 girls, using the previously validated instrument, to investigate the relationships between students' use of SRL strategies and their perceptions of both verbal and mathematical self-efficacy. The researchers found that self-efficacy had significant association with the use of SRL strategies. Moreover, verbal efficacy, mathematical efficacy and strategy use for gifted and older students were higher than that of students who were not gifted and younger students. Also, they found no gender related differences in mathematical self-efficacy.

Pape and Smith (2002) in their study focused on unsuccessful students in mathematics. Through the interview with a small group of these students, they found that these students are hard working. The researchers tried to search about the student's efforts in completing their homework, their time to practice solving problems and studying. They found that these students were mostly doing their homework. Also, attending math classes and spending extra time to prepare for exams. Consequently, the researchers made a decision to find out what is going during studying sessions instead of how much the students are studying mathematics. To restate, they are trying to find the answer of how the students are studying mathematics, where they learned it and when. The researchers examined whether monitoring and regulating the students' mathematics learning can be taught or not by combining theory and practice in a10 week experiment. The students learned to sit goals, monitor achieving these goals and evaluate their plans. Moreover, they learned to how to take notes, read their mathematics books and explore available resources. In other words, these are all phases of self-regulated learning. At the end of the study, the students were able to say that they knew how to study mathematics, while they were not able to say that at the beginning of the study. As a result of Pape and Smith (2002) study, there is an effect of the components of self-regulated learning on the mathematics education.

Pape and Wang (2003) in their study aimed to explore sixth and seventh grade students' self-reported strategy use and the relationship between strategy use, mathematical problem-solving behaviors, and their success in problem solving depending on the strategy categories developed by Zimmerman and Martinez-Pons (1986,1988, 1990). The results of the study revealed that there is no significantly difference between high and low achievers concerning the number of strategies they used, their confidence in

using these strategies, and the frequency of strategy use. However, high achievers reported using different strategies more than low achievers. Additionally, less successful problem solvers lack the essential strategic knowledge for representing mathematical word problems that require transforming words and numbers into mathematical expressions. On the other hand, effective problem solvers are capable of selecting and implementing learning strategies more efficiently and extensively, mainly self-evaluation, organizing and transforming, and goal setting and monitoring strategies.

Puteh and Ibrahim (2010) conducted a study on 249 students of Science Stream Form Four students in Malaysia. The purpose of the study was to identify the use of self-regulated learning strategies, and how it helps students in solving mathematics problem solving. In addition, the level of motivation was also identified. Motivated Strategies Questionnaire-Revised (MSLQ-R) has been used to collect data. Besides reviewing written answers of students' tests on mathematical problem solving which consists of nine items from three topics that mean certain strategies should be appropriate. Then, interviews for 12 selected students were made to obtain clearer responses about students' self-regulated learning. Findings of this research showed high level of motivation and the existence of self-regulated learning strategies which strongly related to the students' performance of problem-solving. More specifically, for motivation, the students mostly adhered to extrinsic goal orientation and task value. For learning strategies, most students revealed practicing the resource and management strategies. There is an agreement on using time and study environment and help seeking strategies. On the other hand, they do not agree with peer learning and they lack of effort regulation. According to mathematical problem solving, the students who tend to use strategies appear to have better performance in their test if compared to students who do not have the strategies.

Al Khatib (2010) conducted a study within the UAE context to examine the predictive association between meta-cognitive self-regulated learning, motivational beliefs and UAE college students' academic performance. 404 students that registered in different general courses participated in the study. Data was collected using seven scales from MSLQ. The results revealed that both motivational beliefs and self-regulated learning components are important in academic performance. More specifically, results showed that intrinsic goal orientation, self-efficacy, test anxiety, and meta-cognitive self-regulated learning were significant predictors of college students' performance.

Gender Differences Related to SRL

Another area can be investigated is the gender difference in mathematics achievement. Zimmerman and Martenize-Pons (1990) found in their study that the boy's verbal self-efficacy was significantly greater than girls, while they both have similar mathematics self-efficacy. Consistent with this finding, Fulk, Brigham and Lohman (1998) who applied the MSLQ to find no gender difference among the participants regarding the self-regulation, self-efficacy and cognitive strategy use. While Ablard and Lipschultz (1998) found in their study that the number of high achieving seventh female graders were more than males in completing homework when they did not understand a problem.

In another study, Tussey (2002) investigated the relationship between motivational variables and anxiety. The participants in the study were 50 male and 53 female students from post secondary grade. The students respond into two surveys; the first with 44 items to measure their level of motivational variables, the second with 20

items to measure their level of anxiety. The results of the study revealed that females had higher levels of anxiety and task value than males.

Drysdale and Milne (2004) conducted a study to investigate the relationship between self-concept and achievement in mathematics and English among middle school students. 63 male and 61 female students who are aged between 12 and 15 years are the participants of the study. For the study purpose, the participants completed three subscales of the Self-Description Questionnaire II. The researchers found that females showed lower levels of mathematics self-concept than males, while there is no statistically significant gender difference in mathematics achievement.

All students can improve their control and performance with enough training, even the low achiever students. Many studies tried to discover the effect of teaching self-regulated learning strategies on the students' achievement (Mason, 2004; Schober & Ziegler, 2001).

Lavasani , Mirhosseini, Hejazi and Davoodi (2011) applied a quasi-experimental method on elementary students to investigate the effects of self-regulation learning strategies training on the academic motivation and self-efficacy of students. Students in the experimental group were taught self-regulation strategies, while the control group did not receive such learning. To collect data, 3 questionnaires were used; students were tested using MSLQ, academic motivation scale and self-efficacy scale. After analyzing the data, the researchers found that academic motivation and self-efficacy of the students are affected by the teaching of self-regulation learning strategies. More specifically, for fifth- grade female students, it is positive and considerable effect on the academic

motivation and self- efficacy. It can be concluded that the students show high level of academic motivation and self-efficacy when they receive self-regulation learning training.

Regarding the effect on achievement "It is not just individuals' cultural, demographic, or personality characteristics that influence achievement and learning directly, or the contextual characteristics of the classroom environment that shape achievement, but the individuals' self-regulation of their cognition, motivation, and behavior that mediate the relations between the person, context, and eventual achievement" (Pintrich, 2000, p. 453).

CHAPTER 3

METHODOLOGY

Introduction

This chapter is devoted to explain the research methods, research design, participants, data collection, and data analysis used in this study. Quantitative method was used to examine the level of some factors (motivation and self regulated learning strategies) that are assumed to influence success in mathematics subject taken by students in grade 12 the scientific stream. Specifically, the study focuses on a) the differences in motivational beliefs, self-regulated learning strategies, and mathematics achievement due to gender; and b) the motivational and self –regulatory factors that impact and predict the academic achievement in math subject for 12^{th} scientific stream students.

Research Design

Quantitative method was employed in this study to collect data from the participants. Gay, Mills and Airasian (2009) indicated that quantitative method stand on analyzing the numerical data collected from a large number of participants. This study is considered to be both causal-comparative and correlational research design. Causal-comparative research aims to determine the cause or results of the already existed differences in the behavior or status of groups. In this design, two groups differing in some variables of interest are selected and compared on some dependent variable (Gay, Mills & Airasian, 2009). The first main research problem of the current study is related to causal-comparative research. Correlational research is defined as a relationship study among two or more variables, where there is no manipulation of variables. According to

Gay, Mills, and Airasian (2009), this design of research describes an existing relationship and the degree to which two or more variables are related. They suggested that correlational research could be a relationship study (to determine relations among variables) or a prediction study (to use these relations to make predictions). So, depending on the preceding definition the second main research problem is a correlational study.

In this study, there are 15 variables of which there were 14 independent variables and one dependent variable. The dependent variable is the mathematics achievement as measured by the final exam of the first semester of the academic year 2011-2012. The scores of this exam ranged from 0 to 100.

The independent variables in the current study are motivational beliefs (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy and test anxiety), and the cognitive and metacognitive strategy use (rehearsal, elaboration, organization, metacognitive self-regulation, time and study environment, effort regulation, peer learning, and help seeking).

Participants

The participants of this study came from a large population, all 12th scientific stream students at secondary schools in Al-Ain, which identified as the accessible population. All of the schools involved in this study were public schools.

Multistage-cluster sampling method was used where "intact group are randomly selected" (Gay, Mills& Airsian, 2009, p.129). The population of the study was first identified. Next, the schools were divided according to gender into two clusters for males and females. Then schools were selected randomly from an alphabetized list. The last

step, was selecting the students randomly from each school. When the population is very large or spread over a wide geographic area, cluster sampling is convenient. The sample according to this technique is representative of the population from which it is selected.

The population being sampled in this study was 1241 students according to the statistics of ADEC's office in Al-Ain. The student body is composed of 602 males and 639 females that represent 48.5% and 51.5% of the population respectively. The researcher distributed the questionnaire to 460 students of which 430 completed the questionnaire, resulting in an overall response rate of 93%. Then the questionnaire was distributed to 225 males and 235 females forming 48.9% and 51.1% of the distributed questionnaires respectively. After the review of the returned questionnaires, some were decided not to be valid. Questionnaires that were considered invalid were excluded from consideration if the consent form was not signed (13), or inconsistencies (i.e., patterns) in responses were present (15). There were 402 valid surveys resulting in a modified response rate of 87.4%. The number of valid responses was 199 males and 203 females representing 49.5% and 50.4% from the sample. The distribution of the participants is presented in Table 3.1.

Table 3.1

The Distribution of the Participants

	Number of males	Percent	Number of Females	Percent	Total
All the population	602	48.5	639	51.5	1241
Distributed questionnaires	225	48.9	235	51.1	460
Valid responses	199	49.5	203	50.4	402

As a result, the sample of the study was 402 students, selected from 6 large schools in Al-Ain city. Schools involved in the study were quiet equivalent; all the schools are directly supervised by ADEC, and all schools implementing the same curriculum for all subjects including mathematics. The students' results at the end of the first semester were the interest of this study. The students are very close in their social classes and their age range from 17-20 years.

Instruments

Mathematics Achievement Test (MAT) and an adapted version of the Motivated Strategies for Learning Questionnaire (MSLQ) were used. MAT is the final mathematics exam for the first semester of the academic year 2011-2012. In UAE the academic year consists of three semesters, so the students are examined central exams in mathematics three times a year. These exams are following blooms taxonomy and measures all the competencies covered in each semester, expert math teachers and supervisors share writing these exams. Also, these exams are rated by central committee of raters that rate all the students' exams following the same rules. The interest of this research is the first semester exam to represent the students' mathematics achievement. This exam is considered moderate in its complexity as claimed the 12^{th} scientific stream mathematics teachers.

Pintrich, Smith, Garcia, and McKeachie designed the MSLQ as a self-report instrument "to assess college students' motivational orientations and their use of different learning strategies for a college course" (Pintrich et al., 1991, p. 3). This questionnaire was one of the first measures in educational psychology to be based on information processing theories of learning and the integration of motivational factors (McClendon,

1996). MSLQ was designed to focus on course level, based on social cognitive theory, assuming that students' motivation can be different from course to course depending on the nature of the academic task as well as their strategy use (Duncan & McKeachie, 2005). International research has generally found that the MSLQ is a reliable and valid instrument (Karadeniz, Buyukozturk, Akgun, Cakmak, & Demirel, 2008). The MSLQ was considered an ideal instrument to use since it was able to assess the learning strategies that were most effective among students.

The MSLQ is a self report instrument with 81 items with fifteen scales, but the questionnaire used in the present study consists of 68 items and fourteen scales after modifications (see Appendix B). All items are Likert scale items and students use a seven-point response option format (1 = "Not at all true of me" to 7 = "Very true of me") to respond to each item. Eight of the 68-items are reverse scored.

MSLQ consists of two sections; the motivational section and the learning strategies section. The students' self-perceptions and beliefs are the focus of motivational variables, while the learning strategies variables focus on specific strategies that students use to control cognitive, metacognitive, and behavioral features of learning (Pintrich et al., 1991). The motivational section consists of 31 items that assess students' beliefs about goal orientation, task value, and self-efficacy. According to Pintrich (1989), the motivational scales stand on three general motivational constructs (components): value, expectancy and affect.

The value component consisted of; intrinsic goal orientation that focuses on learning and mastery (e.g., "*In a course, I prefer course material that really challenges me so I can learn new things*"); Extrinsic goal orientation focus on external factors as grades and approval from others (e.g., "*If I can, I want to get better marks in my course*

than most of the other students"); And task value beliefs that highlight the judgments of how important, useful, and interesting the content of the course to the student (e.g., "*Understanding the subject matter of my course is very important to me*").

Expectancy component measures the students' beliefs about accomplishing a task. The expectancy value consists of; self-efficacy for learning and performance that refer to the students' judgments on their ability and confidence of their skills to accomplish a task (e.g., "*I believe I will receive excellent marks in my course*"); And control beliefs for learning that reflect the students' beliefs that their outcomes are dependent on their efforts (e.g., "*It is my own fault if I do not learn the material in the course*").

Affect is the third general motivational construct; it refers to the students' worry and concern over taking exams as test anxiety (e.g., "*I feel my heart beating fast when I write an exam*"). Table 3.2 shows the motivational section in the current study.

Table 3.2

Motivational Section of the Current Study

Components	Scales	Items	Number of items
Value	Intrinsic goal orientation	1,16,22,24	4
	Extrinsic goal orientation	7,11,13,30	4
	Task value	4,10,17,23,26,27	6
Expectancy	Control beliefs for learning	2,9,18,25	4
	Self-efficacy	5,6,12,15,20,21,29,31	8
Affect	Test anxiety	3,8,14,19,28	5

The second section of MSLQ is the learning strategy section. Originally, it consists of 50 items, but in the current study it consists of 37 items that measures the students' use of cognitive, metacognitive strategies, and management of different resources.

Cognitive strategies refer to processing of information from lectures and books using basic and complex strategies. The first general category is the cognitive strategies that include ; rehearsal strategy that is the most basic strategy that stands mainly on repeating the information (e.g., *"When I study, I practice saying the material to myself over and over"*); On the other hand, elaboration strategies such as paraphrasing and summarizing (e.g., *"When I study for a course, I pull together information from different sources such as lectures, readings and discussion"*); And organization strategies such as creating tables are considered as the complex strategies (e.g., *"When I study for a course, I go over my class notes and make an outline of important concepts"*).

The second general category of learning strategies in the original MSLQ is metacognitive strategies that consist of self-regulation strategies and critical thinking strategy, while in the current study it consists of the metacognitive strategies only and the critical thinking strategy was excluded. The reason behind excluding the "critical thinking" is that it is believed to be more a skill than a learning strategy. Metacognitive strategies refer to strategies that help students to control and regulate their own cognition. It is a large scale that includes 12 items about setting goals by planning, monitoring comprehension and regulating strategies (e.g., *"If I get confused with taking notes in class, I make sure I sort it out afterwards"*).

The last general learning strategy category is resource management that consists of four scales refers to strategies the students use in relation to controlling resources other than their cognition. They consist of; time and study environment management such as having suitable place to study and using time effectively (e.g., *"I usually study in a place where I can concentrate on my coursework"*); effort regulation such as the continuity of

doing the task even if it is hard or boring (e.g., *"I work hard to do well in a course even if I don't like what we are doing"*); peer learning that stand on learning with group or a friend (e.g., *"When I study for a course, I often try to explain the material to a classmate or a friend")* ; and finally help seeking that refers to seeking help from others like friend or teacher (e.g., *"I ask the lecturer to clarify concepts I do not understand well"*) . Table 3.3 shows the learning strategies section of the current study.

Table 3.3

Learning Strategies Section of the Current Study

Category	Strategy scale	Items	Number of items
Cognitive strategies	Rehearsal	5,12,22	3
	Elaboration	17,24,26	3
	Organization	8,14,25	3
Meta- cognitive strategies	Self-Regulation	1r,7,10,18,19,20,33,35,36	9
Resources management	Time/Study management	3,9,16,27,29,30,34r,37r	8
	Effort Regulation	4r,13,23,31	4
	Peer Learning	2,11,15	3
	Help seeking	6r,21,28,32	4

Note: r means that the item is reversed.

Scale scores are determined by taking the mean of each scale, and higher values represent greater levels of academic self-regulation (Pintrich et al., 1991). MSLQ contain some negatively worded items, the rating of these items need to be reversed before computing the scores.

The researcher contacted William McKeachie, one of the developers of the instrument, who was granted and gave his approval to use and modify the Motivated Strategies for Learning Questionnaire (approval email is presented in Appendix A). So, the motivation section items were developed by adapting them from MSLQ. Some minor

changes to the items were made to be applicable to mathematics subject, but no items were deleted. The number of learning strategies section items was reduced from 45 (from the eight scales without the critical thinking scale) to 37items. The excluded items were repetitive or not applicable to math. To be applicable to math, wording of 28 items were modified (the English version of the adapted MSLQ presented in Appendix B). These items from MSLQ were translated into Arabic using independent back-translation. The researcher who is a native Arabic speaker translated the 68 items of the MSLQ then a bilingual native English teacher, who was not part of the research team, translated it back to the English language. Then the two English versions were reviewed to ensure their equivalence by another native speaker who is not familiar with the study. In the last step, two Arabic language teachers revised the questionnaire to ensure the correctness of the language (the Arabic version of the adapted MSLQ presented in Appendix C).

Validity

One of the important steps is to establish the validity of the instrument prior to the administration of the questionnaire. " Validity refers to the degree to which a test measures what it is supposed to measure and consequently, permits appropriate interpretation of scores" (Gay et al, 2009, p154). The original MSLQ was validated through factor analysis over a three-year period that was required to develop the questionnaire. Besides, it has been applied and validated at both higher and secondary educational levels (Montalvo & Torres, 2004). The content validity of the questionnaire was established by referring to a jury of three specialists. This jury judged the belongings of each item to its subscale, and the wording of items. The feedback provided by the educators helped to reconstruct and modify some statements of the instrument to ensure

that it would be understood. The statements were adjusted and sent for the advisor to confirm the changes.

Reliability

Reliability means "the consistency of measurement, that is, how consistent test scores or other assessment results are from one measurement to another"(Miller, Linn &Gronlund, 2009, P 107). According to Field (2005) internal reliability is based on the idea that individual items should produce results consistent with the overall questionnaire. To establish reliability, a pilot test was done on a small sample (n= 57) and the researcher calculated Crombach's alpha which is the most common measure of scale reliability. All the reliability results of the pilot test were acceptable. For the whole scale the reliability was 0.91 which is very high reliability, the subscales reliability ranged from 0.46 to 0.92. Furthermore, the researcher applied the pilot test for investigating the clarity of items and readability of the instrument and to measure the time needed to complete the questionnaire or any other feedback.

All the students' comments were taken into consideration before administrating the questionnaire to the participants in the present study. The reliability of most of the subscales increased and ranged from 0.50 to 0.90. In addition, the reliability for the whole questionnaire rose from 0.91 to 0.92 which is very high. The reliabilities of extrinsic goal orientation, control and learning beliefs, effort regulation, peer learning, and help seeking were low at the pilot study, but they became higher in the present study. Further the reliability coefficients were acceptable and very close to the original study.

Subscales of MSLQ reliability coefficients for the pilot study, actual study, and original study are presented in Table 3.4

Table 3.4

Reliability Coefficients (Cronbach's Alpha) on the MSLQ Subscales.

Scale	Reliability for pilot study (N=57)	Reliability for actual study (N=402)	Reliability from the original version
Intrinsic goal orientation	0.58	0.71	0.74
Extrinsic goal orientation	0.46	0.50	0.62
Task value	0.77	0.84	0.90
Control and learning beliefs	0.48	0.62	0.68
Self-efficacy	0.92	0.90	0.93
Test anxiety	0.75	0.64	0.80
Rehearsal	0.65	0.60	0.69
Elaboration	0.58	0.70	0.76
Organization	0.77	0.63	0.64
Self-regulation	0.72	0.76	0.79
Time and study learning	0.58	0.62	0.76
Effort regulation	0.48	0.55	0.69
Peer learning	0.49	0.54	0.76
Help seeking	0.47	0.56	0.52

As seen from Table 3.4, most the reliability results are acceptable.

Data Collection Procedures

The study started by defining the problem and identifying the key words related to the research problem. An extensive review of the literature and related research such as; articles, master theses and doctoral dissertations as well as the New School Model of ADEC was read by the researcher. After this review, the MSLQ was chosen to collect data from participants. The researcher had one of the authors (McKeachie) permission to use and modify the questionnaire. An approval to conduct the study from ADEC office in Al Ain was gained. This department in turn, sent an official letter to all secondary schools to facilitate the work of the research (see Appendix D).

Then the data collection process began by coordinating with the schools principals and the stakeholders to hand out the questionnaire and collect them, and later to obtain the final semester grade for students in mathematics. The MSLQ was administered to the12th scientific stream students in 6 large schools, 3 males and 3 females schools, from Al-Ain city during the last two weeks before the final tests of the first 2011-2012 semester. Teachers were informed about the study and they were asked for their cooperation through the administration process. Directions were made clear to both the students and the teachers who are going to implement the questionnaire. The researcher provided each school by a packet of materials including informed consent with the questionnaire in addition to an instruction sheet (a copy of these materials can be found in Appendices C-E).

Students were asked to sign an informed consent form, acknowledging their agreement to participate in the study. Students were assured the confidentiality of the data collected and given the option to withdraw from the study at any time. Students who agreed to participate signed the informed consent form and were given15-20 minutes to respond on the questionnaire items.

The implementation process was very smooth without encountering any problems. After the results of the students grades were announced, the researcher then contacted with the schools and got the students' grades in mathematics at the end of first term exam. The schools were cooperative with the researcher and provided the grades for the students who signed the consent form.

When the questionnaires were returned the responses coded according to the Likert seven scale categories in the Statistical Package of Social Sciences (SPSS 19) for the questionnaire's data analysis, in addition to the students grades.

Data Analysis

Descriptive statistics were used to examine the levels of the students' motivational beliefs and SRL strategies including the means, and standard deviations. The independent samples t-test was applied to examine the two means of males and females with an alpha level of 0.05 to determine any statistical significance between them on motivational beliefs, SRL strategies, and achievement. Also, Pearson correlation was applied to investigate the relation between motivational beliefs and self-regulated learning strategies. In addition, multiple linear regression analysis was used to determine which of the motivational beliefs and SRL strategies can be considered as good predictors of mathematics achievement.

CHAPTER 4

RESULTS

This chapter is devoted to present the results of data analyses that used to address the reliability of the questionnaire and the research questions. These results are presented depending on different kinds of statistics including descriptive statistics and inferential statistics. This chapter is divided into five parts according to the research questions. Each part presents a research question and the way of analyzing the data to find out the answer to that question.

First Research Question:

1- What is the level of motivational beliefs of grade 12 scientific stream students in Al-Ain city?

The participants' responses to the 31 items that form the first section of the questionnaire were used to answer the first question about the level of motivational beliefs of grade 12 the scientific stream. To answer this question, the descriptive statistics was found of combined motivational beliefs and then to each of the six subscales (intrinsic goal orientation, extrinsic goal orientation, task value, control and learning beliefs, self-efficacy for learning and performance, and test anxiety). All the items are on a 7-point Likert scale where the students responses range from 1 which is "very wrong to me" to 7 which is "very correct to me". The scale scores are found by finding the average of each scale scores (finding the total of each scale items then divided by the items number). Generally, a higher mean score (more than 4) was better than a lower mean

score (below 4). The only exception was for the test anxiety because higher score meant more worrying.

Table 4.1 shows descriptive statistics of the combined motivational beliefs as a set. These statistics include maximum, minimum, mean, and standard deviation.

Table 4.1

Descriptive Statistics of the Combined Motivational Beliefs

	N	Minimum	Maximum	Mean	Std. Deviation
Motivational beliefs set	402	2.10	6.77	5.48	.70

Table 4.1 shows the mean score of the combined motivational beliefs which is 5.48 with a standard deviation of 0.70. It can be clearly seen that the students' level of motivation is more than the average and very close to the "very correct for me". This means that the students hold high level of motivational beliefs towards learning mathematics. To be more specific, the researcher found the descriptive statistics for each of the motivational beliefs. The results are shown in Table 4.2

Table 4.2

Descriptive Statistics of the Scales of Motivational Beliefs Scores (N=402)

Scales	Minimum	Maximum	Mean	Std. Deviation
Intrinsic goal orientation	1.00	7.00	5.28	1.20
Extrinsic goal orientation	1.25	7.00	6.06	0.89
Task value	1.00	7.00	5.62	1.19
Control and learning beliefs	1.25	7.00	5.55	1.04
Self-efficacy	1.00	7.00	5.69	1.05
Test anxiety	1.40	7.00	4.63	1.27

Table 4.2 reveals that the mean scores of motivational scales ranging from 4.63 to 6.06. As a result, it can be said that the students' level of all the motivational beliefs is above the average and very close to the "very correct for me". From the point of extrinsic goal orientation the students showed the highest level of agreement at a mean of 6.06 which is very close to "very correct to me" with standard deviation of 0.89. While the students' beliefs of self-efficacy, task value, control and learning beliefs, and intrinsic goal orientation follow the extrinsic goal orientation in descending order that are very close to each other and still above the average and higher than test anxiety. The test anxiety scale shows the least mean value among the motivational beliefs which is 4.63 but still above the average according to its position on the 7-point Likert-type scale.

Second Research Question:

2- What is the level of using self-regulated learning strategies of grade 12 scientific stream students in Al-Ain city?

The second section of the questionnaire is the self-regulated learning strategies section which consists of 37 items. The participants' responses were analyzed to answer the second question about the level of self-regulated learning strategies of grade 12 the scientific streams. The descriptive statistics of the combined self-regulated learning strategies as a whole was found and then to each individual of its eight scales (Rehearsal, Elaboration, Organization, Self-regulation, Time and study management, Peer learning, and help seeking).

Table 4.3 shows descriptive statistics of the combined self-regulated learning as a set. These statistics include maximum, minimum, mean, and standard deviation.

Table 4.3

Descriptive Statistics of the Combined Self-Regulated Learning Strategies

Scale	N	Minimum	Maximum	Mean	Std. Deviation
Self-regulated learning strategies set	402	2.24	6.89	5.08	0.75

Table 4.3 exhibits the mean score of the self-regulated learning strategies set which is 5.08 with standard deviation of 0.75. It can be seen that the students show that the level of self-regulated learning was above the average. To be more specific, the

descriptive statistics for each of the self-regulated learning strategies were found, the results of each scale are shown in table 4.4.

Table 4.4

Descriptive Statistics of the Scales of Self-Regulated Learning Strategies Scores (N=402)

Self-regulated learning strategies	Minimum	Maximum	Mean	Std. Deviation
Rehearsal	1.00	7.00	5.66	1.13
Elaboration	1.00	7.00	4.68	1.51
Organization	1.00	7.00	5.27	1.28
Self-regulation	1.78	7.00	5.09	.995
Time and study learning	1.88	7.00	5.10	.882
Effort regulation	1.75	7.00	5.32	1.14
Peer learning	1.00	7.00	4.28	1.31
Help seeking	1.50	7.00	5.04	.95

As shown in Table 4.4, the mean scores of all self-regulated learning strategies scales are above the average and ranging from 4.28 to 5.66. It can be said that the students tend to have high level of agreement, in descending order, on using rehearsal, effort regulation, organization, time and study management, and help seeking strategies. But, the students tend to use rehearsal strategy more than the other strategies; its mean is 5.66 with standard deviation 1.13. Also, the students' use of elaboration and peer help strategies are just above the average which is considered to be moderate level of learning strategy use. The students are less likely to use the peer learning strategy among these strategies (M= 4.28; SD=1.31).

Third Research Question:

3- Are there any statistically significant differences between males and females students from the 12th scientific stream grades on the following variables:

A) Motivational beliefs?

B) Self-regulated learning strategies?

c) Achievement in mathematics?

To answer this question, the independent t-test was used on each variable. For the first part of the question, the independent samples t-test was applied to examine the mean differences of the combined motivational beliefs between males and females. Leven's test for Equality of Variances was used to check the homogeneity of variance among female and male samples. The results are presented in Table 4.5 and Table 4.6.

Table 4.5

Descriptive Statistics of the Whole Sample on the Combined Motivational Beliefs

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Combined motivational beliefs	Female	203	5.46	.64	.045
	Male	199	5.51	.75	.053

Table 4.6

Independent Samples t- Test between Males and Females on All Motivational Scales

	t	Df	Sig. (2-tailed)
Combined motivational beliefs	-.735	400	.463

Based on Levene's test of equality of variances (F = 2.879, P = 0.09) equal variances are assumed. Table 4.6 shows that the value of t-test is t = -0.735 which is statistically not significant (p = 0.46). This means that there is no statistically significant difference between males and females on the set of all combined motivational beliefs. As it is clear from Table 4.5, the means of the combined motivational beliefs for females and males are very close, $M_{females} = 5.46$, $SD_{females} = 0.64$ and $M_{males} = 5.51$, $SD_{males} = 0.053$.

Then the independent samples t-test was used to examine the mean differences of each of the motivational beliefs (intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs, self-efficacy, and test anxiety) between males and females. The results are presented in Table 4.7 and Table 4.8.

Table 4.7

Females and Males' Descriptive Statistics of the Motivational Beliefs

Scales	Gender	N	Mean	Std. Deviation	Std. Error Mean
Intrinsic goal orientation	Female	203	5.23	1.18	.083
	Male	199	5.33	1.22	.087
Extrinsic goal orientation	Female	203	6.10	0.83	.058
	Male	199	6.02	0.95	.067
Task value	Female	203	5.61	1.08	.076
	Male	199	5.63	1.29	.091
Control beliefs	Female	203	5.52	1.01	.071
	Male	199	5.58	1.07	.076
Self-efficacy	Female	203	5.64	1.02	.071
	Male	199	5.73	1.08	.076
Test anxiety	Female	203	4.59	1.34	.094
	Male	199	4.67	1.20	.085

Table 4.8

Independent Samples t- Test between Males and Females on the Six Motivational Beliefs

Scales	t	Df	Sig. (2-tailed)
Intrinsic goal orientation	-.84	400	.40
Extrinsic goal orientation	.94	400	.35
Task value	-.23	400	.82
Control beliefs	-.57	400	.57
Self-efficacy	-.84	400	.40
Test-anxiety	-.64	400	.52

Based on Levene's test of equality of variances for all the motivational beliefs equal variances are assumed except for task value (F = 4.548, P = 0.03) equal variances are not assumed.

As shown in Table 4.8, there were no significant differences between the means of males and females for all the motivational beliefs. Table 4.7 that compare the means of all motivational beliefs of males and females shows the closeness of the means.

To sum up, there were no statistically difference between the means of males and females among the combined motivational beliefs altogether and the individual six motivational beliefs.

For the second part of the third research question the independent samples t-test was used to examine the mean differences of using all learning strategies between males and females. Leven's test for Equality of Variances was used to check the homogeneity of variance among female and male samples. The results are presented in table 4.9 and table 4.10.

Table 4.9

Descriptive Statistics of the Whole Sample on the Combined Self-Regulated Learning Strategies

Scale	Gender	N	Mean	Std. Deviation	Std. Error Mean
Self-regulated learning strategies	Female	203	5.09	.72	.050
	Male	199	5.06	.78	.056

Table 4.10

Independent Samples t-Test between Males and Females on Self-Regulated Learning Strategies Scales

Scale	t	df	Sig. (2-tailed)
Self-regulated learning strategies	.364	400	.716

Based on Levene's test of equality of variances (F = 1.79, P = 0.18), equal variances are not assumed. Table 4.10 shows that the value of t- test is t = 0.364 with significance statistic level 0.716. This means that there is no statistically significant difference between the means of males and females on the set of all combined learning strategies. Table 4.9 shows the closeness of the means.

Then the independent samples t-test was used to examine the mean differences of each of the learning strategies (rehearsal, elaboration, organization, self-regulation, time and study management, effort regulation, peer learning, and help seeking) between males and females. Leven's test for Equality of Variances was used to check the homogeneity of

variance among female and male samples. Results are presented in Table 4.11 and Table 4.12.

Table 4.11

Females and males' Descriptive Statistics of the self-regulated learning strategies

Scale	Gender	N	Mean	SD	Std. Error Mean
Rehearsal	Female	203	5.66	1.11	.078
	Male	199	5.67	1.15	.081
Elaboration	Female	203	4.60	1.53	.108
	Male	199	4.75	1.49	.106
Organization	Female	203	5.34	1.24	.087
	Male	199	5.21	1.32	.093
Metacognitive Self-regulation	Female	203	5.19	0.94	.066
	Male	199	5.00	1.05	.074
Time/study management	Female	203	5.06	0.85	.060
	Male	199	5.14	0.91	.065
Effort regulation	Female	203	5.45	1.13	.080
	Male	199	5.18	1.13	.080
Peer learning	Female	203	4.12	1.27	.090
	Male	199	4.45	1.33	.094
Help seeking	Female	203	5.04	0.97	.068
	Male	199	5.04	0.94	.066

Table 4.12

Independent Samples t-Test between Males and Females on the Six Motivational Beliefs

Scales	t	df	Sig. (2-tailed)
Rehearsal	-.150	400	.881
Elaboration	-.962	400	.337
Organization	1.016	400	.310
Metacognitive Self-regulation	1.862	400	.063
Time/study management	-.873	400	.383
Effort regulation	2.387	400	.017
Peer learning	-2.606	400	.009
Help seeking	.004	400	.997

Based on Levene's test of equality of variances for all the learning strategies are equal variances are assumed. From table 4.12, there is no statistically significant difference between the means of males and females on all self-regulated learning strategies except for effort regulation ($t = 2.387$, $P = 0.017$) and Peer learning ($t = -2.606$, $P = 0.009$).

The difference of effort regulation is in favor of females as the Table 4.11 reveals that female students show higher level of effort regulation ($M_{females} = 5.4$ with $SD_{females} = 1.13$), while the males level was lower than females regulation ($M_{males} = 5.18$ with $SD_{males} = 1.13$).

On the contrary, the difference of peer learning is in favor of males as the Table 4.11 reveals that male students show higher level of peer learning ($M_{males} = 4.45$ with $SD_{males} = 1.33$), while the females level was lower than males peer learning ($M_{females} = 4.12$ with $SD_{females} = 1.28$).

To sum up, there were no statistically mean significant differences between the means of males and females of the combined learning strategies in addition to six individual strategies: rehearsal, elaboration, organization, Metacognitive self-regulation, time/study management, and help seeking. Whereas, there is statistically significant mean difference regarding the effort regulation strategy in favor of the females, and peer learning in favor of males.

In order to answer the third part of the third research question, also the independent samples t-test was applied to examine the mean differences of achievement between males and females. Leven's test for Equality of Variances was used to check the

homogeneity of variance among female and male samples. The results are presented in table 4.13 and table 4.14.

Table 4.13

Descriptive Statistics of Achievement

	Gender	N	Mean	SD	Std. Error Mean
Achievement	Female	203	78.75	19.00	1.334
	Male	199	73.98	19.97	1.416

Table 4.14

Independent Samples t-Test between Males and Females on Achievement

Scale	t	Df	Sig. (2-tailed)
Achievement	2.451	400	0.015

Based on Levens' test of equality of variances for the achievement ($F = 1.040$, $P = 0.308$) equal variances are assumed. Table 4.14 shows that the value of t-test is $t = 2.451$ with $p < 0.05$. This means that there is statistically significant difference between the means of males and females on achievement.

The difference of achievement is in favor of females as the Table 4.13 reveals that female students show higher level of achievement ($M_{females} = 78.75$ with $SD_{females} = 19.00$), while the males level was lower than females achievement ($M_{males} = 73.98$ with $SD_{males} = 19.97$).

To sum up, the only statistically differences between males and females were the three factors. There are statistically differences on achievement and effort regulation in favor of the females, whereas peer learning was in favor of the males.

Fourth Research Question:

4- What is the relationship between motivational beliefs and self-regulated learning strategies among grade 12th scientific stream students in Al-Ain city?

To answer this question, Pearson correlation was applied to investigate the relationship between motivational beliefs and self-regulated learning strategies. The results showed that correlation between the combined motivational beliefs and the combined self-regulated learning strategies is 0.69 which is statistically significant at level 0.01. This means that there is a strong positive relation between motivational beliefs and self-regulated learning strategies. When the students have more motivational beliefs this means that they are using more learning strategies as well.

Then Pearson correlation was used to investigate what motivational beliefs relate to self-regulated learning. Pearson correlation among motivational beliefs and learning strategies are presented in Table 4.15.

Table 4.15

Pearson Correlation among Motivational Beliefs and Learning Strategies

	Rehear	Elab	Organ	Meta	Time	Effort	Peer	Help
Intr	.472**	.568**	.538**	.568**	.475**	.435**	.126*	.135**
Extr	.249**	.051	.194**	.295**	.206**	.158**	.159**	.211**
Taskva	.505**	.558**	.560**	.545**	.443**	.432**	.159**	.176**
Contro	.305**	.222**	.299**	.240**	.279**	.214**	.041	.093
Selfef	.598**	.463**	.580**	.581**	.556**	.535**	.097	.155**
Testan	-.059	-.113*	-.075	-.095	-.193**	-.225**	.124*	.085

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

From Table 4.15, it can be seen that many correlations are statistically significant because the sample size is relatively big (n = 402), However, only some of them are practically significant. Practically significant means the correlation value is big enough when compared with other correlation values.

The results will be explained based on the practical meaning of each. For example, the correlation between self-efficacy and rehearsal strategy is 0.598 which is practically and statistically significant. While the correlation between test anxiety and elaboration strategy is -0.113 which is statistically significant but practically not significant.

It can be seen that intrinsic goal orientation and task value, were positively and statistically significant related to all the SRL strategies. Extrinsic goal orientation was related to all SRL strategies except for the elaboration strategy. While self-efficacy was related to all strategies except for peer learning. Though, among these the self-efficacy was found to have almost the highest correlation to the learning strategies. On the other

hand, test anxiety has the lowest and negative correlation with learning strategies except for peer learning and help seeking strategies it was found to be positive. Also, test anxiety was statistically significant only to elaboration, time and study management, effort regulation and peer learning.

Fifth Research Question:

5- To what extent do motivational beliefs and self-regulated learning strategies predict achievement in mathematics among grade12 scientific stream students in Al-Ain city, and what are the best predictors?

To answer this question, multiple linear regression was run with mathematics achievement as the dependent variable, and the 14 scales of MSLQ as independent variables (intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs, self-efficacy, test anxiety, rehearsal, elaboration, organization, self-regulation, time and study management, effort regulation, peer learning, and help seeking). Table 4.16 shows the regression statistics.

Table 4.16

Regression Statistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.490[a]	.240	.213	17.39664

The analysis showed that the 14 variables (predictors) are accounted for 24 % of the variance of mathematics achievement, as shown in Table 4.16

Table 4.17

Regression Analysis for Motivational Beliefs and Self-Regulated Learning Strategies (N=402)

Variables	B	B	t	sig
Intrinsic goal orientation	-2.015	-.123	-1.709	.088
Extrinsic goal orientation	-2.270	-.103	-2.076	.039
Task value	.766	.046	.636	.525
Control beliefs	-1.582	-.084	-1.578	.115
Self-efficacy	8.051	.430	5.637	.000
Test-anxiety	-.496	-.032	-.645	.519
Rehearsal	.274	.016	.226	.822
Elaboration	.925	.071	1.169	.243
Organization	.370	.024	.346	.729
Metacognitive Self-regulation	.960	.049	.689	.491
Time/study management	-3.107	-.140	-2.147	.032
Effort regulation	3.011	.175	2.801	.005
Peer learning	-1.786	-.119	-2.450	.015
Help seeking	-.385	-.019	-.386	.700

As shown in Table 4.17, five of the independent variables were significant predictors of students' mathematics achievement. The first two variables are extrinsic goal orientation, self-efficacy from the motivational beliefs, and the other three are time and study management, effort regulation, and peer learning from the learning strategies. It can be clearly seen that self-efficacy has the largest beta weight, $\beta = 0.430$, $p < 0.001$ indicating that this variable made the strongest contribution to explaining the variance of the dependent variable (mathematics achievement) when all other variables in the equation were held constant.

Effort regulation strategy become next with beta coefficient $\beta = 0.175$, $p < 0.01$ which made it the second strongest contribution to explain the variance of mathematics achievement. The third predictor to mathematics achievement was peer learning strategy $\beta = -0.119$, $p < 0.05$. The fourth and fifth contributors to explain the achievement were time and study management strategy and extrinsic goal orientation at the same level with a beta weight for time and study management of -.140, $p < 0.05$. For extrinsic goal orientation, it was found that $\beta = -.103$, $p < 0.05$ indicated that it made less contribution than the other predictors. Nine independent variables were found to be non-significant predictors.

CHAPTER 5

DISCUSSION

This chapter is devoted to present the discussion of the results, and conclusions. It also presents the implications of the study as well as recommendations for further research.

Discussion of the Results

This study aimed to quantitatively investigate the level of motivational beliefs and self-regulated learning strategies. Additionally, it intended to investigate the relationship among motivational beliefs and learning strategies.

The main purpose of this study was to investigate which motivational beliefs (intrinsic goal orientation, extrinsic goal orientation, task value, control and learning beliefs, self-efficacy for learning and performance, and test anxiety) and self-regulated learning strategies (Rehearsal, Elaboration, Organization, Self-regulation, Time and study management, Peer learning, and help seeking) can predict students' mathematics achievement in the scientific stream of grade 12.

First Research Question:

The results demonstrated that 12th scientific stream students have high levels of motivational beliefs. The most motivational belief shown by the students was extrinsic goal orientation, while the least motivational belief was test anxiety. It was also obvious from the results that extrinsic goal orientation is followed by self-efficacy. This explains that even though students care very much for their grades and how they appear before

their families and friends, they concurrently hold high level of self-efficacy which reveals very high confidence that they are going to perform well in mathematics. On the other hand, the lowest level of test anxiety was reasonable in light of the students' confidence to do well in mathematics. In UAE, the students set for central exams three times a year and their final grade is the key for their admission to universities. Therefore, the final grade is the students' core of attention during the school year. Accordingly, it can be assumed that the final grade is the reason behind holding extrinsic goal orientation. From importance of grades for students, it can be implied that students are motivated to do their best, which in turn can raise their level of self-efficacy and decrease their level of test anxiety.

The aforementioned result indicates that having high level of motivation is correlated to possessing high level of self-efficacy. These results were supported by similar high level of motivational beliefs that was found for Malaysian Science Stream Form Four. Also, Malaysian students showed extrinsic goal orientation the most among motivational beliefs (Puteh and Ibrahim, 2010). In contrast, Taiwan students demonstrated weak motivation, and low levels of self-efficacy (LIU and LIN, 2010). The Taiwanese results seem to support the relationship between the level of motivation and the level of self-efficacy.

Second Research Question:

Regarding the learning strategy use, the study pointed out that students showed moderate levels of the use of learning strategies. The rehearsal strategy is the most strategy being used by students, whereas the peer learning strategy was the least one being used. Students have high levels of using rehearsal, effort regulation, organization, time and study management, and help seeking strategies.

In the current study, students show higher level of learning strategies use than the Malaysian students in Puteh and Ibrahim's study (2010). Additionally the two studies agreed that peer learning was the least strategy to be used among students. In the same study of Puteh and Ibrahim, the most strategies utilized by students were time and study management as well as help seeking strategies. Conversely, students showed disagreement to the use of peer learning and they showed lack of effort regulation. Whereas, LIU and LIN (2010) indicated that Taiwan students showed low level of learning strategies use. The most used strategy was help-seeking, while communication behavior on internet was the least.

The frequent use of rehearsal strategy in learning can be attributed to students' extrinsic goal orientation. When students hold an extrinsic goal orientation, they may stick to using rehearsal strategy in learning because all what they think about is getting good grades. Consequently, they tend to depend on repeating and highlighting strategies more than the other strategies. This is especially true because grades are very important for students in grade 12.

However, teachers should give more attention to peer learning as a learning strategy. Teachers play the main role in encouraging students to help each other as peers by designing activities that require interaction among peers inside and outside the classroom and when teachers use other strategies such as the cooperative learning, they simulate the use of peer learning strategy as well. Holding extrinsic goal orientation means that the students care very much about how they appear to others including their friends. This may prevent them from relying on peer learning strategy and cooperating with other peers. As they may feel impressed if they were unable to provide their peers

with correct answers. This may be due to the culture of UAE and the Arab countries. In the UAE's culture, students tend to give other people good impression about themselves and are not supposed to make mistakes. For this reason, teachers are expected to promote cooperation among their students.

Third Research Question:

The results of this study also indicated that there is no statistical difference of motivation due to gender. In general, students have the same level of motivation and learning strategies. To be more accurate, no differences were found between males and females on all the motivational beliefs and most of the learning strategies.

This may be due to the assumption that the majority of students are motivated to achieve their best in their last school year, so they all share the same goal and interest which cause no differences between males and females on motivational beliefs. They aim to graduate from high school with success that gives them the opportunity to join the university and pursue their studies and achieve their ambitions. Sharing such support and goals, may explain why there are no differences between them in accordance to motivational beliefs. Female and male students receive the same support and encouragement from teachers, schools and families.

Grade 12 students receive extensive care from their schools because good schools are anticipated to graduate high achiever students. Families also, support their children in all their educational years, but they support them more in their last school year since their achievement is highly countable for their future. Moreover, finding no differences between males and females can be interpreted by having the same education environment

for both genders. Students in Al Ain receive education under the same educational system and approaches of ADEC that are applied in boys' and girls' schools.

Regarding learning strategies, there were no statistical differences between all learning strategies in respect to gender except for peer learning and effort regulation. It was found that male students showed better use of peer learning strategy, whereas female students were better in regulating their effort to study and learn mathematics better. This finding is consistent with Ablard and Lipschultz (1998) that females were better in regulating their effort when faced with challenging problems or distracters.

Generally, in most Arab countries, and particularly in the UAE, females are not allowed to spend a lot of time outside their homes, so they have to spend most of their time at school and home. Therefore, they cannot cooperate with peers outside school. This also makes going to school very important to them. So, they found themselves directed to spend more time studying which helps them develop their regulating effort strategy. Additionally, females have more responsibilities than males that make them more capable of regulating their time to meet their responsibilities. For example, females have social responsibilities towards their home members, relatives and visitors In the UAE's culture and in response to the inherited values and traditions, females are supposed to welcome and spend some time with the visitors and family members as a way of showing respect to them. Besides, some females are sometimes responsible to carry out some house chores in order to help their mothers who might have no maids at home to assist them do the house work.

Culturally, it is acceptable in the UAE for males to socialize with their peers outside their homes. This definitely, increases regular interaction among males and

promotes them to cooperate frequently. Therefore, they have better chances in working together and completing their schools assignments cooperatively. They can also prepare and study for exams together. In contrast, female students are not permitted to spend that much time with their peers; consequently, their dependence and use of on peer learning strategies are less than that of males.

Therefore, a suggestion is proposed that teachers and parents should teach male students how to regulate their effort. School and teachers may organize workshops to teach male students how to regulate their efforts, and to raise students' awareness of the importance of effort regulation in their study. According to female students, teachers should give more attention to peer learning and create chances to help female students to interact with their peers.

Regarding mathematics achievement, female students' achievement was better than male students. The finding that females were more likely to regulate their efforts in learning than males may help to explain research findings that females perform better than males in mathematics (Ikegulu, 2000). Females' effort regulation means that they try to finish their work before they get bored. Besides, they work hard on math and they do not give up even if it is not easy for them to solve the math problems or they do not like them. This strategy may be the reason behind female students' ability to achieve better than male students. The results showed that there is a strong positive relationship between motivational beliefs and self-regulated learning strategies. This result is consistent with the compiled literature and was reflected by Boekarets (2010) description of motivation and learning strategies as two close friends according to the results of the current study, all the motivational beliefs were found to be positively related with the use of all learning

strategies measured by MSLQ except the test anxiety which was negatively related to most learning strategies. Depending on this finding, it can be concluded that motivation is imperative for the use of various learning strategies; cognitive, matacognitve, resource management strategies (Pintrich & DrGroot, 1990; Zusho & Pintrich, 2003). This finding of the present study supported the findings in the literature. For example, Pintrich (1999) found that self-efficacy, task value beliefs, and intrinsic goal orientation are positively related to the use of learning strategies.

Fourth Research Question:

Also, the results showed that the correlation was positive and statistically significant among intrinsic goal orientation and task value beliefs to all the SRL strategies. This result was supported by Ames (1992), who claimed that intrinsic goal orientation leads the students to value their efforts, and to see their self-efficacy judgments as the reason of their success and mastery. In addition, Pintrich (1999) found that intrinsic goal orientation is positively related to cognitive, self-regulatory strategies and actual performance. Also the current study results regarding task value are consistent with VanZile-Tamsen (2001) that found that expectancy success and task value are positively related to the self-regulated learning strategies.

In this study, self-efficacy was found to have almost the highest correlation to the learning strategies. Pintrich and De Groot (1990) emphasized on the same result when stated that students with greater beliefs in their self-efficacy are likely to use greater effort, persistence, and self-regulation strategies.

Fifth Research Question:

In consideration of the contribution of motivational beliefs to students' achievement in mathematics, it was found that self-efficacy has the greatest effect, followed by the extrinsic goal orientation.

Consistent with efficacy theory and previous research (e.g., Pintrich & de Groot.1990), this study disclosed that self-efficacy was the strongest predictor of mathematics achievement. It showed that 12th scientific stream students with higher level of self-efficacy beliefs have higher level of mathematics achievement. Students with high level of self-efficacy enthusiastically choose challenging tasks and demonstrate lower level of test anxiety, and positive feelings toward learning which is supported by their higher achievement. Additionally, those students effectively use learning strategies. This result is supported by another study conducted in the same context on the undergraduate students in UAE (Al Khatib, 2010). Also, results of many other studies were consistent with this study in finding that self-efficacy was the strongest predictor to achievement, in addition to other factors such as cognitive strategy use, and self-regulation (Pintrich, Roeser, & De Groot ,1994; Pajares & Graham,1999). Results of prior studies and those of this study supported the importance of self-efficacy as a predictor of achievement.

Another motivational belief found to be a predictor of mathematics achievement is the extrinsic goal orientation. The results revealed negative relationship between extrinsic goal orientation and achievement; it was found that when the level of extrinsic motivation increased, students' achievement decreased. This means that when students study for getting good grades and to show their ability to others without focusing on the goal of mastering the material, they tend to get lower scores. The results of the current study

showed that the intrinsic goal orientation does not have statistically significant contribution to the students' mathematics achievement. Unexpectedly, the direction of the relation between intrinsic goal orientation and achievement was negative, too. This can be explained by the importance of the students' grades for this year. So, students may focus and study some mathematical concepts until mastery, while leaving other concepts without studying. Even if the students hold intrinsic goal orientation, they still care about grades and this may confuse the students in identifying their goal orientation.

Regarding the learning strategies, effort-regulation, peer learning, and time and study management were found to predict the students' achievement in mathematics; it was found that there is a positive relationship only between effort-regulation and mathematics achievement. Conversely, it was found that there is a negative relationship between peer learning as well as time and study management and mathematics achievement.

The finding that when students increase their effort-regulation level, their mathematics achievement increased, is supported by Lee (1997, as cited in Yumusak, 2007) and Pintrich and De Groot (1990) who also found that intrinsic value, cognitive strategy use, self-efficacy, and self-regulation, which are effort management and metacognition were positively correlated and predicted achievement. This reveals that the students are aware of the fact that their effort in regulating their study time and their ability to try hard even when they deal with difficult tasks are going to affect their achievement.

One of the most important resources of management is managing the students' time. It was found that time and study management was also another predictor of the academic performance of these students which is supported by Garcia-Ros, Gonzalez, and

Hinojosa (2004). Surprisingly, time and study management was negatively related to mathematical achievement. When students increased and managed their study time, their achievement decreased. This result contradicts Zimmerman, Greenberg, and Weinstein (1994) as they found that the students' GPAs have improved when their training on time planning and management helped them to better self-regulate their study time. In UAE, students generally do not like to study very much. So, even if the students arranged for a specific time to study and have management skills such as how to schedule, plan, and manage their study time, it seems that these skills still are not enough to help the students to improve their achievement or are not explained effectively by scale items. This implies that the scale items need to be revised and adapted to provide clearer information about this learning strategy. For example, even though the students report that they make good use of their study time, it is not clear how they consider the good use of this time. In addition, is the study time enough to study the subject? Connecting this finding back with the negative relation between intrinsic goal orientation and achievement this may support the assumption that the students do not spend enough time studying mathematics subject, or they spend a lot of time just rehearsing basic information only ,or focusing on some ideas and neglecting others, because holding intrinsic goal orientation means that the students care very much about understanding the material which means that they are devoting enough time to study until mastery of the mathematics.

It is suggested that teachers should teach the students how to use their time effectively; this can be done by, organizing for effective time management workshops to help the students manage their time. Besides, teachers can organize activities that require limited time and observe the students behavior, and then they will be able to provide the students with directions to solve their problem in management.

The last predictor was peer learning which is unexpectedly negatively related to mathematics achievement of 12th grade students. This may be attributed to the fact that some important goals and objectives that require students to work in a group, and share their ideas have not been emphasized in the mathematics curriculum. Most of the goals do not require the students to work together. Another reason that can be considered behind this negative effect of peer learning on mathematics achievement is the students and teachers practices inside the classroom.

According to ADEC, students are supposed to be the center of learning, one of the strategies to implement this is the cooperative learning which requires the interaction between peers. Teachers tend to organize opportunities for peer learning, but from the researcher observations, students sometimes practice peer learning in a wrong way. For example if the teacher assigns a task for students, then some individuals in the group and other peers copy the assignment passively without understanding or cooperating. This way will lead to an ultimate decline in the students' level of achievement. Also, teachers may not plan for enough peer learning activities because of the extensive curriculum and a lot of competencies that have to be covered.

Students who value cooperation with peers in their learning are likely to reach high levels of achievement. Despite the fact that, peer learning tasks such as working together to analyze, and combine ideas together to build knowledge requires complex level of cognitive processing that may lead students to a better achievement (King, 2002). The finding of this study which showed negative relation between peer learning and mathematics achievement is similar to research finding done by Pintrich, Smith, Garcia, and MaKeachie, (1991). So, more research on the classroom level is required.

These results are partially supported by Puteh and Ibrahim (2010). They found that students show using time and study environment and help seeking strategies. While, they do not practice peer learning and they lack of effort regulation.

Even though, there are some differences, the results of the present study were generally in congruence with the findings in the literature. There are some reasons that may cause the differences in results. One of these reasons is the achievement test. The nature of the test items imply which learning strategies considered being efficient. For example, in tests that require the students to organize what they know to apply it into a new situation, rehearsal and simple recall are not sufficient to solve the test questions. So, the construction of achievement should be clearly defined before analyzing the relation between self-regulated learning and achievement. Different achievement tests may have different predictive abilities, the way how achievement is measured may explain the contradictory findings in the literature (Kuyper, Van der Werf & Lubbers, 2000). The exam used in this study followed Blooms taxonomy and measured all the competencies covered in the semester. Expert math teachers and supervisors shared writing this exam following a table of specifications. Also, this exam is rated by central committee of raters that rate all the students' exams following the same rules. This exam is considered moderate in its complexity.

Recommendations and implications

Teaching mathematics entails integration of cognitive, metacognitive, motivational and affective components of learning. "Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well" (NCTM,2000, p.16). This implies that teachers should

take in consideration what students know and how their current understanding of mathematical concepts can be taken to higher levels. In addition to giving more attention to the students need of SRL components while designing for classroom activities.

The positive relationship between most of SRL components and mathematics achievement suggests that students must be helped to develop effective self-regulatory strategies. Educators may include teaching SRL to mathematics programs. When the students build up SRL skills they will be independent, lifelong learners who are able to extend these skills to different subjects.

Teachers could help students to be aware of the role of their motivational beliefs in their study outcomes. In addition to encourage students to increase their intrinsic goal orientation by the classroom practices such as: praising students' effort and performance only when it is deserved and focus on the improvement rather than performing better than others in the class. The present study revealed that self-efficacy was the strongest positive predictor of achievement, so it is very important to raise the students' self-efficacy depending on classroom activities. Also, as seen from the results of this study some strategies were found to be negatively influencing the students' achievement. So, school and teachers should pay more attention to providing sufficient training for students on SRL, specially peer learning and time and study environment as they have been misunderstood by students.

Educators should encourage students to use learning strategies effectively and they should be aware of individual differences among students to guide them to enhance their learning.

The most important educational implication of the current research results is that it is important to teach learners how to engage in self-regulation and how to improve their motivational beliefs. This kind of teaching could improve the students' mathematics achievement. Additional research on the students' motivational beliefs and SRL strategies in other subjects is required to get results that can be generalized for UAE.

Recommendations for further research

This study examined SRL components relation to mathematics achievement considering the students' side only; future research should investigate whether teachers' beliefs about mathematics have a role in presenting learning activities that may affect the development of students' mathematics related beliefs and SRL strategies.

The variables studied in the present research should be investigated using experimental methods in various classroom environments to examine how these differing classroom environments support students' classroom performance in mathematics. Additionally, there is a need for further studies using qualitative and longitudinal methods to gain deep understanding of these variables and their relationship to each other.

This study is restricted to the year 2011-2012 and a limited geographical area. Further research studies are needed to cover all schools of Abu Dhabi Emirate, the UAE and other countries. Also similar studies may be applied to different subjects and grade levels to make generalization.

Conclusion

The main and most important purpose of the current research was to investigate the relation between motivational beliefs, SRL strategies and students' mathematics

achievement for scientific stream of grade 12. The results offered an evidence for the importance of both motivational beliefs and SRL strategies in mathematics achievement.

Consistent with previous research the results showed that self-efficacy was the strongest positive significant predictor of mathematics achievement. This finding implies that the students' beliefs about themselves form a key for their actions and accomplishments.

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APPENDICES

Appendix A

Author Permission to Use MSLQ

Re: MSLQ questionnaire
Bill McKeachie [billmck@umich.edu]

Sent: Wednesday, October 26, 2011 8:05 PM
To: Hanan Sa'deh Al Marashdi

Dear Hanan, You have my permission to use the MSLQ and to modify it
in any way that will meet your needs.
I'll be interested in your findings.
Bill McKeachie
On Oct 26, 2011, at 5:26 AM, Hanan Sa'deh Al Marashdi wrote:

> Dr. McKeachie,
> I am a graduate student in the education college in the United Arab
> Emirates University. For my thesis, I am studying math motivation
> and learning strategies among students enrolled in high school math
> courses).
> I am requesting your permission to use the Motivated Strategies for
> Learning Questionnaire for my thesis. Given time constraints for
> administering the survey and the parameters of the study, I may need
> to reduce the number of questions and modify the items slightly to
> reflect the students and subject matter.
> Would you be willing to grant me permission to adapt the survey for
> my thesis?
> If you have any questions about the research, I would be happy to
> answer them. Thank you for your consideration. I look forward to
> hearing from you.
>
> Thank you,

> Kind regards,
> Hanan Almarashdi
> Graduate Student, UAEU
>
>

Appendix B

(English version of the questionnaire)

Investigation of Self-Regulated Learning and Motivational Beliefs In Mathematics Achievement Of 12th Scientific Section Students In Al-Ain

CONSENT FORM

This study is applied by a graduate student in United Arab University, Education Collage. It aims to investigate the relation between the 12th scientific stream students' motivational beliefs and self-regulated learning strategies and their effect on mathematics achievement. Participants in this study will complete a questionnaire of two sections: first section about motivational beliefs, and the second section about self-regulated learning strategies. The participants are expected to need 15-20 minutes to complete this questionnaire.

I am .....from 12th scientific stream section(....) from school .....agree to participate in this study.

I understand that responding honestly on this questionnaire will not affect my grade in any case. I also understand that my participation is voluntary and that I may withdraw at any time. I understand that all information collected about me (including my name) as part of the study will be kept confidential. Student responses will not be disclosed to anyone and will not appear in the report and it will be used only for the purpose of this study.

I allow the researcher to use my grades in mathematics for the purpose of this study.

Questionnaire

The following questions ask you about your motivational beliefs and leaning strategies and study skills for this class. There is no right *or* wrong answer. Answer the questions about how you study in this math class. Circle 7 if the statement is very true of you. If a statement is not at all true of you, circle 1. If you are somewhere in between, circle the number that best describes how true the statement is of you.

First section: motivational beliefs

Not at all true to me..... Very true to me

1 2 3 4 5 6 7

1	In math classes , I prefer course material that really challenges me so I can learn new things	1	2	3	4	5	6	7
2	If I study in appropriate ways, then I will be able to learn the math material.	1	2	3	4	5	6	7
3	When I take a test I think about how poorly I am doing compared with other students.	1	2	3	4	5	6	7
4	I think I will be able to use what I learn in math in other courses.	1	2	3	4	5	6	7
5	I believe I will receive an excellent grade in math.	1	2	3	4	5	6	7
6	I'm certain I can understand the most difficult material presented math	1	2	3	4	5	6	7
7	Getting a good grade in math is the most satisfying thing for me right now.	1	2	3	4	5	6	7
8	When I take a test I think about items on other parts of the test I can't answer.	1	2	3	4	5	6	7
9	It is my own fault if I don't learn the material in math.	1	2	3	4	5	6	7
10	It is important for me to learn the math material in this class.	1	2	3	4	5	6	7
11	The most important thing for me right now is improving my overall grade, so my main concern in math is getting a good grade.	1	2	3	4	5	6	7
12	I'm confident I can learn the basic concepts taught in math subject.	1	2	3	4	5	6	7

13	If I can, I want to get better grades in this class than most of the other students.	1	2	3	4	5	6	7
14	When I take tests I think of the consequences of failing.	1	2	3	4	5	6	7
15	I'm confident I can understand the most complex material presented by the teacher in math subject.	1	2	3	4	5	6	7
16	In math class, I prefer the material that arouses my curiosity, even if it is difficult to learn.	1	2	3	4	5	6	7
17	I am very interested in the content area of math.	1	2	3	4	5	6	7
18	If I try hard enough, then I will understand the math material.	1	2	3	4	5	6	7
19	I have an uneasy, upset feeling when I take an exam.	1	2	3	4	5	6	7
20	I'm confident I can do an excellent job on the assignments and tests in math subject.	1	2	3	4	5	6	7
21	I expect to do well in this class	1	2	3	4	5	6	7
22	The most satisfying thing for me in math subject is trying to understand the content as thoroughly as possible.	1	2	3	4	5	6	7
23	I think the math material in this class is useful for me to learn.	1	2	3	4	5	6	7
24	When I have the opportunity in math class, I prefer assignments that I can learn from even if they don't guarantee a good grade.	1	2	3	4	5	6	7
25	If I don't understand the math material, it is because I didn't try hard enough.	1	2	3	4	5	6	7
26	I like the subject matter of math subject.	1	2	3	4	5	6	7
27	Understanding math subject is very important to me.	1	2	3	4	5	6	7
28	I feel my heart beating fast when I take an exam.	1	2	3	4	5	6	7
29	I'm certain I can master the skills being taught in this class.	1	2	3	4	5	6	7
30	I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	1	2	3	4	5	6	7
31	Considering the difficulty of math subject, the teacher, and my skills, I think I will do well in this class.	1	2	3	4	5	6	7

Second Section: Learning Strategies

1	During class time I often miss important points because I'm thinking of other things.	1	2	3	4	5	6	7
2	When studying for math, I often try to explain the material to a classmate or friend.	1	2	3	4	5	6	7
3	I usually study in a place where I can concentrate on my course work.	1	2	3	4	5	6	7
4	I often quit studying for math before I am done with assignments because I get bored or frustrated.	1	2	3	4	5	6	7
5	When I study for this class, I practice solving math problems over and over.	1	2	3	4	5	6	7
6	Even if I have trouble learning the math material, I try to do the work on my own, without help from anyone.	1	2	3	4	5	6	7
7	When I have trouble solving a math problem, I go back and try to figure it out.	1	2	3	4	5	6	7
8	When I study for math, I go through my notes and the text book and try to identify the most important types of problems and concepts.	1	2	3	4	5	6	7
9	I make good use of my study time for this course.	1	2	3	4	5	6	7
10	If something in math is really hard to understand, I change the way I study.	1	2	3	4	5	6	7
11	I try to work with other students from this class to complete the course assignments.	1	2	3	4	5	6	7
12	When I study for math, I review my notes, homework assignments, and/or sample math problems over and over.	1	2	3	4	5	6	7
13	I work hard to do well in math even if I don't like it.	1	2	3	4	5	6	7
14	I make simple charts, diagrams, or pictures to help me solve math problems.	1	2	3	4	5	6	7
15	When studying for this course, I often work with another student(s).	1	2	3	4	5	6	7
16	I find it hard to stick to a study schedule.	1	2	3	4	5	6	7
17	When I study for this class, I pull together information from different sources, such as lectures, class notes, and the textbook.	1	2	3	4	5	6	7
18	I ask myself questions to make sure I understand the material I have been studying in this class.	1	2	3	4	5	6	7
19	I try to change the way I study in order to fit the course requirements and the instructor's teaching style.	1	2	3	4	5	6	7

20	During class time, I often think of other things and do not really listen to what my teacher says.	1	2	3	4	5	6	7
21	I ask my math teacher to explain problems or concepts that I do not understand well	1	2	3	4	5	6	7
22	I memorize key equations or formulas that I need to know for tests.	1	2	3	4	5	6	7
23	When math work is hard, I give up or only study the easy parts.	1	2	3	4	5	6	7
24	I try to relate math topics to ideas from other courses.	1	2	3	4	5	6	7
25	When I study for math, I go over my class notes and the textbook and write down important concepts or equations.	1	2	3	4	5	6	7
26	I try to relate material from math class to what I already know.	1	2	3	4	5	6	7
27	I have a regular place set aside for studying.	1	2	3	4	5	6	7
28	When I can't understand the material in this course, I ask someone else for help.	1	2	3	4	5	6	7
29	I keep up with homework and other assignments for this class.	1	2	3	4	5	6	7
30	I attend math classes on time.	1	2	3	4	5	6	7
31	Even when math homework is boring, I keep working until I finish.	1	2	3	4	5	6	7
32	I try to find someone in this class whom I can ask for help when I need it.	1	2	3	4	5	6	7
33	In math, I keep track of how much I understand the work, not just if I am getting the right answers.	1	2	3	4	5	6	7
34	I often find that I don't spend very much time on math subject because of other activities.	1	2	3	4	5	6	7
35	Before I start studying for math, I decide what I want to accomplish during my study time.	1	2	3	4	5	6	7
36	If I get confused in class, I make sure I sort it out afterwards.	1	2	3	4	5	6	7
37	I rarely review my notes or homework assignments before tests.	1	2	3	4	5	6	7

Appendix C

(Arabic version of the questionnaire)

علاقة الدافعية لتعلم الرياضيات باستراتيجيات التعلم وأثرهما على تحصيل طلاب الصف الثاني عشر في مدينة العين

تطبق هذه الدراسة من قبل طالبة ماجستير في جامعة الامارات , كلية التربية. و تهدف الى بحث العلاقة بين دافعية طلاب الثاني عشر لتعلم مادة الرياضيات و علاقتها بالاستراتيجيات المستخدمة في التعلم , وأثرهما على التحصيل الأكاديمي .

المشاركون في هذا الاستبيان سيقومون بالاجابة عن جزأين : الجزء الاول يبحث أسئلة تتعلق بدافعية الطالب لتعلم مادة الرياضيات , والجزء الثاني يبحث في استراتيجيات التعلم التي يستخدمها الطالب أثناء دراسته لمادة الرياضيات.

من المتوقع أن تستغرق الاجابة على الأسئلة في هذا الاستبيان من 15-20 دقيقة .

أنا..... من الصف الثاني عشر , شعبة (.....)

من مدرسة ..... أوافق على المشاركة في هذه الدراسة.

- أدرك انه لن يكون هناك مخاطر بسبب مشاركتي بالاجابة عن هذا الاستبيان بأمانة, وأنه لن يؤثر بأي حال من الأحوال على درجاتي , وان مشاركتي تطوعية وأنني استطيع الانسحاب متى أشاء بدون أي عواقب.

- أدرك أن المعلومات المتضمنة بهذا الاستبيان ستكون سرية بما في ذلك اسمي أو أي معلومات عني, وأن استجابات الطلاب لن يطلع عليها الا المعنيون في البحث.

***أعطي الإذن للباحثة بالاطلاع على درجاتي في مادة الرياضيات لاستخدامها فقط لأغراض هذه الدراسة.

Appendix C

(Arabic version of the questionnaire)

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الجزء الأول : الدافعية

الاسئلة التالية تسألك عن دافعيتك و مواقفك من مادة الرياضيات وكذلك الاستراتيجيات التي تتبعها أثناء دراستك لمادة الرياضيات. من المهم تذكر أنه لايوجد اجابة صحيحة أو اجابة خطأ, فقط يرجى الإجابة بدقة بقدر الإمكان باستخدم المقياس الموضح أدناه للاجابة عن الاسئلة. إذا كنت تعتقد ان الجملة صحيحة تماما بالنسبة إليك, فضع دائرة حول الرقم 7; واذا كنت تعتقد أن الجملة خطأ تماما بالنسبة إليك, فضع دائرة حول الرقم 1 . إذا كانت الجملة أقرب إلى الصحه أو إلى الخطأ فحاول ايجاد رقم بين 1 و7 بحيث يصف ما تشعر به.

1	2	3	4	5	6	7
خطأ تماماً بالنسبة لي	. . . . .					صحيح تماماً بالنسبة لي

1- في دروس الرياضيات , أفضل المواضيع التي تتحداني لأتعلم أشياء جديدة.	1	2	3	4	5	6	7
2- إذا درست الرياضيات بطريقة ملائمة , فسيكون لدي القدرة على تعلمها.	1	2	3	4	5	6	7
3- عند امتحان الرياضيات أفكر بمدى سوء أداني مقارنة مع الطلاب الآخرين.	1	2	3	4	5	6	7
4- أعتقد أنني سأتمكن من استخدام ما تعلمته في الرياضيات في مواد أخرى.	1	2	3	4	5	6	7
5- أعتقد أنني سأحصل على درجات ممتازة في الرياضيات.	1	2	3	4	5	6	7
6- أنا متأكد/متأكدة انني سأحصل على درجات ممتازة في الرياضيات.	1	2	3	4	5	6	7
7- أكثر ما يرضيني الان هوالحصول على درجة جيدة في الرياضيات .	1	2	3	4	5	6	7
8- عند امتحان الرياضيات أفكر بالأشياء التي لم أستطع حلها في الامتحان.	1	2	3	4	5	6	7
9- اذا لم أتمكن من تعلم مادة الرياضيات فهو خطئي.	1	2	3	4	5	6	7
10- تعلم مادة الرياضيات في هذا الصف مهم لي.	1	2	3	4	5	6	7
11- أهم أولوياتي الان هو رفع معدلي الدراسي ولذلك فان سبب اهتمامي بمادة الرياضيات هو الحصول على درجة جيدة	1	2	3	4	5	6	7
12- أثق بقدرتي على تعلم المفاهيم الأساسية في مادة الرياضيات.	1	2	3	4	5	6	7
13- إذا استطعت , أود الحصول على درجة أفضل من معظم الطلاب في مادة الرياضيات.	1	2	3	4	5	6	7

14- عند امتحان الرياضيات فانني أفكر في عواقب الفشل.	1	2	3	4	5	6	7
15- أثق بقدرتي على فهم المواضيع التي شرحها المعلم في مادة الرياضيات.	1	2	3	4	5	6	7
16- في مادة الرياضيات أفضل المواضيع التي تثير فضولي , حتى ولو كانت صعبة التعلم.	1	2	3	4	5	6	7
17- أنا مهتمّ/مهتمة جدا بمحتوى مادة الرياضيات.	1	2	3	4	5	6	7
18-أذا حاولت بجد سأفهم مادة الرياضيات.	1	2	3	4	5	6	7
19- عند امتحان الرياضيات يتملكني شعور بالإحباط وعدم الإرتياح .	1	2	3	4	5	6	7
20- أثق بقدرتي على العمل بشكل جيد على واجبات وامتحانات مادة الرياضيات.	1	2	3	4	5	6	7
21- أتوقع ان ابلي جيدا في مادة الرياضيات.	1	2	3	4	5	6	7
22- أكثر ما يرضيني في مادة الرياضيات هو محاولتي بقدر الإمكان الفهم التام لمحتوى المادة .	1	2	3	4	5	6	7
23- أعتقد ان مادة الرياضيات لهذا الصف مفيدة لي للتعلم.	1	2	3	4	5	6	7
24- عندما تسنح لي الفرصة فإنني أختار الواجبات التي أستطيع التعلم منها حتى لو كانت لا تضمن لي درجات جيدة.	1	2	3	4	5	6	7
25- أذا لم أفهم مادة الرياضيات فهذا لأنني لم أبذل جهداً كافياً.	1	2	3	4	5	6	7
26- أحب مادة الرياضيات.	1	2	3	4	5	6	7
27- فهم مادة الرياضيات مهم جداً بالنسبة لي.	1	2	3	4	5	6	7
28- أشعر بأن ضربات قلبي تتسارع عند امتحان الرياضيات.	1	2	3	4	5	6	7
29- أعتقد أنني أستطيع إتقان المهارات التي تعلمتها في دروس الرياضيات.	1	2	3	4	5	6	7
30- أريد ان أبلي جيدا في الصف لأنه من المهم بالنسبة لي ان أظهر قدراتي لعائلتي وأصدقائي.	1	2	3	4	5	6	7
31- أخذاً بعين الإعتبار لصعوبة المادة و المعلم ومهاراتي , أعتقد أنني سأبلي حسنا في الرياضيات.	1	2	3	4	5	6	7

الجزء الثاني : استراتيجيات التعلم

1- غالبا ما تفوتني بعض النقاط المهمة لأنني أفكر في مواضيع أخرى أثناء وقت الحصة .	1	2	3	4	5	6	7
2- عندما أدرس الرياضيات , أحاول غالبا شرح المادة لزميل أخر.	1	2	3	4	5	6	7
3- أدرس عادة في مكان أستطيع التركيز فيه على المادة.	1	2	3	4	5	6	7
4- غالبا ما أترك دراسة الرياضيات قبل إنهاء واجباتي لأنني أشعر بالملل أو الإحباط.	1	2	3	4	5	6	7
5- عندما أدرس الرياضيات أتمرن على حل مسائل الرياضيات مراراً وتكراراً.	1	2	3	4	5	6	7
6- أحاول إنجاز المهام بنفسي بدون مساعدة من أحد حتى لو واجهت مشاكل في تعلم الرياضيات.	1	2	3	4	5	6	7
7- عندما تواجهني مشاكل في حل مسائل الرياضيات , أعاود المحاولة للوصول الى حل .	1	2	3	4	5	6	7
8- عند دراسة الرياضيات , أراجع ملاحظاتي و كتابي لتحديد أهم أنواع المسائل والمفاهيم.	1	2	3	4	5	6	7
9- أستغل جيدا وقت دراستي لمادة الرياضيات.	1	2	3	4	5	6	7
10- أحاول أن أغير أسلوبي في الدراسة إذا واجهت صعوبة في فهم الرياضيات.	1	2	3	4	5	6	7
11- أحاول العمل مع زملاء آخرين من صفي لإنهاء الواجبات.	1	2	3	4	5	6	7
12- عندما أدرس الرياضيات فأنا أراجع ملاحظاتي, واجباتي المنزلية و/أو نماذج من مسائل الرياضيات.	1	2	3	4	5	6	7
13- أعمل بجد لأبلي حسنا في مادة الرياضيات حتى لو لم أكن أحب ما أفعل.	1	2	3	4	5	6	7
14- أقوم بعمل مخططات بسيطة , رسوم توضيحية , أو جداول لتساعدني في حل المسائل.	1	2	3	4	5	6	7
15- عندما أدرس لمادة الرياضيات فغالبا ما أدرس مع زميل أو زملاء آخرين.	1	2	3	4	5	6	7
16- أجد أنه من الصعب الإلتزام بجدول للدراسة.	1	2	3	4	5	6	7
17- عندما أدرس الرياضيات, أجمع معلومات من مصادر مختلفة مثل الحصص و الملاحظات الصفية وكذلك الكتب.	1	2	3	4	5	6	7
18- أمتحن نفسي للتأكد من فهمي لما قد درسته.	1	2	3	4	5	6	7
19- أحاول أن أغير طريقتي في الدراسة لتناسب متطلبات المادة وطريقة المعلم في شرحها.	1	2	3	4	5	6	7

20- غالبا ما أفكر في أشياء اخرى في وقت الحصة ولا أستمع فعلا لما يقوله المعلم.	1	2	3	4	5	6	7
21- أطلب من معلمي أن يوضح المسائل والمفاهيم التي لم أفهمها جيدا.	1	2	3	4	5	6	7
22- أحفظ المعادلات والصيغ (القوانين) المهمة للإمتحان.	1	2	3	4	5	6	7
23- عندما تكون دراسة الإمتحان صعبة, فإما أن أستسلم أو أن أدرس الأجزاء السهلة فقط .	1	2	3	4	5	6	7
24- أحاول ربط الرياضيات بأفكار من مواد أخرى.	1	2	3	4	5	6	7
25- عندما أدرس مادة الرياضيات فأنا أراجع ملاحظاتي وكتابي, وأسجل المفاهيم والمعادلات المهمة.	1	2	3	4	5	6	7
26- أحاول ربط دروس مادة الرياضيات بما أعرفه في الأصل.	1	2	3	4	5	6	7
27- لدي مكان معتاد أجلس فيه جانبا من أجل الدراسة.	1	2	3	4	5	6	7
28- عندما لا أفهم موضوعا في مادة الرياضيات , أطلب المساعدة من شخص آخر.	1	2	3	4	5	6	7
29- أحافظ على أداء واجباتي المنزلية وكذلك واجباتي الأخرى لمادة الرياضيات.	1	2	3	4	5	6	7
30- أحضر حصص الرياضيات بإنتظام.	1	2	3	4	5	6	7
31- حتى لو كانت الواجبات المنزلية مملة ,فإنني أستمر بأدائها حتى الإنتهاء منها.	1	2	3	4	5	6	7
32- أحاول أن أجد في صفي من أستطيع أن أطلب منه المساعدة عندما أحتاجها.	1	2	3	4	5	6	7
33- في مادة الرياضيات, أتابع مدى فهمي للمادة وليس فقط قدرتي على إيجاد إجابة صحيحة.	1	2	3	4	5	6	7
34- غالباً لا أكرس الكثير من الوقت لمادة الرياضيات بسبب كثرة الأنشطة الأخرى.	1	2	3	4	5	6	7
35- قبل البداية في دراسة الرياضيات, أقرر ما أريد أن أنجزه خلال وقت دراستي.	1	2	3	4	5	6	7
36- أذا ارتبكت في أخذ الملاحظات في الصف أتأكد من ترتيبها لاحقا.	1	2	3	4	5	6	7
37- نادراً ما أراجع ملاحظاتي أو واجباتي المنزلية قبل الامتحان.	1	2	3	4	5	6	7

Appendix D

ADEC Approval

UNITED ARAB EMIRATES
Abu Dhabi Education Council
Dept. of AlAin Educational Zone

دولة الإمارات العربية المتحدة
مجلس أبو ظبي للتعليم
مكتب العين التعليمي

الرقم: 2011/
التاريخ 2011/1/28م

تعميم رقم (602) لسنة 2011

السادة / مدراء ومديرات المدارس الثانوية المحترمين

تحية طيبة... وبعد،،،

م/ تسهيل مهمة باحث

في إطار التعاون القائم بين مكتب العين التعليمي ومؤسسات المجتمع المحلي ، تقوم الأستاذة /حنان شاهر المراشده بدراسة عنوانها " **علاقة الدافعية باستخدام استراتيجيات التعلم عند طلاب المرحلة الثانوية في مادة الرياضيات وإثرها على التحصيل والأكاديمي** " وتتطلب الدراسة توزيع استبيان على الطلاب.

يرجى التكرم بتسهيل مهمة الباحثة.

شاكرين لكم حسن تعاونكم،،، ،،،

وتفضلوا بقبول فائق الاحترام

عائشة راشد الشويهي
رئيس قسم المناهج والبرامج

مجلس أبو ظبي للتعليم
مكتب العين
Abu Dhabi Education Council
Al Ain Office

Appendix E

Instructions for administrators of the questionnaire

تعليمات للاجابة عن الاستبيان

أتقدم بالشكر الجزيل مقدماً للمعلم الذي يشرف على تطبيق هذا الاستبيان . وجعل الله جهوده في ميزان حسناته يوم القيامة.

يرجى العلم بان الاستبيان يقيس دافعية الطالب لتعلم مادة الرياضيات وعلاقتها باستخدامه لاستراتيجيات التعلم وأثرهما في تحصيله الدراسي ولذلك

*من الضروري كتابة الاسم كاملا مع رقم الشعبة واسم المدرسة

*من الضروري الاجابة على جميع الاسئلة وعدم ترك أي سؤال

في حال ترك أي سؤال فانه يتم استبعاد الاستبانه كاملة وهذا له تأثير سلبي على سير الدراسة وكذلك على شفافية نتائجها.

التأكيد على كتابة اسم الطالب ورقم الشعبة واسم المدرسة , حيث سيتم ربط اجابة الطالب عن الاستبانة بدرجة الفصل الاول للمادة . ولذلك أي استبانه لا تحمل هذه البيانات تكون بلا قيمة ويتم استبعادها

في حال لم يرغب أحد الطلاب بالافصاح عن اسمة لا يتسلم أي استبانه

كل الشكر والتقدير لجميع الزملاء المشرفين على تطبيق الاستبيان وكذلك الطلاب المشاركين في الاستبيان .

ملخص الدراسة

هدفت الدراسة إلى الكشف عن مستوى امتلاك طلبة الصف الثاني عشر العلمي لمكونات التعلم المنظم ذاتياً، وما إذا كانت هذه المكونات تختلف باختلاف جنس الطالب. إضافة إلى تعرف القدرة التنبؤية لمكونات التعلم المنظم ذاتيا بالتحصيل الأكاديمي، ودراسة أية فروق ذات دلالة احصائية بين متوسطات الطلاب والطالبات من حيث مكونات التعلم المنظم ذاتيا وكذلك التحصيل الدراسي. وقد تكونت عينة الدراسة من (402) طالباً وطالبة من طلبة الصف الثاني عشر العلمي في مدينة العين بدولة الإمارات العربية المتحدة، ولتحقيق أهداف الدراسة استُخدِم مقياس معدل للتعلم المنظم ذاتياً والذي تم تطويره من قِبل بينتريش، سميث، جارسيا وماكيشي (1991). بالإضافة إلى امتحان الفصل الدراسي الأول لمادة الرياضيات للسنة الدراسية 2011-2012. وقد أظهرت النتائج أن امتلاك الطلبة لمكونات التعلم المنظم ذاتياً جاء ضمن المستوى المرتفع "لتوجه الهدف الخارجي" و"استراتيجية التسميع"، وباقي الأبعاد الدافعية بدرجة متوسطة. و قد طبق اختبار "تي" للعينات المستقلة على متوسط كل من الذكور والإناث على مستوى ألفا 0.05 لتحديد أي دلالة إحصائية بين الجنسين فيما يختص بمعتقدات الدافعية و استراتيجيات التعلم المنظم ذاتياً وكذلك التحصيل الدراسي. كما بينت النتائج أنه لا توجد فروق ذات دلالة احصائية بين الذكور والاناث إلا فيما يتعلق باستراتيجية "تعلم الاقران" فكانت الدلالة الاحصائية لصالح الذكور بينما كانت الدلالة الاحصائية لاستراتيجية "تنظيم الجهد" وكذلك "التحصيل الدراسي" لصالح الإناث. كما تم استخدام تحليل الإنحدار الخطي المتعدد لتحديد أي من مكونات التعلم المنظم ذاتياً التعلم الذاتي المنظم يمكن أن يتنبأ جيداً بتحصيل الرياضيات. وقد أظهرت الدراسة بأنه يوجد خمسة متغيرات تتنبأ بتحصيل الطلاب في الرياضيات وتتضمن كل من: الكفاءة الذاتية، التوجيه الخارجي للهدف، تنظيم الجهد، وتنظيم الوقت وبيئة الدراسة. وظهرمن النتائج أن مكوني "الكفاءة الذاتية" واستراتيجية "تنظيم الجهد" يتنبئان إيجابياً بالتحصيل الأكاديمي لدى الطلبة. أما فيما يتعلق "بتوجه الهدف الخارجي" و "تعلم الاقران" وكذلك استراتيجية "تنظيم بيئة ووقت الدراسة" فكانت تتنبأ سلبياً بالتحصيل الدراسي. كما أن أهم النتائج التربوية لهذه الدراسة هي أهمية تدريس الطلاب لطرق التعلم المنظم ذاتيا. فهذا النوع من التعليم قد يحسن من التنظيم الذاتي للطلاب و كذلك اتجاهاتهم ودوافعهم نحو مادة الرياضيات مما يؤثر على التحصيل الدراسي في النهاية. كما يوصى بالمزيد من الدراسات التربوية لمكونات التعلم المنظم ذاتياً للمواد الأخرى لتعمم النتائج على طلاب دولة الإمارات.

الكلمات المفتاحية :التعلم المنظم ذاتيا، تحصيل الرياضيات.

جامعة الإمارات العربية المتحدة
United Arab Emirates University

UAEU Faculty of Education

جامعة الإمارات العربية المتحدة

كلية التربية

قسم المناهج وطرق التدريس

برنامج الماجستير في التربية

دراسة طرق التعلم المنظم ذاتيا والدافعية لتعلم الرياضيات وأثرهما على التحصيل الدراسي

دراسة مقدمة إلى قسم المناهج و طرق التدريس – كلية التربية –جامعة الإمارات العربية المتحدة

لنيل درجة الماجستير

إعداد

حنان شاهر سعادة المراشدة

إشراف

د. عثمان نايف السواعي

مايو، 2012