

## Motives for using critical thinking skills among gifted and non-gifted adolescent students

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### ABSTRACT

This study aimed to identify the motives for using critical thinking skills among gifted and non-gifted students. A measure of motivation for using critical thinking skills prepared by Valenzuela & et al., 2011 was used, which includes two dimensions: motivation for use based on expectation and value. The results showed that the level of motives for using critical thinking skills among gifted students was high, while the level was medium among non-gifted students. The results also indicated that there were statistically significant differences in the dimension of expectation and the total degree of the motives of use due to gender in favor of male students. The study also found statistically significant differences in the dimensions (expectation, value) and the total score of the motives of use due to the classification of students (gifted or non-gifted) in favor of gifted students. The study recommended teachers and curriculum developers to find strategies and activities that would raise the level of motivation for critical thinking among non-gifted and female students.

**Keywords:** Motivation, Critical Thinking, Expectation and Value, Gifted/ Non-gifted Students.

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### 1. Introduction

Dealing with the huge amount of information that the individual faces daily, and judging it in light of the cognitive and technical acceleration has become one of the necessary skills that an individual must possess in the third millennium, so students should be motivated and pushed to become more able to think critically through excellence in possessing and activating various skills such as distinguishing between truth and opinion, activating the role of discussions, using evidence, and addressing wrong ideas. Critical thinking is situation-sensitive, has high corrective controls and relies on certain criteria to reach judgments [1]. Critical thinking is described as a disciplined mental process during which an individual thinks skillfully and actively using the perception, perception, application, and evaluation of information collected or generated from his observations, experiences, reflections, or communications as evidence of belief and action [2]. A successful critical thinker is characterized by a set of characteristics, including: the ability to ask questions about the issue to be addressed, openness to new ideas, separation between emotional and logical thinking, the ability to know the shortcomings of the necessary information, interest in addressing new solutions to problems, verification of opinions, beliefs,

facts, evidence and proofs that underlie them, and making judgments based on data and facts, Evaluate statements and discussions, possess a sense of curiosity, interest in finding new solutions, attributing facts to their owners, and self-evaluation on an ongoing basis [3, 4, 5, 6]. In order for the individual to excel in the use of critical thinking, he must possess two main components, the cognitive component, which is represented by critical thinking skills, and the non-cognitive component, which is the motivation and mental habits necessary for implementation; To reach the desired results in an appropriate manner [4]. Having high degrees of motivation requires special motivation to use this hard thinking that requires greater perseverance and patience to reach the desired results. Critical thinking is a type of high-order thinking in which a number of simple thinking interact so that it becomes more complex, as well as interact with other higher types of thinking, such as creative, reflective, and metacognitive thinking, so that this interaction forms comprehensive thinking and is appropriate for performing higher mental tasks and solving complex problems [7]. A review of the psychological literature related to the abilities of gifted students shows that gifted students outperform non-gifted students in critical thinking skills; they possess a high ability to think critically, criticize stupid ideas, excel in the ability to predict sound decisions and outcomes, make decisions wisely, organize, actively pursue special interests, inhibit abstract objects, enjoy hypotheses, interest and research, and a high level of accuracy [8]. Critical thinking motivation is a special type of mental motivation because having critical thinking skills and strategies is essential for practicing it, but these skills and strategies are not effective in the absence of inclination and motivation [9]. The implementation and use of critical thinking depend on a set of skills and actions. Skills represent the cognitive component. Although most theorists admit that this is a complex construction integrated through mental motivations and habits, they do not explain further. We conducted a study in an attempt to explore the internal structure of the arrangements. We propose a possible hypothesis of the "motivational formation of conclusions", through which the action is formed by motivation and mental habits, although the contribution of each of these factors will change depending on the acquired practice in critical thinking. Thus, when a person is not practiced in critical thinking, motivation contributes more than mental habits. However, with practice and stimulating exercise of critical thinking skills, the impact of these mental habits increases. Regression analyses supported this hypothesis [10, 11, 12]. There are multiple perspectives for dealing with critical thinking motivations [13] by linking Atkinson and McClelland's theories of achievement motivation, as well as the Eccles and Wigfield models to measure achievement motivation according to Atkinson's perspective (expectation and value), and then applying this perspective to critical thinking as a motivation task. These researchers thought that motivation is due to individuals' choice and achievement of the tasks given them. The effort exerted by an individual while performing the task appears to be highly related to his expectations about success or failure in the task, as well as the value of success that will result from accomplishing it according to Atkinson's perspective on achievement motivation [14]. [13] pointed out that critical thinking is a goal of motivation (expectation and value); they therefore identified two main dimensions of motivation: expectation and value, according to the following:

*Expectancy:* It refers to the individual's prediction and belief about performing the task appropriately, and this idea differs from the idea of self-efficacy in Bandura and this difference comes from the fact that expectation refers to future competencies associated with performance, while Bandura focuses on self-efficacy on current competencies for performance.

*Value:* It represents the value of performance and includes four sub-components: gain, interest, cost, and interest.

- **Attainment:** It refers to the importance of the subject to perform the task well, and this component is related to the identity of the individual, and his ability to perform in the field given to him.
- **Utility:** It refers to the extent to which the task is feasible for the individual according to his future plans, in addition to evaluating this task effectively so that it serves him to achieve other goals.
- **Cost:** It refers to the extent to which the individual's decision is binding on him in performing the specified activity, to reach the possibility of doing other tasks, and this component shows the effort required of the individual to perform the tasks, in addition to its emotional cost.
- **Interest:** It refers to the pleasure emanating from the implementation of the task, when the task carries an internal value (pleasure) shows important psychological results that reflect positively on the performance of the individual and become part of his own component.

Considering the above, the motivation of critical thinking represents the expectations of the individual about his future performance of tasks that require critical thinking, in addition to the value of performing these tasks

represented by the benefits and gains of the individual, and the interests and costs it requires. The researcher defines the motivation of critical thinking in this study as the internal stimuli that direct the individual towards perseverance to carry out the tasks that require critical thinking, and oblige him to pay attention to these tasks, and scrutinize them well, and be careful tirelessly before issuing a judgment, in addition to challenging the difficulties he faces until the completion of these tasks to the fullest, and obtaining gains, and the benefits resulting from that. [15] observed that the difficulty of tasks facing individuals affects the interaction between ability and motivation, by changing the relationships between predictors and performance; when the task is less difficult, the ability may be less powerful in predicting performance than motivation, but when the task is more difficult, performance is likely to be greatly affected by the effects of the interaction between ability and motivation together to overcome the difficulty of this task. Critical thinking tasks are difficult. It requires the individual to employ his higher mental skills and high struggle to be accurate to complete them to the fullest. Motivation represents the driving force of the mental processes that the individual employs during the practice of critical thinking, because it affects the finding of attention, and includes directives that include the desire and familiarity of the field of thinking and recognition of its features, in addition to determining the energy necessary to invest time, making an effort to solve the contradictions of thinking, curiosity, which includes the desire to know, asking questions a lot, and the need to find balance in feelings, in order not to negatively affect knowledge, but rather maintain continuity in performance, and taking risks in order to reach a solution to these contradictions [16]. [17] found that there are effects of the home environment on the motivation of gifted students, including the presence of expert parents, parents' reliance on the behavior modification system, in addition to the contradiction of parents in providing home environments that support the development of their gifted children towards internal forms of motivation. Gifted students are distinguished from others by a set of characteristics in motivation such as: the ability to difficult work and perseverance to accomplish it, participation in all social activities at school, high effectiveness in attention, participation and discussion in the classroom, in addition to appealing for perfection and ambition to reach the ideal position [18]. They are also characterized by perseverance in pursuing their interests and questions, curiosity, criticism of self and others, and a tendency not to accept answers, judgments, or superficial expressions [19]. [20] found that gifted students outperform others during the basic stage in the following motivation factors: optimism, positive attitude towards school, idealism, and belonging. [21] also found that gifted students compared to non-gifted students. They recognize themselves as more competitive, are highly confident in their ability to control their school success or failure (control effort), and score high levels of self-efficacy. [22] found statistically significant differences between gifted students and others on the motivation scale in its dimensions (interest, challenge, choice and fun) in favor of the gifted. [23] found that the control center for the gifted was internal for the gifted, while it was external for the non-gifted. Kahyaoglu (2013) found that gifted students were better than others in motivation and learning styles. With regard to gender differences in motivation, [24] found statistically significant differences between the sexes in motivation, self-concept and attention in favor of males, and gender differences among gifted people were higher than among non-gifted people. [25] did not find gender differences in mental motivation. [26] indicated that gifted males were more psychologically and socially adapted than others, gifted males were more psychologically and socially adapted than gifted females who were distinguished by their high susceptibility to anxiety crises and social isolation, while non-gifted males and females did not differ in psychological and social adaptation. Several studies were conducted aimed at identifying critical thinking among gifted or non-gifted students, including the study of [27, 28] which revealed the low level of critical thinking among gifted students, and [29] found that high-achieving students outperformed the average achievement in the skills of deduction, induction, assumption and total score. [30] that the level of critical thinking of the gifted was high, and that gifted students outperformed others in critical thinking, and a positive relationship was found between critical thinking and both cognitive ability and achievement, while there were no statistically significant differences in critical thinking attributed to gender. The results of studies on gender differences in critical thinking have conflicted, with [28] finding that gifted males outperform females in deduction skill, females excel in assumptions, while the sexes did not differ in the overall score of critical thinking, as found by [27, 29, 30, 31] they found male students outperformed females in critical and logical thinking. Many studies have also been found in the educational literature that have dealt with the relationship between motivation and critical thinking, while studies that have dealt with the motivation of critical thinking as an independent concept of subject modernity are still rare. One such study is [32] on 758 community college and university students. Its results indicated a positive relationship between motivation and critical thinking, and self-orientation towards the goal was a positive predictor of critical thinking, and a positive relationship was found between critical thinking and both orientation towards internal goals, and mastery. [33] conducted a study on a sample of (587) university students, with the aim of verifying the factors that drive students to use

critical thinking, and the study found through the results of factor analysis that there are seven main factors: the search for truth, open-mindedness, analysis, regularity, confidence in the ability to use critical thinking, love of knowledge, and finally cognitive maturity. [34] dealt with the relationship between students' use of internal organization strategies for motivation (internal motivation) and critical thinking, and the sample consisted of (115) university students. The results revealed a positive correlation between internal regulation of motivation, critical thinking and expansion of thinking. [13] built the Critical Thinking Motivation Scale (CTMS) and verified its psychometric properties on a sample of (470) university students in Spain, and found a factorial construction of the scale, where the factor analysis produced two main factors: expectation and value, and factor analysis produced four sub-factors of the value dimension: gain, interest, cost, and interest, and good levels of stability of the scale and the ability to distinguish, in addition to the presence of coefficients. A positive and statistically significant correlation between the scores of the sample members on the scale and their scores on the scales of learning motivation and critical thinking. [35] study aimed to investigate the motivation for critical thinking among nursing students in Chile. The sample consisted of (478) nursing students. The results resulted in the fact that after the expectation he received the lowest score. A positive and substantial correlation was found between the cost dimension and the age variable. A predictive relationship of academic factors (problem-based learning, teacher motivation) was also found in critical thinking motivation.

It is clear from studies that have dealt with motivation and critical thinking that there are positive correlations between motivation and critical thinking. In general, and between the motivation of critical thinking and some variables such as academic factors and age.

### 1.1. Study problem

Critical thinking among gifted and non-gifted students is an essential pillar to reach solid facts based on evidence and evidence and address issues logically and analytically, and the importance of this thinking is highlighted among students in terms of addressing academic topics or general life topics, and this type of thinking is characterized by difficulty, and requires higher perseverance and more time and effort to reach the truth, so doing it requires high motivation, especially that may differ from other types of motivation. However, some students are impatient and rush to discuss alternatives and hypotheses before studying and thinking about the situation effectively, and they expect to get specific answers from the teacher instead of reaching them through analysis, criticism and serious thinking, so they fail to think critically not because they do not have his skills, but because there is insufficient motivation [7]. The concept of critical thinking motivation has recently emerged by [13] as it can be used to explain many aspects of critical thinking among gifted students and others, male and female, and to solve many contradictions in the results of some studies related to critical thinking among gifted students and others. The viewer of the results of the studies sees that gifted students outperform others in measures of motivation and critical thinking [22, 30], on the other hand, students who are not gifted, according to the opinion of their teachers in the educational field, may fail in many critical thinking tasks, so this study came to address the differences between gifted and non-gifted students in critical thinking motivation as an independent concept of both motivation and critical thinking. Specifically, this study came to answer the following questions:

- What is the level of motivation for critical thinking among gifted tenth grade students in Jordan?
- What is the level of critical thinking motivation among ungifted tenth grade students in Jordan?
- Are there statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the motivation of critical thinking due to gender and classification (gifted/ non-gifted) and the interaction between them among tenth grade students in Jordan?

This study aimed to identify the level of critical thinking motivation among gifted and non-gifted tenth grade students in Jordan.

### 1.2. Importance of the study

The theoretical importance of this study stems from its treatment of the topic of critical thinking motivation, which is very recent in the psychological and educational arena, as this study can provide Arab researchers interested in gifted and non-talented students with a theoretical starting point that helps them understand the concept of critical thinking motivation, and contributes to the production of other future researches. The practical importance of this study stems from many aspects, including the provision of a critical thinking motivation scale, which can be used along with critical thinking scales to verify the level of motivation of these students about critical thinking, and to identify their training and educational needs to stimulate this thinking,

which helps to find appropriate training activities that will raise the level of this motivation for students, which may contribute to the success of their training programs for critical thinking skills. The practical importance of the study also stems from its results, which can benefit teachers, educational counselors and those in charge of building and developing educational curricula for the tenth grade to provide opportunities, encouragement and the appropriate atmosphere that works to raise the levels of motivation of these students towards critical thinking and practice it with vigour and determination.

### 1.3. Terminological and procedural definitions

*Critical thinking motivation:* The internal stimuli that urge the individual to carry out critical thinking tasks, and oblige him to pay attention to these tasks, scrutinize and deliberate before making a judgment, and challenge the difficulties he faces until these tasks are completed to the fullest and obtain the gains and benefits resulting from that. Critical thinking motivation is defined procedurally in this study as the degree to which gifted and non-gifted students receive the Critical Thinking Motivation Scale (CTMS) with both expectation and value dimensions.

*Gifted students:* Tenth grade students enrolled in King Abdullah II Schools for Excellence in the governorates of Balqa, Irbid, Zarqa and Ajloun, who were selected for these schools based on the foundations set by the Jordanian Ministry of Education, and the most important of these foundations is the very high achievement of the previous grades, in addition to passing the admission tests for these schools according to intelligence and creativity tests, and when two students are equal in grades, the distinction of one of them in a certain talent is invoked.

*Non-gifted students:* Tenth grade male and female students enrolled in regular public schools in the cities of Salt, Irbid, Zarqa and Ajloun. They were not selected to enroll in gifted schools in Jordan, whether King Abdullah II Schools for Excellence, Jubilee, or Entrepreneurial Centers, and their achievement rates ranged between (50-79).

*Limitations of the study:* This study was limited to gifted tenth grade students enrolled in King Abdullah II Schools for Excellence and non-gifted students in the governorates of Balqa, Irbid, Zarqa and Ajloun. The study is also determined by the measure of motivation of critical thinking and its dimensions of value and expectation and its psychometric properties of sincerity and stability.

## 2. Method and procedure

### 2.1. Study population and sample

The study population included gifted and non-gifted tenth grade students in the cities of Irbid, Salt, Zarqa and Ajloun. A stratified random sample of gifted tenth grade students in King Abdullah II Schools was selected for excellence in these cities, where their number reached (157) gifted students (81 males, 76 females). As for the non-gifted students, they were selected by the random cluster sample method through the use of the lottery to choose two schools from each city, then choose one division for males from among the selected school divisions and another for females from each school, and the number of non-gifted students reached (201). The number of students in the gifted students ranged between (17-25) male and female students, while the non-gifted students ranged between (28-41) students.

### 2.2. Critical thinking motivation scale

The scale consists of (19) items that measure the motivation of two main areas: expectation and value, where the expectation field includes paragraphs (1-4), while the value area includes four sub-dimensions: interest, which is represented by paragraphs (5-8), and cost, which is represented by paragraphs (9-11), and the gain achieved is represented in paragraphs (12-19), while after attention is represented in paragraphs (16-19). The scale was developed in this study after translating its paragraphs from English into Arabic, and then verifying its validity and stability.

### 2.3. Scale truthfulness

The authors of [13] verified the validity of the scale in several ways: the veracity of the arbitrators, the veracity of the test, where he found high correlation coefficients between the scores on the scale and the scales of motivation and critical thinking, and the factor honesty, which produced two main factors: value and expectation. In the current study, the validity of the scale was confirmed in the manner of the sincerity of the arbitrators, by presenting it to (10) arbitrators specialized in educational psychology, measurement and

evaluation at Al-Balqa Applied University, in order to express their opinions on the appropriateness of its paragraphs to the phenomenon, dimensions, age stage, and linguistic integrity, and the arbitrators agreed on the validity of all paragraphs and dimensions, while some amendments were made in the linguistic formulation of some paragraphs of the scale based on the opinion of the arbitrators. The validity of the internal consistency of the paragraphs was verified after applying it to an exploratory sample consisting of (53) gifted and talented tenth grade students, then calculating Pearson's correlation coefficients between their scores on the paragraphs and their grades on the total score, and Table 1 shows the results.

Table 1. Pearson's correlation coefficients between scores on scale paragraphs and the total score\*\*

Paragra ph	Correlati on coefficie nt	Paragra ph	Correlati on coefficie nt	Paragra ph	Correlati on coefficie nt	Paragra ph	Correlati on coefficie nt	Paragra ph	Correlati on coefficie nt
1	.37	5	.56	9	.37	13	.40	17	.44
2	.47	6	.58	10	.53	14	.48	18	.43
3	.31	7	.54	11	.49	15	.51	19	.51
4	.42	8	.47	12	.46	16	.31		

\*\*All values are statistically significant at significance level ( $\alpha = .01$ )

It is clear from Table (1) that the values of the correlation coefficients between the scores of the members of the survey sample on each paragraph of the scale and the total degree ranged between (0.31-0.58) and all these values were statistically significant at the level of significance ( $\alpha = 0.01$ ), which indicates the validity of the paragraphs to measure the motivation of critical thinking and their suitability for the purposes of this study.

#### 2.4. Scale stability

The authors of [13] ensured that the stability coefficient of the original scale was calculated by internal consistency by calculating the Cronbach alpha equation on a sample of (470) university students, and the scale stability coefficients on dimensions ranged between (0.73-0.85). In the present study, the stability coefficient of the scale was calculated by two methods: the Test-Retest method and the internal consistency method. Where the stability coefficient was calculated after applying the scale to the same honesty sample and with a difference of two weeks between the first and second applications, and the repetition stability coefficient for the value dimension was (0.89), and for the expectation dimension (0.76), and the repetition stability coefficient for the total scale was (0.81). The value of Cronbach alpha for the first application was (0.83) for the value dimension, and (0.80) for the expectation dimension, and (0.86) for the overall scale. These stability coefficients are high and acceptable for the purposes of the present study.

#### 2.5. Correction of the scale

The scale consists of (19) paragraphs followed by a five-point scale, and is corrected as follows: always (5 degrees), a lot (4 degrees), sometimes (3 degrees), a little (two degrees), never (one degree), knowing that all paragraphs are positive, and to judge the levels of motivation of critical thinking, the following equation has been calculated to measure the range between categories:

Range = (upper limit (5) – minimum (1))/ number of levels (3). Thus, the following criteria can be used: low (1-2.33), medium (2.34-3.67), and high (3.68-5).

#### 2.6. Study procedure

- Randomly selecting the study sample from gifted and non-gifted students in the cities of Irbid, Salt, Zarqa and Ajloun.

- Developing the scale of critical thinking motivation for the study sample and extracting the indications of its honesty and stability through the sincerity of the arbitrators, the sincerity of the construction and the stability of the repetition on an exploratory sample.
- The application of the scale to the study sample by the same researcher and (4) assistants from graduate students, where unified instructions were given to the students, in addition to determining the application time by (15) minutes.

### 3. The results of the study

- *Results of the first question: What is the level of motivation of critical thinking among gifted students?*

To answer this question, the arithmetic averages and standard deviations of the performance of gifted students were calculated on the paragraphs of the critical thinking motivation scale, and Table 2 shows the results.

Table 2. Level of Critical Thinking Motivation of Gifted Students Based on Arithmetic Averages and Standard Deviations

Dimension	Arithmetic mean	Standard deviation	Level
Value	4.04	0.38	High
Expectation	4.00	0.60	High
Total	4.02	0.40	High

It is clear from Table 2 that the levels of motivation of critical thinking and then the value and expectation of gifted tenth grade students were high, and it is clear that the dimension of value came higher than the dimension of expectation among gifted students.

- *Results of the second question: What is the level of motivation for critical thinking among non-gifted students?*

To answer this question, the arithmetic averages and standard deviations of the performance of non-gifted students were calculated on the paragraphs of the critical thinking motivation scale, and the level of critical thinking motivation was judged, and Table 3 shows the results.

Table 3. Level of thinking motivation of non-gifted students based on arithmetic mean and standard deviations

Dimension	Arithmetic mean	Standard deviation	Level
Value	3.59	0.52	Medium
Expectation	3.45	0.61	Medium
Total	3.52	0.48	Medium

It is clear from Table 3 that the levels of motivation of the total critical thinking, and then the value and expectation of the tenth-grade non-gifted students, were average, and it is clear that the dimension of value came higher than the dimension of expectation among non-gifted students.

- *The results of the third question: Are there statistically significant differences at the level of significance ( $\alpha = 0.05$ ) in the motivation of critical thinking among tenth grade students due to gender and classification (gifted, not gifted)?*

To answer this question, the arithmetic averages and standard deviations of the performance of the study sample were calculated on the critical thinking motivation scale according to the gender and classification variables, and Table 4 shows the results.

Table 4. Arithmetic Averages and Standard Deviations of the Performance of the Study Sample on the Critical Thinking Motivation Scale According to the Gender and Classification Variables (Gifted, Untalented)

Dimension	classification	Number	Talented		Untalented		Total	
			Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation
Expectation	males	157	4.15	0.38	3.66	0.41	3.89	0.46
	females	201	3.93	0.36	3.54	0.60	3.70	0.55
	Total	358	4.05	0.39	3.60	0.52	3.79	0.52
Value	males	157	4.06	0.57	3.48	0.48	3.76	0.60
	females	201	3.92	0.60	3.42	0.69	3.63	0.70
	Total	358	4.00	0.58	3.45	0.61	3.69	0.66
Total	males	157	4.11	0.39	3.57	0.35	3.82	0.46
	females	201	3.93	0.39	3.48	0.57	3.66	0.55
	Total	358	4.02	0.40	3.52	0.48	3.74	0.51

It is clear from Table 4 that there are apparent differences between the arithmetic averages of gifted and non-gifted students in the motivation of critical thinking at the level of dimensions and the total score, where the total arithmetic mean for males was (3.82) with a standard deviation of (0.46), which is higher than for females, which amounted to (3.66) with a standard deviation of (0.51), as shown in Table (3). ) The existence of apparent differences between the averages of gifted and non-gifted arithmetic in the motivation of critical thinking, where the total arithmetic mean of the gifted (4.02) with a standard deviation of (0.4), while the arithmetic mean of the non-gifted (3.52) with a standard deviation (0.48), and to verify the significance of the differences between these averages, multiple binary variance analysis was performed by the Hotling Woolkes-Lambda method, and the analysis of binary variance, and Table 5 shows the results.

Table 5. Analysis of multiple binary variance of critical thinking motivation in its two dimensions expectation and value according to gender variables and student classification

source	Dimension	Sum of squares	Degrees of freedom	Average squares	P value	Significance level
<b>Sex</b> Hotling Treats = .033 Significance=.003**	Expectation	2.463	1	2.463	11.616	** .001
	Value	.929	1	.929	2.617	.107
<b>Category</b> (talented, not talented) Hotling Treats = .309 Significance=.000**	Expectation	17.119	1	17.119	80.724	** .000
	Value	25.943	1	25.943	73.053	** .000
<b>Interaction</b> Volks-lambda = .997 Significance=. 581	Expectation	.224	1	.224	1.055	.305
	Value	.124	1	.124	.349	.555
<b>Error</b>	Expectation	75.072	354	.212		
	Value	125.714	354	.355		
<b>Total</b>	Expectation	95.523	357			
	Value	153.273	357			

\* \* Statistically significant at significance level ( $\alpha = .01$ )



It is clear from Table 5 that there are statistically significant differences at the level of significance ( $\alpha = 0.01$ ) in the expectation dimension attributable to sex, where the calculated P value was (11.616) at the level of significance (.001) and it is clear from Table 3 that the differences were in favor of males, while there were no statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the value dimension attributed to sex, where the calculated P value reached (2.617) with a significance level (.107). It is clear from Table (5) that there are statistically significant differences at the level of significance ( $\alpha = 0.01$ ) in the dimensions of expectation and value attributed to the classification of gifted and non-gifted students, where the value of P calculated for the expectation dimension was (80.724) with a significance level of (.000), and the value of P calculated for the value dimension reached (73.053) with a significance level of (.000) and it is clear from Table (3) that the differences were in favor of the gifted. The results in Table (5) indicate that there were no statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the two dimensions of expectation. The value is attributable to the interaction between sex and classification. Where the value of P calculated for the prediction dimension was (1.055) with a significance level of (0.305), the calculated P value for the expectation dimension was (.3490) with a significance level of (.555). To verify the significance of the differences in the overall degree of critical thinking motivation according to the gender and classification variables, a binary variance analysis was performed, and Table 6 shows the results.

Table 6. Analysis of the binary variance of the motivation of the total critical thinking according to the variables of gender and student classification

source	Total squares	Degrees Freedom	Medium squares	value P	level Significance
Sex	1.605	1	1.605	8.122	** .005
classification	21.302	1	21.302	107.825	** .000
Interaction	.170	1	.170	.861	.354
Error	69.938	354	.198		
Total	93.015	357			

\* \* Statistically significant at significance level ( $\alpha = .01$ )

It is clear from Table 6 that there are statistically significant differences at the level of significance ( $\alpha = 0.01$ ) in the overall critical thinking motivation attributed to gender, where the calculated value of P was (8.122) with a significance level of (.005) and it is clear from Table (3) that the differences were in favor of male students, and the results in Table (6) showed that there were statistically significant differences at the significance level ( $\alpha = .01$ ). ) in the motivation of critical thinking is due to the classification of gifted and non-gifted students, where the calculated value of P (107.825) with a level of significance (.000), and it is clear from Table (3) that the differences were in favor of gifted students. With regard to interaction, the results in the table indicate that there were no statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the overall critical thinking motivation attributable to the interaction between sex and classification. Where the calculated P value was (.861) with a significance level of (.354).

#### 4. Discussion of the results

The results of the first question indicated that the level of motivation of critical thinking was high among gifted students, and this result is logical from the perspective of the characteristics of the gifted in general motivation and aspects of thinking, where gifted students are characterized by perseverance, challenge and curiosity, and are distinguished by excellence in critical thinking skills. This result may be attributed to the methods of teaching gifted tenth grade teachers in King Abdullah II Schools for excellence and continuous encouragement for these students, which may contribute to enhancing their confidence in their abilities to think effectively, and increase their level of motivation towards thinking in general and critical thinking in particular. The continuous encouragement of parents and teachers for the gifted in the tenth grade can also play a role in raising the level of motivation in critical thinking, as [17] found that parents' support for their gifted son at home increases internal forms of academic motivation. The presence of gifted students in schools of excellence with peers who excel in mental and academic abilities may motivate them to activate their critical thinking skills and motivation better, as [36] indicates that integration into high-performance learning communities enhances the ability of gifted people to discuss and clarify their own ideas, listen to the ideas of others, and at the same time become more aware of the different points of view, information, and knowledge of their colleagues, and this leads them

to learn that genius in a subject means more hard work and perseverance to reach the desired goal. This finding is consistent with the findings of some studies on critical thinking and motivation that have found that gifted students are distinguished by high motivation as studies [ 20, 21, 22, 37,38], and high abilities in critical thinking skills such as the Cutler study [30]. This finding was consistent with the [35] study, which found that after the expectation, he received the lowest score in nursing students who (not classified as gifted). This finding was not consistent with the findings of [27, 28] that the level of critical thinking was low among gifted students.

The results of the second question indicated that the level of motivation of critical thinking among non-gifted students was average, and this result may be attributed to the teaching methods that students undergo in regular schools, which do not focus much on critical thinking among non-gifted students nor on motivating them towards this thinking, but the greatest focus is on motivating students to memorize and retrieve the information they study or read in textbooks, and this is evident in the exam questions that teachers set for students. It is noticeable that most of them focus on memorization, not on logical and analytical mental treatments or assumptions, arguments, deduction and reasoning, although some of their indicators are in the skill of interpretation, which is often retrieved from the book and not from the logical treatment of the subject. This is in addition to another reason that may be complementary to the role of exams and teaching methods, which is the nature of teachers' questions addressed to non-gifted students in the classroom, which may be direct questions that do not stimulate the motivation of critical thinking among these students, whether in terms of their interest in critical thinking, or the sense of the value of doing this thinking.

Critical thinking also requires appropriate activities for its development, but these activities do not exist as required in regular schools, so how are students motivated to do this thinking and the extent to which it is activated by teachers in the classroom is still little, but it is noted that some students in regular schools when they enter into a logical discussion about a particular issue with some teachers in the classroom are suppressed and described as "philosophical" or that they want to waste class time.

The results of the third question indicated that there were statistically significant differences in the total degree of critical thinking motivation and expectation dimension among gifted and non-gifted tenth grade students attributed to gender and in favor of male students, while there were no statistically significant differences in the value dimension. The superiority of males over females in critical thinking motivation can be explained by the fact that males have better abilities than females to think logically and mathematically to which critical thinking is subject, and it has been found in the educational literature that males They excel in logical mathematical skills on the left side of the brain while females excel in language skills on the left side of the brain, and this superiority may motivate students to prefer to use thinking associated with these skills and expect to obtain positive results associated with it, as many studies indicate that males outperform females Logical thinking, including the study of [31]. The result may be attributed to the fact that the fear of failing to perform critical thinking tasks in females more than males, aspects related to critical thinking motivation may be related to the characteristics of the individual himself personal and emotional, self-confidence and the ability to address the situation with mental focus away from the distractions of excess fear and anxiety, in addition to the ability to think critically itself, and male students may be more able to adapt personally and socially to aspects of the surrounding environment and the thinking process, which may help them to motivate and activate Their critical thinking skills based on their positive expectations associated with these tasks.

This finding was consistent with a number of studies that found males superior to females in motivation or critical thinking, such as those of [24, 29], while this finding differed with studies of [27, 28, 30, 39], Which found that motivation or critical thinking does not differ according to gender.

The results of the third question also indicated the superiority of gifted students over the non-gifted in the motivation of critical thinking, and this result is logical if it is viewed from the perspective of the superiority of gifted students over the ungifted, whether in internal motivation or in critical thinking, as [9] indicated that students do not succeed in performing critical thinking tasks if they do not have the appropriate motivation to do so. Some studies have also found positive relationships between motivation and critical thinking, such as [31, 32], which indicates that excellence in one has a positive role in the superiority of the other, and since gifted students excel in motivation and critical thinking compared to non-gifted according to [8], this leads to the conclusion that excellence in motivation and critical thinking will lead to superiority in the motivation of critical thinking. Also, [33] found that there are a number of factors that drive students to use critical thinking, such as the search for truth, open-mindedness, analysis, regularity, confidence in the ability to use critical thinking, love of knowledge, and finally cognitive maturity.

This result can be attributed to the nature of critical thinking tasks, which are difficult to employ higher mental abilities, as many researchers and scientists such as Newman and Lipman classified critical thinking as a type of complex thinking or high-ranking thinking that requires more effort, perseverance and determination to perform it properly, and the components of motivation and ability may interact positively to perform critical thinking tasks in individuals, [15] pointed out, in this regard that performance on a difficult task is greatly affected by the interaction between ability and motivation in contrast to an easy task, and thinking tasks can generate critical thinking in gifted people determination, perseverance and greater interest even if they are difficult; because they start from their positive expectations about this type of thinking, in addition to the value they will gain from doing it [19]. Unlike non-gifted students, critical thinking tasks may have a negative impact on them because they test their abilities and cannot perform as required, which may negatively affect their motivation and interest, even if their completion of the task entails high value.

This study agreed with several studies that found the superiority of gifted people compared to non-gifted in motivation, such as [20, 21, 22, 38, 23]. The study also agreed with studies that found the superiority of gifted and talented people over others in critical thinking, such as the study of [29,30]. Al-Jassim and Al-Hamdan (2012), Kettler (2012).

## 5. Conclusions and recommendations

It can be concluded from the results of the study, which indicated the high level of critical thinking motivation among gifted students and their superiority over non-gifted students, that this motivation lies behind the superiority of gifted students in critical thinking skills over non-gifted students, in addition to other factors such as excellence in mental abilities, but what is interesting in this study is that it revealed one of the special factors that characterize gifted students, and thus this study can add a new characteristic for gifted students, which is thinking motivation Critic elevated. It can be concluded from the results that indicated that male students outperform females in critical thinking motivation, that females need more support and encouragement from teachers to enhance their confidence in their abilities to perform critical thinking tasks, in addition to working to reduce the tensions that accompany their performance of such tasks. Based on the above, the study recommends the following:

- Work on building school curricula that raise the level of critical thinking motivation among students in regular schools.
- Work on the implementation of training programs and classroom activities that will raise the level of motivation of critical thinking.
- Providing the appropriate atmosphere and ways to deal with it to raise the motivation of critical thinking among female students.
- Conducting more studies on critical thinking motivation, such as: the effectiveness of thinking programs in developing critical thinking motivation, the relationship between critical thinking motivation, achievement and the ability to think critically, and the development of critical thinking motivation among students at different stages.

### Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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### Author contribution

- Ahmad Mohammad Alzoubi: Conceptualization, Methodology, Data collection, Writing - original draft.
- Najeh Rajeh Alsalhi: Conceptualization, Methodology, Data analysis, Writing - review & editing.
- Rasha Mohamed Abdelrahman: Data collection, Literature review, Writing - review & editing.
- Bushra Ahmed Alakashee: Data analysis, Visualization, Writing - review & editing.
- Fakir Al Gharaibeh: Supervision, Project administration, Funding acquisition.

- Abdellateef Alqawasmi: Supervision, Project administration, Resources.

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