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The Levels of Creative Thinking and Metacognitive Thinking Skills of Intermediate School in Jordan: Survey Study

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Abstract
This study is aimed at investigating the levels of creative and metacognitive thinking skills among students as well as the effect of student's gender on creative and metacognitive thinking skills in the intermediate stage at Al-Balqa Province in Jordan. The method of stratified sampling was selected for the purpose of this study. The metacognitive inventory consisted of (52) items, and Torrance test (Figure B), has been applied on (372) students.The results showed that there were statistical significant differences between the average performance of males and females on the creative and metacognitive thinking for the benefit of males as well as a high level of Metacognitive thinking from the viewpoint of the students. The researcher recommended that further studies should be focus on training programs for students on metacognitive skills and impact on educational achievement and creative thinking.

Key words: Metacognitive thinking skills; Creative thinking skills; Education; Gender

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INTRODUCTION
Many teachers in Jordan believe that developing the capabilities of student thinking is the goal of education. Thinking and enhancing skills for students is an important goal for education, and schools should exert efforts to provide opportunities for students thinking, especially for those talent students. However, this goal is often effected by reality in practice, because educational system does not provide sufficient experience of thinking such as creative or metacognitive thinking skills, while schools rarely provide students opportunities to carry out their missions in learning stems, although the majority of workers in the education field convinced that the importance of developing students thinking skills is talented. They argue that the mission of the school is not a process of filling the minds of students with information, but to the extent of developing thinking and creativity. There are many bad practices and behaviors still prevalent in schools, which opposes this concept that believe the teacher is the first and last.

Teachers depend on some students for answering questions. They do not give the students enough time to think and answer the questions. Most of the questions are simple and do not require high thinking skills. They also don't care about the way of students thinking as a learnable process, which includes a variety of patterns that range form high complexities to simplicity in thought and abstractness (Harris, 2002). Solving the complexities of student-creativity problems is not only by changing classical teaching methods but also by simplifying the context and ways of how to tackle the issue. Students need not to learn or develop basic skills of drafting, and technical drafting; they should be aware of the process and progress of their way of thinking and creativity. They should have a link with the degree of simplicity or complexity, which they are using in their design. Students' needs are essential for developing the use of terms, how to integrate them into their designs and how digits and numbers can formulate the concepts. All of this should be based on processes that will guide students to stages of one exercise and the different exercises. It should be emphasized that creativity actually represents a set of

skills and processes. By examining literature related to the creative process one can begin to develop a theoretical understanding of creativity and identify essential skills and behaviors. The process of creative thinking is considered as one of the mental cognitive processes, which an individual practices during his daily life as the case with the metacognitive thinking (Beyer, 1987; Swartz & Perkinsn, 1990). The metacognitive thinking skills are teachable one, if given an appropriate time and planning carefully. There is a need to teach students metacogitive thinking and skills, especially the talented ones, either as part of the curriculum or as separate way. Nevertheless, students need more training skills beyond their knowledge or metacognitve skills.

Problem Statement

There is a large concern of the developed countries on education, and consequently, each educational organization seeks to develop the creative abilities of its students with all means to benefit the community, the country to coup with future problems.

Jordan among other countries seeks to develop such creative abilities to enable Jordanians live in a good condition that allow them to accommodate with life challenges, be creative and productive. Students who grow with creative approach will have the proper means and opportunities of creativity through activities, potentials and practices obtained from the primary, preparatory and secondary schools and the university and then will affect positively the community. It becomes necessary to make a student positive, active and efficient in the various educational level and activities, concerned about his personality, developing his capacities, readiness, developing his attitudes. However, this development requires that the teacher should help the student to link the theoretical educational curriculum together with his practices in life. As a result, we will attempt through this study to examine the students' creative skills, the relationship between the creative thinking and metacognitive skills, the creative thinking skills and relationship with gender.

This study aims to answer the following questions:

1. What are the levels of creative thinking among students of higher primary stage?
2. What are the different levels of creative thinking among students according to gender?
3. What are the levels of metacognitive thinking among students of higher primary stage?
4. What are the different levels of metacognitive thinking among students according to gender?

Study Importance

The importance of this study resides the following:

To know the effect of gender on creative and metacognitive thinking skills by higher primary stage students.

Results obtainable from this study would be helpful for educational people in producing more accurate and meaningful thinking structures that are usefully for constructions *Curriculum*.

Results from this study would provide both parents and educators recommendations on how to guide children and students towards teaching that help them acquire accurate thinking and to decline traditional teaching with out thinking.

Study Objectives

The purpose of this study is to identify:

1. The levels of creative and metacognitive thinking skills.
2. The effect of gender on creative and metacognitive thinking skills.

Limitations

This study is designed for Eighth, Ninth and Tenth grades of primary students attending the academic stream in Jordan schools within Salt Directorates of Education during the academic year 2010/2011. It is limited specifically to the validity and reliability of instruments. Therefore, other limitation has to do with the extent to which the findings can be generalized beyond the sample study. The number of sample is too limited for broad generalizations**.** The conclusion as well as the limitations of this study also brings forth some fruitful and interesting possible future research that might be needed in relation to the study. The most important future research obviously lies in continuing the elaboration of the elements of the creative and metacognitive thinking process.

Operational Definitions

Metacognitive skills: the mental process that allows students to know what they think about includes planning, monitoring their individual own thoughts, problem solving, making decisions, and strategies for remembering information.

Creative thinking skills: the cognitive process, which leads to generate new ideas by combining, changing, or reapplying existing ideas ability to imagine or invent something new that no one seems to have thought of yet.

Gender: the array of socially constructed roles and relationships, personality traits, Attitudes, behaviors, values, relative power and influence that society related to the two sexes on a differential basis. Whereas biological sex is determined by genetic and anatomical characteristics.

1. LITERATURE REVIEW

This current era is characterized with rapid changes, huge amounts of information inflows and knowledge developments that included all aspects of life, which caused educators to cope with such changes, through providing students methods to achieve their cognitive

development, in order to cope with the continuous developments. Consequently, a change has taken place in the field of learning psychology from behavioral to cognitive psychology, which focuses on the method to storage quality information in the brain in best ways, and performs mental processes, which reflected on the field of education, either on the level of theory or application.

Brown (1987) emphasized metacognitive skills or regulations, and defined metacognition as an awareness of one's own cognitive activity; the methods employed to regulate one's own cognitive processes; and a command of how one directs, plans, and monitors cognitive activity. Stated differently, metacognition is made up of active checking, planning, monitoring, testing, revising, evaluating, and thinking about one's cognitive performance (Baker & Brown, 1984).

Therefore, metacognition is important in learning and is a strong predictor of academic success (Dunning, Johnson, Ehrlinger & Kruger, 2003; Kruger & Dunning, 1999). According to Samek (1981), the "Meta" phenomenon is a consequence of human beings' evolving conscious awareness. Metacognition is the ability to be aware of, to attend to, and use information about personal cognitive processes, so that one can effectively enhance performance on cognitive tasks

The term "metacognition" is most often associated with Flavell (1979). He said that metacognition consists of both metacognitive knowledge and metacognitive experiences or regulation. Metacognitive knowledge refers to acquired knowledge about cognitive processes, knowledge that can be used to control cognitive processes. Flavell further divides metacognitive knowledge into three categories: knowledge of person variables, task variables and strategy variables.

Metacognitive experiences are conscious cognitive or affective experiences that concern any aspect of an intellectual undertaking. Sternberg (2002) defines it as "figuring out how to do a particular task or set of tasks, and then making sure that the task or set of tasks are done correctly" (p.24). However, Metacognition refers to awareness and monitoring of one's thoughts and task performance, or more simply, thinking about your thinking (Flavell, 1979). It refers to higher-order mental processes involved in learning such as making plans for learning, using appropriate skills and strategies to solve a problem, making estimates of performance, and calibrating the extent of learning (Dunlosky & Thiede, 1998). The metacognitive theory plays important roles in promoting the teaching on a mental level, and in various kinds of learning (Erez & Peled, 2001; Gama, 2004), metacognition is concerned with the learner's ability to plan, observe, control and make his own learning (Costa, 2000; Armbruster, 1989). Accordingly, they improve the learners' ability to gain various teaching processes, bear responsibility, control the cognitive processes that related with teaching (Hargrove, 2007) and facilitate the active construction of knowledge as well as encouraging the learners to think through their own thinking methods. In this regard, metacognitive processes help develop independent thinking, decision- making skills, problem solving and to be active and independent learners when teaching a specific skill, metacognitive finally refers to higher order thinking that involves active control over the thinking processes. On the other hand, the metacognitive strategies indicate the one's ability to guide and organize his mental processes while performing a new teaching task. Other studies indicated the efficiency of using some of the metacognitive strategies to develop the students' thinking, change the concepts and scientific principles of the meanings that used in solving the problems they face in their daily lives. In addition, these strategies develop the learner's thinking methods help to solve the daily life problems, since the metacognitive thinking strategies help the students to develop their academic achievement in various topics, and develop the metacognitive skills, especially the creative thinking skills (Hargrove, 2007). Furthermore, the students who can control the metacognition in a good way, know how to learn and do while being engaged in various learning conditions. Thamaraksa (2004) states that the metacognitve is not inherited but can be instilled in the student's minds through direct situations introduced to the students to help them solve the educational and behavioral problems.

In many cases, individuals setting situations that include many choices and alternatives that require a creative solution from them (Sternberg, 2002), and one should choose the best and most suitable alternatives to achieve his purpose with more benefit and less possible efforts. However, the creative thinking related with the metacognitive thinking, where there is a clear agreement in the field of thinking that the aspects and components of creative thinking include metacognitive skills such as planning and evaluation (Arambruster, 1989). These metacognitive skills are necessary to help an individual solve the problems, with the same degree of the importance of creative thinking (Jausovec, 1994). In Beyer's design of the metacognitive skills, it was evident that these skills (planning, observation and evaluation) create the key for any training program that depends on the creative thinking.

Pesut (1990) suggested that the main thinking skills such as brainstorming and analysis affect vitally on guiding the persons mentally to use the metacognitive skills, which encourage and contribute in developing thinking in general, and develop the creative skills in particular. He has conceptualized creativity as a metacognitive process, meaning the ability to think about one's own thought processes, to regulate thinking through planning, monitoring and evaluation is the essence of creativity. Creative strategies guide thinking

and promote the generation of novel, useful associations. Creativity conceptualized as a metacognitive process can be enhanced because of treatment methods developed by combining cognitive and metacognitive skills; he suggests creativity-training programs are successful because they encourage the development of metacognitive abilities. In addition, Arambruster (1989) studied largely the effect of metacognitive skills on the creative thinking through suggesting supportive guiding skills, and confirmed the role of metacognitive thinking skills in supporting and encouraging the creative thinking skills, as he indicated to the possibility to train the individuals to support the metacognitive thinking skills during the professional training programs. From the above, it becomes clear that the metacognitive processes are considered the most important components of the thinking process as a mental activity. The metacognitive thinking processes include planning, observation and evaluation (Beyer, 1987). Accordingly, thinking perceived as one of the highest ranks of the thinking components that include thinking patters with the help of simpler ones to evaluate the thinking processes. This can be achieved through creative thinking, problem solving and other means. This means that the cognitive mental processes do not work separately from each other; there are interrelated relationships among them (that affect and be affected), but they work within a specific procedure to reach a specific result (Taylor, 2000), which means: thinking depends on the previous cognitive mental processes in order to achieve the goal through the thinking processes. Most creativity training programs are successful (Davis *et al.*, 1972; Mansfield & Krepelka, 1978) because these programs encourage the development of "thinking about thinking" or metacognitive abilities. These training programs provide metacognitive experiences to participants and thereby encourage the development of an individual's metacognitive knowledge. On the other hand, metacognitive thinking skills play a significant role in the successful education (Rynearson & Kerr, 2000). Therefore, it is necessary to study the way of how to develop the students' metacognitive thinking skills (Wade & Reynolds, 1989), help them to apply the metacognitive thinking skills in a better way through controlling this process (Liginston, 1997). Consequently, it becomes clear that an education, which reaches to the level of metacognitive, considered one of the successful teaching and learning requirements. However, metacognition is one of the necessary human capacities that help students to increase their awareness through learning and experience (Willen & Phillips, 1995), and thus, help develop the students' life experiences. Costa (2000) thinks that if students could understand their thinking in a better way, then they will be able to describe what goes on in their minds, what they know, and the knowledge they need, not to forget that they will be able to describe their work plan before starting to solve a problem, put sequential steps and clarify where they are within this chain while solving the problem. In addition, they can go away of the closed roads while solving a problem, and at the end, they can decide the extent of their success in achieving the proposed plan. Through this, they are applying the cognitive aspects appropriately when they describe their thinking skills and strategies. Therefore, many educators recognize the importance of enhancing and developing creative problem solving skills, which are seen as important for both individuals and the society (Sternberg & Lubart, 1995). Because a major goal of most educational programs for students is the development of creativity and problem solving, often called "higher levels of thinking." Research on creativity development, for instance, shows that certain aspects of the learning environment encourage while others discourage creativity. A focus on extrinsic rewards such as a promise that if one engages in a certain task, he will receive a certain reward, winning a competition because one's artwork or story is judged "the best," and grades contingent upon "creative" products decreases creativity while an environment in which intrinsic motivation is a key element — participation in tasks or activities because of their inherent interest — increase creativity (Hennessey, 1996; Hennessey, 2000). Therefore, the main idea for this paper is examine the students' creative and metacognitive skills, In addition the relationship between the creative thinking and metacognitive skills for the students in Jordan.

2. METHODOLOGY

This study employed survey methodology, which fits with the nature and questions of this study, through applying two scales to measure the creative thinking skills and the metacognitive skills, to explore these skills and the relationship between them, possessed by the students of the higher primary stage in Al-salt Educational Directorate in Jordan.

2.1 Population

The population of the study consisted of all eighth, ninth and tenth grades in the higher primary stage in Al-salt Educational Directorate in Jordan. The number of classes was (820) which contain (15600) students as shown in Table 1.

Table 1
Number of Classes and Students in the Higher Primary Classes in Salt Educational Directorate – Jordan

Class	Semesters	Number of students	
		Males	Females
Eighth	220	2200	2750
Ninth	250	3650	2846
Tenth	350	1560	2594
Total	820	7410	8190

2.2 Sample

Stratified sample method has been applied for this study. I have chosen classes in cooperation with the administration of each school to represent the population of the study where possible. The population was divided into three layers (eighth, ninth and tenth grades), and by applying the stratified sample method, we have choosing the sample randomly from each of the three classes. The sample size of each stratum is proportionate to the population size of the stratum. Strata sample sizes are determined by the following equation:

$n_h = (N_h / N) * n$

Where n_h is the sample size for stratum *h*, N_h is the population size for stratum *h*, N is total population size, and (n) is total sample size. The sample (372) was chosen from males and female equally as shown in Table 2 according to:

1. Male:

Eighth grade: 2200 / 7410 * 186 = 55

Ninth grade: 3650 / 7410 * 186 = 92

Tenth grade: 1560 / 7410 * 186 = 39

2. Female:

Eighth grade: 2750 / 8190 * 186 = 62

Ninth grade: 2846 / 8190 * 186 = 65

Tenth grade: 2594 / 8190 * 186 = 59

Table 2
The Sample of the Study of the Students of Both Genders in Salt Educational Directorate – Jordan

Class/gender	Males	Females
Eighth	55	62
Ninth	92	65
Tenth	39	59
Total	186	186

After that the researcher was select randomly one classes from each Semesters (eighth, ninth and tenth grades), then chosen the sample randomly from all students in each class.

2.3 Instrument

A five point likert scale was used with weighed Mean of 3.00 and above as the criteria cut off point for the level of agreement.

The survey comprised two sections. The first section consists of 52 items representing metacognitive Awareness Inventory (MAI; Schraw & Dennison, 1995). It has good reliability and validity for metacognition assessment. It effectively covers various aspects of metacognition in-depth and can be used to obtain scores for individual areas of metacognition, such as monitoring, planning, comprehension.

The second section is for Torrance test (Figure, B) to assess the creative thinking. Due to the efforts exerted by Torrance for nine sequential years of the research and study in Minnesota University, this test is used to measure the creative thinking ability, and fits all age groups starting from the kindergartens until the graduate stage. This test also can be applied individually or on groups.

The researcher made sure that the necessary time to apply the test is half an hour, distributed equally on the three activities (Construction Activity, Completion Activity, Circles Activity) as of (10) minutes for each activity. Torrance Test (B) for creative thinking.

2.4 Validity of Metacognitive Awareness Inventory

2.4.1 Content Validity

The researcher presented the inventory to ten referees from Balqa Applied University, who are specialized in measurement and evaluation, educational psychology, creation and giftedness and English language, to insure that the items are consistent with the topic of metacognitive, clarity of the items, accuracy and language formulation. Based on their suggestions and remarks of the referees, the Inventory finally approved.

2.4.2 Internal Consistency Validity

The internal consistency validity of the Inventory was insured by applying it on a pilot sample consisting of (60) students other than the sample of the study. Pearson relative factor was calculated between the degrees of each item of the Inventory, and total score of the Inventory, by using SPSS program as shown in Table 3.

Table 3
Correlation Factor of the Item with the Total Degree of the Inventory Items

Item No.	Correlation	Item No.	Correlation	Item No.	Correlation
1	0,88	19	0,82	37	0,61
2	0,88	20	0,41	38	0,82
3	0,52	21	0,68	39	0,67
4	0,86	22	0,86	40	0,55
5	0,52	23	0,69	41	0,82
6	0,81	23	0,80	42	0,72
7	0,80	25	0,64	43	0,80
8	0,86	26	0,58	44	0,85
9	0,83	27	0,46	45	0,48
10	0,81	28	0,38	46	0,65
11	0,68	29	0,32	47	0,80
12	0,42	30	0,38	48	0,64
13	0,45	31	0,86	49	0,58
14	0,44	32	0,52	50	0,46
15	0,43	33	0,81	51	0,38
16	0,82	34	0,80	52	0,46
17	0,81	35	0,42	-	-
18	0,82	36	0,45	-	-

From the above table, we notice that the relation factor of the item with the total grade of the Inventory was statistically significant for all items of the Inventory, and accordingly, the Inventory on its final version consisted of (52) item.

2.5 Reliability of Metacognitive Awareness Inventory

2.5.1 Test-Retest Reliability

To test for reliability, the questionnaire was distributed to 60 students selected from the population but outside of the main sample. The questionnaire was distributed again two

weeks later to the same sample under similar conditions. The coefficient of the study reached (0.93) which is acceptable for purpose of this study. The Chronbach alpha for internal consistency is (0.90).

2.5.2 Reliability of Torrance Test (Figure, B)

The Reliability of the Torrance test results insured by calculating the Reliability factor using (test-retest) method, with a time interval of two weeks on a pilot primary sample outside of the sample of the study (30 student) males and females from the tenth grade. The results indicated that the validity factor is good for all dimensions of the test on the three activities (0.53-0.91) as shown in Table 4.

Table 4
Reliability Factors of Torrance Test (Figure, B)

Activity	Skill	Reliability factor
	Originality	0,62
Activity 1	Elaboration	0,65
	Fluency	0,85
Activity 2	Flexibility	0,83
	Elaboration	0,80
	Originality	0,53
	Fluency	0,82
	Flexibility	0,91
Activity 3	Elaboration	0,80
	Originality	0,83

2.5.3 Correcting Torrance Test Figure (B) for Creative Thinking

The students' responses corrected based on the correction key that is prepared for the Test Figure (B), where the test consisted of three activities measuring four skills: fluency, (the ability to produce a large number of ideas), flexibility (the ability to produce a large variety of ideas, originality, (the ability to produce ideas that are unusual), and elaboration (the ability to develop, embellish, or fill out an idea). In the first activity (Picture Construction), participants were given a coloured curved shape, and asked to think of a picture or an object, which they can draw with the shape as a part. They encouraged thinking of as original, a picture or object as possible and keep adding new ideas to their first idea to make it tell as interesting and as exciting a story as they can. When they have completed their picture or object, they have to think up a name or title for it. In the second activity (Picture Completion), participants were given incomplete figures to make and to name an object or a picture. They encouraged creating some objects that no one else could think of. In the last activity (Lines), participants were given three pages of lines, which the subject is to use as a part of his or her picture. The pairs of straight lines should be the main part of whatever they make. The total score is obtained by averaging the standard scores from each of the subscales and adding the creative strengths ratings. The data were analyzed using SPSS statistical package.

2.5.4 Ethical Approval

Ethical approval was gained after meeting the requirements. Formal application to proceed my research was submitted to the Salt Educational Directorate in Jordan attached with information sheet about the research paper.

3. RESULTS

Results Related with the first Question: What are the levels of creative thinking of the students of the higher primary stage? To answer this question, the means, standard deviations and the relative importance of the levels of creative thinking were calculated for the students of higher primary stage, according to the gender variable. From Table 5 it is clear that the highest level of the students' levels of creative thinking for males was in the Elaboration dimension, where the means of the student's performance on this dimension was (68.20), followed by fluency (26.88), originality (25.98). However, the least performance of the students was on the flexibility dimension, where the mean of the student's performance was (21.90). As for the females students, the highest level of their creative thinking was on the elaboration dimension with (mean: 55.11), followed by Originality (21.59), then fluency (20.86), while the least performance of the female students was on the flexibility dimension (means: 18.18). Regarding the total grade on Torrance Test (B) for males and females, it was for the benefit of males than females, where the total grade for males was (141.949) while females achieved (115.83).

Table 5
Means, Standard Deviations and Relative Significance of the Students' Creative Thinking Levels as Per the Gender Variable Arranged from up to Down as Per the Means

Dimension rank	Dimension	Males		Dimension rank	Dimension	Females	
		Means	SD			Means	SD
1	Elaboration	68,20	15,65	1	Elaboration	55,11	11,85
2	Fluency	26,88	3,93	2	Originality	21,59	3,12
3	Originality	25,98	4,25	3	Fluency	20,86	2,93
4	Flexibility	21,90	2,82	4	Flexibility	18,18	2,39
Total degree	141,949	15,85			Total degree	115,83	13,18

Results Related with the Second Question: Do the creative thinking levels vary with the variation of the students' gender? To answer this question, results were analyzed using T-test. From Table 6, it becomes clear that the total means of the males' performance in the measurement of creative thinking was higher than females (141.949), while the mean of females' performance on the measurement of creative thinking was (115.83). In

addition, the same table shows significant statistical differences between the means of males and females' performance on the scale of creative thinking, for the benefit of males (T: 4.38), which statistically significant at ($\alpha \leq 0.05$), Whereas there were statistical significant differences between the males and females' performance on all dimensions of the test, for the benefit of males, except for flexibility (T: 1.63), which is not significant at ($\alpha \leq 0.05$).

Table 6
Results of T-test to Examine the Differences Between the Levels of Creative Thinking Based on the Gender Variable

Dimension	Gender	Means	SD	T. Value	Statistical Significance
Fluency	Males	26,88	3,93	49,55	* 0000
	Females	20,86	2,93		
Flexibility	Males	21,90	2,82	1,63	0,202
	Females	18,18	2,39		
Originality	Males	25,98	4,25	16,81	0000
	Females	20,86	2,93		
Elaboration	Males	68,20	15,65	16,26	* 0000
	Females	55,11	11,85		
Total	Males	141,949	15,85	4,38	*0,038
	Females	115,83	13,18		

* Statistically significant at ($\alpha = 0.05$)

Results of the third question: What are the metacognitive thinking levels of students of the higher primary stage? To answer this question, means, standard deviations and the relative importance were calculated for the metacognitive levels of thinking for the students of the higher primary stage according to the gender variable, as shown in table 7 the means of the answer on the items of the inventory ranges for male between (2.39-3.88), item (46) scored the highest mean of (3.88), while item (9) scored the minimum mean of (2.39). In addition (42) items have means more than (3), while the items that have lower mean (below than 3) was (10) items. On the other hand the means for female ranged between (2.10 - 3.56), item (42) reached the maximum mean of (3.56), and while item (47) reached the lowest mean of (2.10). In addition the total of items that their means was more than (3) are (33) items, while the items that have mean below than (3) was (19) items. The weighted means of the males' performance in the measurement of meatacognitive thinking was higher than females (3.391), while the means of females' performance on the measurement of creative thinking was (2.963). We can conclude that the levels of metacognitive thinking of the males' students are higher than females to some extent; and there are differences between the means of performance on the inventory of metacognitive thinking.

Table 7
Means & Standard Deviations for the Metacognitive Levels of Thinking for the Students According to Gender Variable

Item No.	Item	Male		Female	
		Means	SD	Means	SD
1	I ask myself periodically if I am meeting my goals.	3.18	1.215	2.19	1.015
2	I consider several alternatives to a problem before I answer.	3.44	1.347	2.99	1.247
3	I try to use strategies that have worked in the past.	3.40	1.340	3.04	1.040
4	I pace myself while learning in order to have enough time.	3.56	0.998	3.01	0.898
5	I understand my intellectual strengths and weaknesses.	3.84	0.898	3.02	0.666
6	I think about what I really need to learn before I begin a task.	3.62	1.331	3.26	1.031
7	I know how well I did once I finish a test.	2.87	1.389	2.33	1.089
8	I set specific goals before I begin a task.	2.97	1.356	2.66	1.002
9	I slow down when I encounter important information.	2.39	1.222	2.17	1.057
10	I know what kind of information is most important to learn.	3.23	1.002	3.11	1.256
11	I ask myself if I have considered all options when solving a problem.	2.87	1.184	2.11	1.232
12	I am good at organizing information.	2.77	1.089	2.55	1.222
13	I consciously focus my attention on important information.	3.33	1.070	3.22	1.223
14	I have a specific purpose for each strategy I use.	3.29	1.2790	3.09	1.324
15	I learn best when I know something about the topic.	3.04	1.838	2.88	1.333
16	I know what the teacher expects me to learn.	3.08	1.381	3.22	1.021
17	I am good at remembering information.	3.25	1.191	3.11	1.535
18	I use different learning strategies depending on the situation.	3.33	1.134	3.12	1.354
19	I ask myself if there was an easier way to do things after I finish a task.	3.73	0.955	3.22	0.856
20	I have control over how well I learn.	3.49	1.012	3.22	1.962
21	I periodically review to help me understand important relationships.	3.61	0.902	3.02	0.666
22	I ask myself questions about the material before I begin.	3.34	1.148	3.01	1.023
23	I think of several ways to solve a problem and chose the best one.	3.44	0.973	3.02	0.999
24	I summarize what I have learned after I finish.	3.77	0.438	3.33	0.567
25	I ask others for help when I don't understand something.	3.49	0.915	3.44	0.546
26	I can motivate myself to learn when I need to.	3.73	1.069	3.43	1.235
27	I am aware of what strategies I use when I study.	2.95	1.060	2.45	1.356
28	I find myself analyzing the usefulness of strategies while I study.	3.56	0.930	3.46	0.550
29	I use my intellectual strengths to compensate for my weaknesses.	3.67	1.139	3.47	1.365
30	I focus on the meaning and significance of new information.	3.66	1.122	3.08	1.453
31	I create my own examples to make information more meaningful.	3.55	1.173	3.05	1.267
32	I am a good judge of how well I understand something.	2.99	1.0930	2.55	1.896
33	I find myself using helpful learning strategies automatically.	3.77	0.994	3.28	0.886
34	I find myself pausing regularly to check my comprehension.	3.66	1.261	3.06	1.532

To be continued

Countiued

Item No.	Item	Means	SD	Means	SD
35	I know when each strategy I use will be most effective.	3.55	0.842	3.44	0.235
36	I ask myself how well I accomplished my goals once I've finished.	2.55	1.195	2.34	1.256
37	I draw pictures or diagrams to help me understand while learning.	3.77	1.206	3.47	1.123
38	I ask myself if I have considered all options after I solve a problem.	3.55	1.028	3.06	1.354
39	I try to translate new information into my own words.	2.66	1.015	2.17	1.564
40	I change strategies when I fail to understand.	3.55	1.247	3.44	1.236
41	I use the organizational structure of the text to help me learn.	3.60	1.040	3.40	1.356
42	I read instructions carefully before I begin a task.	3.66	0.898	3.56	0.996
43	I ask myself if what I am reading is related to what I already know.	3.84	0.898	3.02	0.987
44	I reevaluate my assumptions when I get confused.	3.62	1.031	3.01	1.123
45	I organize my time best to accomplish my goals.	2.99	1.089	2.66	1.235
46	I learn more when I am interested in the topic.	3.88	1.356	2.97	1.231
47	I try to break studying down into smaller steps.	3.09	1.057	2.10	1.468
48	I focus on overall meaning rather than specifics.	3.66	1.256	3.23	1.875
49	I ask myself questions about how well I am doing while I am learning something new.	3.87	1.184	2.87	1.852
50	I ask myself if I learned as much as I could have once I finished a task.	3.77	1.089	2.77	1.258
51	I stop and go back over new information that is not clear.	3.33	1.070	2.33	1.963
52	I stop and reread when I get confused.	3.55	1.279	3.09	1.367
Total		3.391	1.119	2.963	1.195

Results of the forth question: What are the different levels of metacognitive thinking among students according to gender? In order to answer this question, results analyzed using (T-test).

Table 8
Results of T-test for Examining the Differences Between the Levels of Metacognitive Based on the Gender Variable

Field	Type	Means	SD	T	Significance level
Metacognitive inventory	Male	3.391	1.119	5.03	*0.00
	Female	2.963	1.195		

* Statistically significant at (α = 0. 05).

From Table 8, it is clear that the total means of the males' performance on the inventory of metacognitive was higher for the benefit of females, where the males' mean was (3.391), while the mean of female performance on the inventory of metacognitive thinking was (2.963). The same table shows significant statistical differences between the means of male and female performance on the inventory of metacognitive thinking for the benefit of males (T value: 5.03), which statistically significant at ($\alpha \leq 0.05$). In addition, there were significant statistical differences between the performance of males and females for the benefit of males on all items of the inventory of metacognitive thinking. This means that the levels of metacognitive thinking of the male students are better than the females in general.

4. DISCUSSION

The results of the study for the first question showed that the highest level of the levels of creative thinking of the male students was on the elaboration dimension; the lowest performance of the students was on the flexibility dimension. However, as for females, the highest level of the levels of creative thinking for the female students was on the elaboration dimension; while the lowest level was on the flexibility dimension. As for the highest degree on Torrance Test (B) for males and females, males achieved higher than females, which indicate to the importance of the students' creative thinking. Bayard *et al.* (2008) confirmed the importance of creative thinking, especially the dimensions of originality and flexibility. However, this study differs from the study conducted by Bayard in the scientific method and the sample. The results of this study are congruent with the study of Russo & Christine (1987), which evaluated the students' level in the creative skills (fluency, originality and fluencies), as the results of the two studies showed that students posses higher levels of creative thinking, especially if they receive training on such skills.

The results of the second question showed that the overall means of the males' performance on the scale of creative thinking was higher than females, and the same table shows significant statistical differences between the means of the males and females performance on the scale of creative thinking for the benefit of males, with significant statistical differences between the performance of the males and females on all dimensions of the creative scale for the benefit of males, except for the dimension of flexibility. This shows that male students enjoy higher degrees than females on the creative test. This result is consistent with the result of the study conducted by (Mubeecel *et al.*, 1993), which showed that male students tend to use creative thinking skills than females. The results of this study is consistent with the study of Oglertree (1996), which showed that there are statistical significant differences between males and females for the benefit of males on the total degree of the scale.

This is a clear indicator that male students tend to use the creative thinking skills than females, while females tend to use the skills of analytical thinking, as shown in various studies. This might be attributed to the fact that intelligence can be deep and productive (creative), while the sterile intelligence is related with the weak ability to imagine creatively, or weakness in developing independent thinking and originality. These two features are interrelated and basic in the creativity process. The studies conducted on samples of males and females to examine the effect of social raising provided to both genders in developing such abilities, that females lack the independent thinking and originality, while males receive training on independency in an early age. In addition, father encourages their children's independent behavior, and consequently, they achieve and excel in the mental field more than females, who grow with the need for loyalty instead of the need for independency. Moreover, parents do not encourage the independent behavior of the girl, since it require rejected characteristics due to her social role and gender as a female. As a result, this prevents the development of necessary features for creativity with the girl. Hoffman (1973) explained the loyalty motive and social acceptance of females, that parents do not encourage independency in an early age. Such non-encouragement is related with some mental abilities, and so it might lead either to the development and growth or weakening such skills. However, the researcher knows that violating the habits and social traditions by the girl contradicts with the expectations of the society towards her role, which explains the low grades of the females compared with males in the dimension of originality in general, since it requires violating the customs, with a tendency to be free of the ordinary thinking frames (meaning: thinking openly), a tendency for risking in thinking, being open to various experiences, and violating values and social customs. Accordingly, the requirements of creative thinking, originality and flexibility contradicts with some kinds of the female's behavior and thinking, which characterized - as shown by many studies- with a tendency towards being conservative, rigidity in thinking, accepting ambiguity and non-affirmation. As a result, contradiction occurs – for the female- between the requirements of originality and the social role drawn by her.

The results of the third question showed that the levels of metacognitive thinking of the males students are higher than females to some extent; and there are differences between the means of performance on the inventory of metacognitive thinking., males had higher grades than females, all these means show that students posses the metacognitive skills. This result is consistent with the results of the study concluded by Macrindle & Christensen (1995), which indicated that students have the planning skills. The results of the fourth question showed significant statistical differences between the means of males and females on the metacognitive inventory for the benefit of males, with significant statistical differences between males and females for the benefit of males on all items of the metacognitive inventory. This indicates that the metacognitive skills thinking skills of male's students are better than females in general, which is an indicator that males enjoy more metacognitive skills than females. The reason for that can be attributed the males' ability to employ the metacognitive skills in the daily situations dues to the prevailing habits and traditions in Jordan, where the Islamic education and raising, and the woman does not interact with the social environment as the case with the man.

5. RECOMMENDATIONS

The researcher would recommend other researchers to conduct the following studies:

1- Construct programs to train students on the metacognitive skills and examine their effects on the students' achievement and creative thinking skills.

2- Study the relationship between the metacognitive skills and gender, academic specialization and the academic level of the university students.

3- Evaluation of the curriculum content of the metacognitive skills in all academic stages.

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