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Learning and Thinking Styles of Mentally Talented Students in Public and Private Schools

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Abstract The present study aimed at identifying the interaction effect of education type variable (public-private) and gender variable (male - female) on styles of thinking (syntactic - ideal - practical - analytical - realistic) and on learning styles (deep - surface - by operations) in the students at first stage secondary school of Saudi Arabia. The study determined the relationship between thinking styles and learning styles of mentally talented students in these schools. The sample consisted of (192) male and female students from the first stage secondary class students in Al-Kharj governorate schools, both private and public. A battery of tests was identified for this study which included Thinking Styles Test, translated and Arabicized by Magdy Abdel Karim; Successive Matrices Test for "Raven" translated and Arabicized by Ahmed Saleh, Learner Learning Styles Questionnaire (deep - superficial) translated and Arabicized by Ramadan Muhammad. The results of the study revealed that: there are statistically significant differences in the thinking styles (syntactic - ideal - practical - analytical - realistic) according to education styles variable (public- private) in favor of public education and similar results according to the gender variable (male - female) in favor of female. In learning styles, too, statistically significant differences were evident in (deep - surface - by operations) according to education type variable (public- private) in favor of public and gender variable (male - female) in favor of female. This study provides useful insights in understanding the differences between thinking styles and learning styles of mentally talented students and ordinary students. This study shall be an important guideline to help educational professionals in curriculum development and designing teaching methodology appropriate for mentally talented students.

Keywords Learning Styles, Thinking Styles, Mentally Talented Students, Public-Private, Gender

1. Introduction

Thinking has received a wide interest in most educational literature and practical application as well. The great expansion of knowledge has made thinking styles a vital and essential necessity in human life. An individual encounters a vast amount of information when he is involved in the thinking process. He chooses the information that suits his requirements and matches with the situation that he thinks about to solve it (Aziz, 2006). Thinking is an activity that an individual exerts to solve the problem facing him, regardless of the nature of activity (Jihad & Al-Huwaidi, 2003). Sternberg (2004) observes that individuals think differently. There are people who think about success in their life and career, while others do not; some people fail to study in life, while others study subjects like Law or Medicine or Accounting. Some good doctors who have degrees from excellent medical colleges but they fail with their patients. It is emphasized that what happens to us in life depends not on how well we think, but on how and what we think. Many people prefer a particular style of thinking and their preference depends much on the suitability and compatibility between their thinking style and their abilities and capabilities (Ahmed & Ahmed, 2002; Tong & Baslom, 2019; Abikar & Mirioglu, 2019).

Thinking is also one of educational goals that determine educational policies in Arab and foreign countries (Jihad &Al-Huwaidi, 2003). Theories have emerged concerning the preferred thinking styles among individuals, including Harrison and Pramson's theory, that categorize thinking styles into five kinds: syntactic, ideal, practical, analytical and realistic styles (Abdul Karim, 1995). Sternberg's theory of thinking styles also categorizes thinking styles as: legislative, executive, royal, Judicial, hierarchical, minority, local, internal, external, conservative, and progressive (Sternberg, 2004).

Likewise, learning is a process of acquiring assistance and satisfying needs and achieving goals, until it is utilized to solve problems. Learning also has different styles, and each student is distinguished by a learning style that differs from others (Ziyad, 1999). Learning styles are defined as the way individuals start focusing on processing and remembering new and hard information (Katame, 2000). Learning styles have multiple classifications, including Entwistle classification, Kolb classification, Dunn classification and so on. Learning occurs as a result of the interaction between learning environment that consists of curriculum, teaching styles, teachers, and teaching aids or learning activities on one hand, and the student's preparations and mental abilities on the other hand (Al-Saadi & Abdel-Hamid, 1997; Bankole-Minaflinou, 2019; Mishchenko, 2019; Yildirim & Kaya, 2019; Weda & Juanda, 2019). This is based on the fact that a classroom contains a number of students that have different mental abilities.

In Saudi Arabia, at secondary levels, the education in public and private schools generally comprise mathematics, science, literature, history, Arabic, and Islamic studies. A student after having completed intermediate school has the option to choose arts, sciences, commerce, or a particular vocation of his or her choice. Private secondary schools in Saudi Arabia follow the Saudi national educational curriculum while a few are affiliated to international certifications; for example, the British GCSE – or a French international school. The Saudi educational system has a larger vision of preparing students for practical aspects of life and simultaneously inculcating them the values of following the country’s religious, social and economic norms. While talking of mentally gifted or talented students, the Ministry of Education, Saudi Arabia has also set special provisions of special education for the differently abled.

Among the students, there are students who are mentally talented, and others are ordinary (medium intelligence). It is clear that learning and thinking are two processes that occupy the mind of those who are interested in psychology in general and cognitive psychology in particular, most people agree that thinking is an important goal of learning (Ahmed &Ahmed, 2002). The present study therefore aimed to identify learning styles and thinking styles of mentally talented students from public and private schools, a term that will be unequivocally used synonymous to mentally gifted students.

Problem Statement

It is noted that students in the schools of Saudi Arabia are different in intelligence, so we find students who are mentally talented (featured by high intelligence) and need only enrichment programs. They need specific teaching styles to carry out various activities; diversification in educational tools to further develop their mental abilities. On the other hand, ordinary students (featured with medium intelligence) also need certain teaching methods that fit their mental abilities. A difference in their thinking styles may be reflected in their learning styles. Therefore, teachers face these differences in classrooms, and may find it hard to teach and meet the different needs of students according to their mental abilities and intelligence. Therefore, teacher's knowledge of thinking styles of mentally talented and ordinary students and the difference between them and their learning styles may help them in overcoming these problems.

Alborzi & Ostovar (2006) indicate that there are differences between mentally talented students and ordinary students with respect to thinking styles. However, Ajwa (1998) concluded that there is no relationship between thinking styles and intelligence, the two criteria by which we differentiate between the mentally talented students and ordinary students. Shirly & Gray (1982) & Dellaval (1989) concluded that mentally talented students and ordinary students have different learning styles but which was inconsistent with Thornton & Haskell (2006) who emphasized that a difference existed between the learning styles.

Sternberg indicated that there are variables that affect thinking styles such as the type of institution-public or private; gender –male or female; and so on (Sternberg, 2004; Missaglia& Sanchez, 2020; Hernández & Prieto, 2020). Abdel Karim (1995) carried out a study and identified the differences between thinking styles of teachers (male & female) according to education type (public - private) on a sample of 650 teachers at different levels of education using Harrison and Pramson thinking style scale. Results revealed differences between male and female teachers in public and private schools and also a high level of analytical thinking in public education and of low level in private education teachers. Hassan (2003) & Ajwa (1998) carried out studies that showed no differences in male and female thinking styles, but results of Huang & Choa (1994), Abdel Fattah (1995), Ali and Ali (2000), Ibrahim (2002), Ahmed (2003), Musaad (2004), Yahya (2006) and Muhammad (2008) showed significant differences between male and female in thinking styles. As for the effect of gender on learning styles, studies of Holm (1996) Sanchez (1997), Harbor (1997) and Saber (1999) concluded that there were differences between male and

female in learning styles. On the other hand, studies of Abdul Majeed (1990) and Mahmoud (2006) have different results showing no differences in learning styles between males and females.

Concerning the relationship between learning styles and thinking styles, Zhang (2000) measured the relationship between learning styles and thinking styles among a sample of university students (N= 854) students on the Sternberg scale for thinking and learning styles. The study found a relationship between learning and thinking styles, specifying this relationship based on types: between superficial learning styles and the executive, governmental, liberal and hierarchical thinking styles. The study also found a significant relationship between deep learning style and the local, royal, conservative and executive thinking style. These results were consistent with Inweregbu & Jude (2006) who also showed a statistically significant correlation between the progressive style of thinking and the deep learning style. It also showed a relationship between the surface learning style and the legislative style of thinking.

A few research and literature gaps are evident in the previous research studies. In order to bridge these gaps, this current study was planned and designed. For instance, it has been felt that there is lack of studies on relationship between learning styles and thinking styles, particularly using the Harrison and Pramson method. No study has so far examined the relationship between Harrison and Pramson's thinking styles and deep and surface learning styles by operations. Similarly, a gap exists in studies between learning styles and thinking styles among students in public and private schools. This study therefore concentrated on studying learning styles as well as thinking styles among mentally talented students in public and private schools as well. Lastly, the research studies have also studied the differences in learning and thinking styles according to the gender variable. This study also followed this practice and included the gender variable to bring consistency in the research

The aforementioned study problems or research gaps are determined through the following questions in this study:

1. Are there statistically significant differences in the styles of thinking (syntactic - ideal - practical - analytical - realistic) according to education type variables (public- private) and gender (male - female)?
2. Are there statistically significant differences in learning styles (deep - surface - in operations) according to education type variables (public- private) and gender (male - female)?
3. Is there statistically significant correlation between thinking styles and learning styles of mentally talented students?

Study Terminology:

Various terms have been used in this study and their contextual meaning and application in this study is as follows:

i. Learning styles

Learning styles are relatively fixed styles that learners use to deal with information during the learning process (Muhammad, 1990). Its various types include—

- Surface learning: a learning style that is distinguished by the desire to remember some facts in a topic that are directly related to questions and are dependent on curricular instructions, motivation to learn and to achieve career aspirations.
- Deep Learning: a learning style distinguished by learners' interest in the subject their aim to understand its meaning in connection with previous knowledge and experiences while remaining self-motivated during the learning process.
- Learning styles by operations: a learning style that focuses on the learnt subject and the stored learning can be retrieved when needed by short and long term memory through the inbuilt processes of attention, short-term memory, and long-term memory.

ii. *Thinking styles*: these are intellectual styles that individuals prefer to deal with and apply depending upon the problems and the situation faced by them. These styles are classified as syntactic, ideal, practical, analytical, and realistic styles (Abdel Karim, 1995)

iii. *Mentally talented student*s: In this study, these are students whose grades are according to the percentile criteria for "Raven" IQ test scored at the percentile (90-95).

2. Literature Review

Learning styles

Learning styles vary according to attitudes of individuals, their characteristics, variety and theoretical frameworks. The first one to use the concept of learning and thinking styles was Ellis Torrance who linked thinking with creativity and later also became popular with his Torrance tests of creative thinking (Torrance,1974; Chang & Huuang, 2020). Learning style is considered as a synonymous term for processing information style (Katame, 2000; Joel, 2019; Abbas, Butt, Masood & Javaria, 2019; Aksoy & Sayali, 2019; Bai, et al., 2020; Espinosa-Espinosa et al., 2020). Al-Abdan (1993) defined it as "cognitive, emotional or physiological behavior that characterizes learners and acts as a relatively stable indicator of how learners perceive, interact with and respond to educational environment. James (1998) defined learning styles as a style that distinguishes an individual in his learning of various tasks, but it is more automated than

the cognitive strategies that are more optional. “Learning style is also defined as ‘a subjective tendency’ of the learner to prefer a specific learning pattern, either a sensory pattern by employing external perceptions or a mental pattern by employing inner perceptions using a method based on analysis, description, or conclusion in the treatment of events, phenomena, things, or a sensory pattern" (Ali, 2007).

There are many models that deal with learning styles. Entwistle (1998) described student learning through three learning approaches (styles): personal meaning orientation; reproducing orientation; and achieving high grades orientation. Entwistle realized that these attitudes were accompanied by different types of motivation and this led to learning processes variation. Another theory, the Antostel theory, interprets students learning based on connecting learning styles and preparation level which is represented by students understanding level of information or the strategy used by students in understanding and learning subjects (Mustafa, 2003; Chen et al., 2020).

The present study adopts Entwistle theory (model) for a few reasons: first, this model explains how students learn by connecting learning styles and processing level and how it is represented by students’ understanding level of acquiring information or learning a subject; secondly, Abu Sari (1995) and Willcoxson & Prosser (1996) have proved that there are overlapping relationships between Bigss theory and Entwistle theory and that these theories have similar contents and differ only in names; third, a tool derived from this theory can be applied easily and correctly to measure learning styles (surface, deep and achievement); last ,but not the least, there is a lack of studies related to Entwistle model of learning styles in relation to thinking styles in the Arab environment.

Thinking Styles

Al-Aser (2000) defined thinking styles as "distinctive styles of individuals that deal with the presented data." The present study adopt Harrison and Pramson's theory of thinking styles that has five categories: Synthesis, Ideal, Practical, Analytic and Real.

1. Synthesis thinking style: a style wherein an individual tends to merge and synthesize different things, especially ideas, and tries to find ways to produce a new and innovative composition by caring for contradictions, thus connecting them to new ideas to solve the problem in an integrative manner (Al-Bahi, 2003).
2. Ideal thinking style: a style wherein an individual tends to have a future direction in his thinking, holds broad views of things as he hears and agrees with others, and enjoys discussions with them about their problems and also expresses his feelings, values, and thoughts (Al-Bahy, 2003).
3. Practical thinking style: a style of an individual of practical thinking who experiments and uses his personal experiences to verify what is right or wrong and tends to search for a quick solution (Ibrahim, 2002).
4. Analytic thinking style: a style of an individual with analytical reasoning and one who faces problems with caution, detail, and rationality (Abdul Karim, 1995).
5. Real thinking style: a style wherein an individual relies on observation and experimentation and gets interested in tangible results and wants to complete tasks with steadiness and confidence (Ibrahim, 2002).

Mentally talented students:

Mentally talented students are defined in terms of their intelligence level. Lina Hulingwort believes that a mentally talented child is "one who learns with the ability and speed of superiority over the rest of the children in the field, such as music and painting, as well as in mechanical fields, or it may be in the field of abstracts and academic achievement" (Abu Samaha & et .al, 1992). Terman believes that a mentally talented child "is the one who obtains grades in Stanford test with intent, which places the child among the best 1% of the group he belongs to" (Mahmoud, 1999). Dunlap refers to the IQ levels that determine the mentally talented students but believes that restriction of the IQ factor to (130) or more is something of an exaggeration. It was emphasized to reduce this IQ factor to (120) as a limit for mental excellence and see the sufficiency.

Jihad & Al-Huwaidi (2003) classified mentally talented students into three classes: (i) excellent class: comprises students whose intelligence coefficients ranges from (120-125) to (135 - 140) if the Stanford Binet scale is applied to them; (ii) outstanding class: comprises students whose intelligence coefficients ranges from (135 - 140) to 170 if their intelligence is measured on the same scale; and (iii) genius class: comprises students whose intelligence coefficients are 170 or more. The American Encyclopedia also identified mentally talented child as "the child that falls between ratios of intelligence (125-135) if it relies on the proportions of intelligence as a basic criterion between mentally talented students and ordinary students." (Al-Khaldi, 2003).

The American Education Office adopted the definition that was approved by the American Senate in 1971: A mentally talented child is the one who provides evidence of high achievement or ability to do so in the following areas combined or alone: general mental ability, special academic readiness, creative or productive thinking, leadership ability, visual or performing arts, motor psychic ability (Amin, 2005). The present study considers mentally talented students as the ones whose scores are according to the percentile criteria for the "Raven" IQ test at the percentile (90-95). The study also uses this term “mentally talented” unequivocally synonymous to “mentally gifted” students.

Significance of the Study

The importance of the study lies in its variables of thinking styles and learning styles in the educational context. Research claims that these styles shape the students' future and their abilities. The study contributes to understanding the differences between the thinking styles and learning styles of mentally talented students and ordinary students. The rationale behind choosing mentally talented students in this study was to create a design and apply such teaching methods that are appropriate for thinking styles of mentally talented students and can be compared with ordinary students. The sampling of mentally talented students would also be useful for teachers who use modern teaching methods to stimulate students' thinking in classrooms, helping them to use different thinking styles, as well as learning styles that are appropriate for both types of students. Last, but not the least, it was the objective of this study to help educational professionals, particularly those in charge of developing curricula and preparing lessons, to design curricula of highest standard befitting from ordinary to mentally talented students.

The study would give useful insights to those professional particularly those in charge of developing curricula to focus on teaching thinking and its various styles in academic courses. This study would also assist in diversifying teaching and evaluation styles in order to match with students' different thinking styles, whether mentally talented students or ordinary students. It would develop their skills and thinking and learning styles so that they can deal with the different mental abilities that exist in classrooms. It can also help to prepare teacher training programs to develop their different thinking styles such as reviewing exam systems; devising questions that urge thinking, creativity, innovation, criticism, opinion; and encouraging desirable learning styles.

3. Methodology

Data analysis

The descriptive analysis methodology was used in this study to get a scientific and accurate description of the relationships between the research variables.

Study sample

- *Survey Study Sample*: This sample was randomly chosen from public and private secondary schools in Al-Kharj Governorate. It consisted of (100) male and female students.
- *Main study sample:* The first main sample (192) comprised 98 male and 94 female students from public and private secondary schools in Al-Kharj Governorate, with an average age of (16.23) years. The standard deviation of (0.743) was distributed as follows: public schools included (51 male & 45 female), private schools included (47 males & 49 females).

Study tools

Learning Styles

A battery of tests was used to measure the learning styles for this study. This battery aimed to measure learning style of operations by selectively measuring the processes involved in it like attention, short-term memory and long-term memory. This battery of tests by operations consisted of (15) tests prepared to measure these processes which are placed here as under:

First: Attention Tests:

These tests consisted of Selective Visual Attention, Selective Auditory Attention, and Connective Attention

Selective visual attention: There were three tasks to measure the selective attention

i. Photo task: It consisted of five tasks each one was a photo displayed on the computer using PowerPoint program. The student was required to look at them for 30 seconds. Then three photos were presented to him with an answer sheet to write the number of the previously displayed photo on it in a given time duration.

Correction method: A score was given for each photo, so the total score for each task was one degree and the total score for the task was 5 degrees.

Time: Determined experimentally.

ii. Letter task: It consisted of a sheet of (10) rows of letters and each row contained (10) letters and the student was asked to cross out the letters in each row.

Correction method: A score was given for each letter, so the total score for each row was (six) degrees and total score for the task was (60) degrees.

Time: Determined experimentally.

iii. Number task: It consisted of a sheet with (10) rows of numbers and each row contained (10) numbers. The student was required to cross out number (6) if it was preceded by an odd number and also cross out number (3) if preceded by an even number.

Correction method: A score was given for each number, so the total score for each row was (2) degrees and the total score for the task was (20) degrees.

Time: Determined experimentally.

Selective auditory attention: It consisted of two tasks to measure selective attention

i. Words task: It consisted of (5) tasks and in each task, the student listened to a specific word and determine the order of hearing this word in a group of (10) words that he would listens to after hearing this word. He

was asked to put a sign (√) in the place that indicated the order in which the word was heard until the end of the task.

Correction task: A score of (1) degree was given for each word, so total task score was (10) degrees.

Time: Determined experimentally.

ii. Numbers task: It consisted of (5) tasks. In each task the student listened to a specific number and to determine the order in which he heard this number within a group of ten numbers. After hearing a number, he was required to put a sign (√) in the place that indicated the order in which that number was heard and so on until the last task.

Correction method: A score of (1) degree was given for each word, so total task score was (10) degrees.

Time: Determined experimentally.

Connective Attention: It consisted of two tasks to measure Connective attention

iii. Photo task: It consisted of (6) questions and each question was a photo that the student was asked to look at well. After identifying the photo, he was required to establish its relationship in a group of (6) photos and place a sign (√) on the photo he would choose.

Correction method: A score of (1) degree was given for each word, so total task score was (10) degrees.

Time: Determined experimentally.

Words task: It consisted of (6) words in column (a). The student was asked to choose the word with which he would establish a relationship of three words in column (b).

Correction method: A score of (1) degree was given for each word, so total task score was (10) degrees.

Time: Determined experimentally.

Second: short-term memory tests:

These tests consisted of four tests:

i. Photo name recall test: It consisted of (10) familiar and unconnected photos that were presented to the student using data show program for a duration of (30) seconds (the time of display of ten photos). Then the student was asked to write the names of the photos that were presented in the show.

Correction method: A score of (1) degree was given for each photo whose name was remembered, and thus total score was (10) degrees.

Time: Determined experimentally.

ii. Audible word recall test: It consisted of (10) unconnected words that the student listened to during the (30) seconds (time of hearing the ten words) recorded on the computer and played by the examiner. An answer sheet was given to write the words he listened to.

Correction method: A score of (1) degree was given for every word he remembered and the total score was (10) degrees.

Time: Determined experimentally.

iii. The written word recall test: It consisted of (10) unconnected words that were presented to the student by using the data show program during (30) seconds, (total display time for ten-words). An answer sheet was given to write the words presented to him.

Correction method: A score of (1) degree was given for every word he remembered and total score was (10) degrees.

Time: Determined experimentally.

iv. Photo recognition test: It included (10) photos that were presented to the examiner on consecutive cards within (30) seconds. After displaying photos, the examiner presented a sheet of (20) photos (identification list) arranged in a different order. During the presentation itself, the student was asked to specify the photos that were shown to him.

Correction method: A score of (1) degree was given for each photo that was recognized bringing total score to (10) degrees.

Time: Determined experimentally.

Third: Long-term memory tests:

These tests consisted of four tests:

i. Photo name recall test: It consisted of (10) familiar and unconnected photos that were presented to the student in a row using data show for (30) seconds (the time of display of ten photos). The student was asked to name the photos shown to him.

Correction method: A score of (1) degree was given for each photo whose name was remembered, and thus the total score was (10) degrees.

Time: Determined experimentally.

ii. Audible word recall test: It consisted of (10) unconnected words that the student listened to in succession during (30) seconds -time of hearing ten words. The student was given an answer sheet the next day to write the words he had listened to.

Correction method: A score of (1) degree was given for every word he remembered and total score was (10) degrees.

Time: Determined experimentally.

iii. The written word recall test: It consisted of (10) unconnected words that were presented to the student in succession using the data show for (30) seconds (ten-word display time). The student was then given an answer sheet the next day to write the words presented to him.

Correction method: A score of (1) degree was given for every word he remembered, and total score was (10) degrees.

Time: Determined experimentally.

iv. Photo recognition test: It includes (10) photos that were presented to the student on consecutive cards

during (30) seconds. After examining the photos, he was given a sheet of (20) photos (identification list) arranged in a different order from the initial arrangement of photos in the show. He was asked to specify the photos that were shown to him.

Correction method: A score of (1) degree was given for each photo that it recognizes, total score to (10) degrees.

Time: Determined experimentally.

The validity of this battery of test was verified by presenting it to (10) specialists in the field of educational psychology. They were asked to express their views on the suitability of the photos and words in the battery in terms of linguistic formulation and dimensions to which the photos and words belong to. They were also asked to comment on the extent to which the scale was appropriate for application to the present study sample. They were asked to do any modification, deletion or addition in relation to the scale items. Their notes were taken in consideration to determine the ease and difficulty coefficient of the battery items, which were between (0.23 - 0.79). This indicated appropriateness of values of the coefficients of ease and difficulty for students' levels. The variation of the battery items occurred in the period between (0.17 - 0.25), which indicated that the values of the discrimination factors for the battery items were appropriate. The verification of the stability of the battery was also checked and the stability factor was Alpha Cronbach (0.780), which indicated that the battery had an acceptable stability factor.

Thinking Styles Scale:

Harrison & Bramson at California University prepared a Thinking Styles Scale in 1980 to measure prevailing and preferred thinking style of individuals facing daily life situations. They used a quantitative assessment method to assess the preference of individuals and their inclination to use one of the thinking styles. The test (Arabized version) consisted of (90) phrases distributed over (18) daily situations faced by individuals. There were five phrases in each situation, each phrase representing a solution to that situation. Each solution expressed one of the five thinking styles that the test measured. Test validity was measured by using the associated validity through calculating correlation factor between the students' scores on this scale. The Sternberg & Grigorenko scale (1993) acted as a benchmark to compare the scores of the scale used in this study. The author calculated stability factor of the test using Alpha Cronbach on exploratory sample and test scale stability factor was found to be (0.750) which indicated that the scale had an acceptable stability factor.

Raven Sequence Test:

A Raven Sequence Test was prepared in a successive matrix which consisted of (5) groups. Each group comprised (12) items and the total test items were (60). The five groups were graded for difficulty level, and the difficulty level was graded for each group. Fouad Abu Hatab (1977) had legalized this test in the Saudi environment on a sample of 4,932 students, (3,158 males and 1,774 females) of schools, institutes and universities. It was found that the test had a high degree of validity and stability. The author calculated test stability factor using Alpha Cronbach on the exploratory sample and test stability was (0.812) which indicated that the scale had an acceptable stability factor.

Learner's Learning Styles Questionnaire

A Learner's Learning Styles Questionnaire was borrowed from Entwistle & Ramsden (1983) which was translated in Arabic by Mahmoud Awadallah (1990). The translated version was also reformulated with expressions to suit behavioral situations directly related to real life situations in the Arabic context. The questionnaire consisted of (60) positions and every (20) position represented a separate measure for each of the three learning styles – deep, surface and strategic. Ramadan Muhammad (1990) had excluded (19) items from this questionnaire to form a scale of strategic style and was not taken into consideration in this study.

Based on what was mentioned by Intostel and Ramsden, each part of the questionnaire was a completely independent scale, different from other parts. It was possible to exclude any part - as long as it was independent - from the questionnaire. Therefore, the questionnaire consisted of (38) items to measure both deep and superficial styles. This version was used in the present study and its validity was calculated by measuring the correlation factor between the students' scores on this questionnaire and their grades on the questionnaire of "Biggs" learning styles that was translated by Ahmed (2003). This acted as a comparison benchmark for the present questionnaire of this study. The correlation factor was high (85,0), which was a high value and indicated the validity of the questionnaire. The author also calculated the questionnaire's stability factor by using Alpha Cronbach on the exploratory sample, and it was (0.770) which indicated that the scale had an acceptable stability factor.

4. Results

First question: *"Are there statistically significant differences in thinking styles (syntactic - ideal - practical - analytical - realistic) according to education variables type (public- private) and gender (male - female)?"*

"T" test was used to calculate the significance of the differences between the averages, illustrated in Table (1, 2). Table (1) shows that there are statistically significant differences in thinking styles (syntactic - ideal - practical - analytical - realistic) according to education type variable (public- private) in favor of public education. This means

that public schools outperform private schools in their use of thinking style. These results are consistent with (Abdel Karim, 1996).

Table 1. Results of "T" test to calculate the significance of the differences between the mean scores of the sample individuals in thinking styles (syntactic - ideal - practical - analytical - realistic) according to education variables type (public- private)

Style	Group	N	Mean	St.d	df	T
Syntactic	Public	96	21.03	1.77	190	7.98**
	Private	96	18.01	1.61		
Ideal	Public	96	20.58	1.38		6.25**
	Private	96	18.63	1.31		
Practical	Public	96	20.44	1.53		5.59**
	Private	96	18.02	1.97		
Analytical	Public	96	20.37	1.48		7.03**
	Private	96	18.06	1.64		
Realistic	Public	96	20.72	1.44		7.16**
	Private	96	17.99	1.60		

**Significant at 0. 01

The author attributes these results to student environments and student achievement methods. Students in private schools tend to summarize and avoid detailing (analytical) so that many teachers make notebooks that include exam questions. Students are also not interested in comparison to get new things (syntactic) and do not tend to look at future and think about goals (ideal thinking). The students only recall article summaries and are not interested in collecting information, whether related to the subject or on any external topics from different sources of knowledge either the library, or the Internet, or other diverse knowledge sources. Their knowledge is limited only to information scope that is given to them and thus narrows the scope of their thinking. Eventually, they prefer short, quick ways to solve their problems and not take up observation (realistic) nor do they tend to find new ways to make experimentation (practical).

However, in public schools, the teacher encourages students to collect information from various knowledge sources on the topic related to the subject (analytical). The teacher assigns them various activities (syntactic) related to the subject, and encourages them to observe (realistic). The teacher also adopts teaching styles such as discussion, brainstorming, respecting others' ideas, forming different points of view towards things, and listening to open discussion with others (ideal). The teacher also trains students to find new ways of doing things from available subjects (practical) and this is reflected in students' thinking styles.

These findings are consistent with Zayed (1990) who had a similar study and results showed that teaching and educational facilities in public schools are better in quality than in private schools; public schools have better teachers while those of private schools are deficient in skills and are untrained. It is observed that the teachers in private schools had qualifications below the required level in comparison with those in public schools. As a result, students in private schools are weak and get poor results in comparison with their peers in public schools. The National Research Center (1983) study also found similar results which showed that private schools suffer from a lack of teacher preparation, bad financial conditions, weaker level of students and a low percentage of results in general exams. Morkos (1983), too, found that private schools suffer a shortage of teaching staff in terms of quantity and quality, less teaching activities and problems related to infrastructure and equipment.

Table 2. Results of "T" test to calculate the significance of the differences between the mean scores of the sample individuals in thinking styles (syntactic - ideal - practical - analytical - realistic) according to the gender variable (male - female).

Style	Group	N	Mean	St.d	df	T
Syntactic	Male	98	19.34	1.61	190	6.78**
	Female	94	22.13	1.77		
Ideal	Male	98	17.98	1.31		5.63**
	Female	94	21.56	1.38		
Practical	Male	98	17.34	1.97		6.12**
	Female	94	21.22	1.53		
Analytical	Male	98	17.56	1.64		6.76**
	Female	94	21.46	1.48		
Realistic	Male	98	16.89	1.60		7.23**
	Female	94	20.98	1.44		

**Significant at 0.01

Table (2) shows that there are statistically significant differences in thinking styles (syntactic - ideal - practical - analytical - realistic) according to gender variable (male - female) in favor of females. This means that females outperform males in their use of (synthetic - ideal - analytical-practical-realistic) thinking styles. These results are consistent with Abdullah (2007) who found the superiority of females over males in thinking styles. These results are attributed to the fact that the socialization of females in society forces them to take care of individual needs and focus their attention on what is good for people and society. Females also have the ability to synthesize different ideas, communicate to build new and original ideas, completely different from what others do, and to connect seemingly opposing perspectives.

Second question: *"Are there statistically significant differences in learning styles (deep - surface - by operations) according to education type variables (public-private) and gender (male - female)?"*

"T" test was used to calculate the significance of the differences between means. The findings are illustrated in Table (3, 4). Table (3) shows that there are no statistically significant differences in learning styles (deep - surface - operations) according to education type variable (public-

private). The author attributes the absence of differences between public and private schools in deep, surface and by operations learning styles to the fact that private schools try to improve the level of teachers and teaching styles to match public schools and do succeed a little.

Table 3. Results of "T" test used to calculate the significance of the differences between the mean scores of the sample individuals, learning styles (deep - surface - by operations) according to of education type variable (public- private)

Style	Group	N	Mean	St.d	df	T
Deep	Public	96	43.03	1.75	190	1.02
	Private	96	43.01	1.59		
Surface	Public	96	38.58	1.33		1.05
	Private	96	38.63	1.29		
By operations	Public	96	34.44	1.49		0.95
	Private	96	34.31	1.78		

Table 4. Results of "T" test used to calculate the significance of the differences between the mean scores of the sample individuals, learning styles (deep - surface - operations) according to the gender variable (male - female)

Style	Group	N	Mean	St.d	df	T
Deep	Male	98	40.22	1.59	190	7.84**
	Female	94	43.67	1.75		
Surface	Male	98	36.12	1.29		6.14**
	Female	94	39.43	1.33		
By operations	Male	98	32.43	1.78		5.39**
	Female	94	35.46	1.49		

**Significant at 0.01

Table (4) shows that there are statistically significant differences in learning styles (deep - surface - by operations) according to gender variable (male - female) in favor of females. This means that females outperform males in their use of the (deep - surface - by operations) learning styles. These results are consistent with the findings of Saber (1999). These results are attributed to the fact that females in society tend to learn to achieve self - affirmation and obtain a high social position, as they tend to use different learning styles (deep - surface - by operations) according to the desirable goal of learning.

Third question: *"Is there a statistically significant correlation between thinking styles and learning styles among mentally talented students?"*

The author calculated the value of "Pearson's correlation factor between thinking styles and learning styles of mentally talented students as shown in Table (5). It is evident that there is no statistically significant correlation between Syntactic thinking style and the deep learning style as the correlation value between them was 0.059 which has non-statistically significant value. There is also a statistically significant positive correlation between ideal thinking style and deep learning style. There is also a statistically significant positive correlation between realistic thinking style and the deep learning style. The value of the correlation between them is 0.769 which is a statistically significant value at 0.01. The author attributes this to the fact that students whose motivation for learning is to understand the academic subject and connect it with their previous knowledge and experience (deep learning), They tend to observe things through senses and experiments (realistic).

Table 5. Results of the correlation factor between the thinking styles and learning styles of mentally talented students

Learning Styles	Thinking Styles	Pearson's correlation factor	Significant level
Deep	Syntactic	0.059	Not significant
	Ideal	0.420	0.01
	Practical	0.015	Not significant
	Analytical	0.649	0.01
	Realistic	0.769	0.01
Surface	Syntactic	- 0.238	0.05
	Ideal	- 0.654	0.01
	Practical	- 0.255	0.05
	Analytical	- 0.795	0.01
	Realistic	- 0.899	0.01
By operations	Syntactic	0.729	0.01
	Ideal	0.432	0.01
	Practical	0.779	0.01
	Analytical	0.049	Not significant
	Realistic	0.079	Not significant

Table (5) also reveals a statistically non-significant positive correlation between syntactic thinking style and *deep* learning style with a correlation value of 0.059. However, a statistically significant positive correlation between ideal thinking style and deep learning style with the correlation value of 0.420 and significant factor at 0.01. The author attributes this to the fact that students whose motivation for learning is understanding subjects and connecting it with previous knowledge and experience (deep learning) tend to look for future direction to achieve goals and form different points of view towards things (ideal). However, there is no statistically significant correlation between practical thinking style and deep learning styles. The value of the correlation between them is 0.015, which is a non-statistically significant value. There is a positive correlation relationship statistically significant between analytical thinking style and deep learning styles, correlation value between them is 0.649 which is a value of statistical significance at the level of 0.01. The author attributes this to the fact that students whose motivation for learning is understanding academic subjects and connecting it with previous knowledge and experiences (deep learning) tend to face problems carefully and in a systematic way and collecting the largest amount

of information about the problem to solve it (analytical).

Table (5) also presents a negative statistically significant correlation between syntactic thinking style and *surface* learning style. The correlation value between them is 0.238 which is a statistically significant value at 0.05. The author attributes this to students' motivation to study only the subjects that can be memorized in order to pass exams and get high marks (surface learning). This shows that students are not interested in the processes of comparison between things and connect contradictory ideas to get new ideas. There is also a statistically significant negative correlation between ideal thinking style and surface learning style which is 0.654 which is a statistically significant value at 0.01. The author attributes this to the fact that students whose motivation for learning is to memorize a subject and to pass exams (surface learning) do not like open conflict arguments (ideal). There is also a negative correlation statistically significant relationship between practical thinking style and surface learning style with a correlation value of 0.255, a statistical value at level of 0.05. The author attributes this to the fact that students whose motivation for learning is to memorize academic subject to pass the exam and only to get high marks (surface learning) do not tend to find new ways of doing things using available subjects (practical), and there is a negative correlation statistically significant between analytical thinking style and surface learning style, value correlation between them is 0.795 that is a statistically significant value at 0.01 . The author attributes this to the fact that students whose motivation for learning is to memorize learnt subjects to pass exams and get high marks only (surface learning) do not tend to pay attention to theories, or pay attention to details, and collecting the largest amount of information to solve the problem (analytic).

There is a negative correlation relationship statistically between the syntactic thinking style and learning *by operation* style. Students whose motivation for learning is to memorize learnt subjects to pass the exam and get only high marks (surface learning) do not tend to experiments and observe or think about correcting errors (learning by operation), and there is a positive correlation statistically significant between syntactic thinking style and the way of being aware of processes, correlation value between them is 0.729 that is a statistically significant value 0.01. The author attributes this to the fact that students that have learning style in operations are high and have the ability to synthesize different ideas to construct new ideas (syntactic thinking), and the existence of a correlation statistically significant positive between the ideal thinking style and learning style by operations. Correlation value between them is 0.432 that is a statistically significant value at 0.01. The author attributes this to the fact that students that have a high learning style by operations like to tend to the future direction to achieve goals. There is a also a different relationship to things (ideal), and a positive relationship statistically between the practical thinking style and learning style with deep processes. Correlation value between them is 0.779 that is a statistically significant value at 0.01. The author attributes this to the fact that students that have a learning style by operations are high They tend to experiment and excel in finding new ways of doing things from available subjects (practical), the absence of a statistically significant correlation between analytical thinking style and learning style by operations. Correlation value between them is 0.049 that is a statistically insignificant value, the absence of a correlation statistically significant between realistic thinking styles and learning style processes, correlation value is 0.079 which is statistically insignificant value.

Recommendations

Based on the results this study, the following recommendations are made:

1. The educationists and other academic staff responsible for curriculum development should be directed to pay attention to developing different thinking styles in order to generate interest and bring variety in teaching and evaluation styles.
2. It is also recommended to develop thinking and learning styles for student / pre-service teachers in colleges of education so that they can deal with students of different mental abilities in their classes.
3. It is also recommended to prepare programs to train teachers to develop different thinking styles, such as reviewing tests systems and include such questions that encourage developing skills for thinking, creativity, innovation and criticism.
4. It is recommended to further explore teachers thinking styles vis-à-vis the curriculum in order to determine the predominance of activities that lead to surface vs deep learning. This is absolutely significant since the same curriculum is delivered across private and public schools.

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