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LEVEL SCIENTIFIC THINKING AND MENTAL CAPACITY AND THEIR RELATIONSHIP TO THE COGNITIVE ACHIEVEMENT OF STUDENTS IN THE DEPARTMENT OF LIFE SCIENCES / COLLEGE OF EDUCATION FOR PURE SCIENCES IN CHEMISTRY

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Abstract
The current research aims to the to get to know on level scientific thinking and mental capacity and their relationship to the cognitive achievement of students in the Department of Life Sciences / College of Education for Pure Sciences in Chemistry. I reached the research sample(55) male and female students From students of the Department of Life Sciences at the College of Education for Pure Sciences/University of Wasit for the academic year2023-2024And he rose The two researchers Building paragraphs The standards, then Be Scientific thinking scale from (20) Poverty While the mental capacity scale consists of (25) items AndFor each paragraph five Alternatives, may It was completed making sure from Properties Psychometrics of performance fig To be ready to apply, And Dish The two researchers Descriptive approach to reach Information it requires search, and after performing statistical treatments using the righty Statistics (Spss),The research reached the following results:
-The presence of scientific thinking at an average rate among students.
-The students possess mental capacity, but at an average rate.
-There is a good percentage of achievement among students.
-There is a positive, moderate correlation between scientific thinking and students' achievement when comparing them, and this indicates the existence of a positive, statistically significant relationship.
-Medium positive correlation between...Mental capacity Students' achievement when compared between them indicates a positive, statistically significant relationship.
In light of the above results Y guardian the two researchers with:
1. Working to direct educational institutions to pay attention to critical thinking scientific and capacity the mentality of students in order to advance the educational and learning process.
2. Holding training courses for teachers in educational institutions to raise their awareness of different thinking methods, including critical thinking scientific How to practice these thinking skills in teaching methods and various educational activities.
3. Working to hold workshops to train students to practice thinking skills scientific And capacity mentality by providing educational and guidance programs.
4. Activating the role of female counselors in universities, especially in the field of seeking academic assistance.
Y The researcher suggests that What's coming?
1. Conduct further studies and research for the purpose of evaluating the level of...capacity Mentality and thinking scientific For students of different academic levels.
2. Conduct a study aimed at identifying the causes of difficulties in learning to think scientific and its prevalence in our society.
3. Conduct other studies on the capacity Mentality, but with other variables (personality types, psychological compatibility).

key words /scientific thinking-Mental capacity-Cognitive achievement

FIRST: THE RESEARCH PROBLEM:

Thinking is considered one of the important basic elements in an individual's life. It is a series of mental activities that the brain performs when it is exposed to a specific stimulus through one or more of the five senses. Through it, solutions to problems are found and many matters are controlled and controlled. The great blessings that God Almighty has bestowed on human beings and distinguish them from other living creatures. The Holy Qur'an called and urged man to think and contemplate the universe, as it praised those who think and contemplate about the creation of the heavens and the earth. Thinking contemplatively is the culmination of the mental processes, which is necessary to Educators pay attention to it and develop it in the individual learner, as it helps him plan in advance for any action he undertakes and follow the appropriate steps to reach the correct decision. The more the individual thinks contemplatively, the more this leads to arriving at a convincing and successful solution. People with scientific thinking are usually able to work and think well and correctly because they possess them. Flexibility and high mental fitness help them understand relationships, make summaries, and benefit from all information for the purpose of overcoming and overcoming the difficulties they face (Abdul Wahab, 2005: 16).

Mental capacity and scientific thinking are among the important things through which the individual learner is able to adapt to the environment and circumstances surrounding him and interact with difficulties with high confidence, as they play an important role in the student's processing of his information and in his acquisition of many experiences and skills represented by his employment of mental processes in learning, remembering, thinking, and solving. Problems, as they give the individual a sense of his ability to control his thinking and thus improve his level of performance and get rid of tension and irritability. The mind trained in fitness and reflective thinking remains alert and its memory is strong (Alwan, 2009: 2).

And because the researcher that They are teaching In a section Sciences life- Faculty of Education For pure science At Wasit University through Inform him MB ased on previous studies, And very much that It is necessary to care University institutions teach and train their students to have mental flexibility and more contemplation in thinking. They are considered one of the important institutions of society because of their role in reform and development and the center for radiating thought, as they are considered a new and different experience from previous educational experiences in the student's life in terms of experiences. And the new skills he acquires and the new educational problems he faces. Both mental capacity and meditation have an impact on the student's academic achievement and in making him able to benefit to a large degree from the educational process and thus increasing his ability to progress and succeed under any circumstances, no matter how difficult.

Hence the idea of this study came to...To get to know the importance of scientific thinking and mental capacity among undergraduate students in the Department of Life Sciences and their reflection on their achievement levels and their role in achieving the goals of the educational and learning process.

And so Stand out problem This research aims to answer the following main question:

What level Scientific thinking and mental capacity and their relationship to the cognitive achievement of students in the Department of Life Sciences / College of Education for Pure Sciences in Chemistry?

SECOND: THE IMPORTANCE OF RESEARCH:

The process of working on developing thinking skills of all types and fields is necessary for the purpose of enabling students to face the difficulties and challenges that have emerged as a result of the rapid scientific and technological progress during our current era, as acquiring and understanding knowledge in a narrow manner has not become capable of achieving global competitiveness, so the individual learner must acquire Different thinking skills help him deal with complex conceptual experiences in a contemplative, integrative manner and on a broader scale. The development of these different skills is considered a fundamental goal of teaching science. Having them helps students study various ideas and gives them the ability to analyze them to reach an appropriate scientific decision. Thus, it is It is directed to shifting from interest in studying the external factors of learning to interest and reflective thinking about how the learning process occurs (Al-Sammadi, 2023: 255).

Scientific thinking is considered one of the types of thinking that supports this trend, as John Dewey emphasized that this type of thinking helps to develop interest in stimulating thinking and contemplation of different life situations, searching and investigating the reasons for their occurrence, and it also helps to clarify ambiguous and ambiguous things by relying on previous experiences. And linking it to new experiences. Reflective thinking is a type of purposeful and directed thinking that helps the learner reach the desired result in addition to developing problem-solving skills and how to formulate inferences. Thus, it leads to educational outcomes represented in accustoming students to reducing their impulsive behavior and helping them to analyze ideas. Different ways carefully, with flexibility and great mental fitness. Therefore, the interrelation between reflective thinking and mental fitness makes the student distinguish between a useful and appropriate learning style that is rich in stimuli.

This is what makes the educational process effective and its results appear on the student in his personality and way of thinking (Al-Zubaidi, 2019: 403).
Because university education is of great importance in shaping the mentality of nations, their industry, and their development, given that the university stage is the final stage and the top of the educational pyramid, which has a large and important role in preparing and qualifying university students, who are considered the forefront of the youth elite in society, therefore, attention must be directed to them and work must be done to train them to a high degree, whether intellectual, scientific, educational, cultural or professional (Ahmed, 2016: 328).
Therefore, the researchers confirm on the importance Shedding light on the way of thinking among university students and its important role on their academic achievement and even on their daily life situations in order to prepare A capable generation to contribute to creating an image of a conscious and thinking society and cultured.
It can be summarized the importance of the search for the following points:
1- The study of scientific thinking and mental capacity and their relationship to cognitive achievement is necessary for university students, so the researchers sought to clarify its importance and role in society.
2- Providing the educational side with a study related to this sector by presenting a theoretical framework consisting of mental capacity, scientific thinking, and cognitive achievement.
3- The importance of this study is highlighted in shedding light on the importance of contemplation and flexibility in thinking among students for academic excellence and the extent of their relationship to it.
4- Contributing to drawing the attention of educators to the importance of mental capacity and scientific thinking in the academic process of students.
5-RecognitionThe extent of students' ability to think in ways Scientific in All aspects of their lives and the extent of their ability to apply it to face problems and difficulties.
6- The importance of this topic and its effective impact on developing the strengths of thinking of the individual learner.
7- This study provides a measure of the scientific thinking of students at the university level.

THIRD: AHDAIN SEARCH:

The current research aims to find out:
1- The level of scientific thinking for second stage students / Department of Life Sciences / College of Education for Pure Sciences / University of Wasit.
2-levelMental capacity to Second stage students / Department of Life Sciences / College of Education For pure science/ University of Wasit.
3- The level of cognitive achievement for students in the second stage / Department of Life Sciences / College of Education for Pure Sciences in Chemistry.
4- The relationship of scientific thinking to students' achievement in chemistry.
5- The relationship of mental capacity to students' achievement in chemistry.

FOURTH: RESEARCH LIMITATIONS:

The research was limited to students The second phase /Oath Life science in the College of Education For pure science/ Wasit University for the academic year 2023-2024M.

Fifth, search terms:
Firstly: scientific thinking
- know him (Blessings,2011) that "The ability to deal with educational situations, events, and stimuli with vigilance and analyze them deeply and carefully to reach the appropriate decision at the appropriate time and place to achieve the goals expected of it." (Blessings, 2011: 45).
Operational definition:
It means a group of Paragraphs to which students of the Life Sciences Department at the College of Education for Pure Sciences/Wasit University respond It is measured by the total score they obtain by answering the thinking scale Scientific used in this research.
secondly: Mental capacity
-He knows her (Petter, 2003) as: "The individual's mental ability that affects his way of thinking, his ability to remember, his mood, his compatibility with life, his feeling of happiness and success, and his ability to make sound decisions, solve problems, challenge risks, and face them with flexibility and high confidence" (Petter,2003: 13).
Operational definition:

What is meant is the grade that students of the Life Sciences Department at the College of Education for Pure Sciences / Wasit University will obtain through their answers to the items of the mental capacity scale used for the purposes of the current research.

Third: **Cognitive achievement**

(Al-Hamwi, 2010) defines it as "the total score that a student obtains in the achievement tests of the first or second semester or the end of the semester" (Al-Hamwi, 2010: 190).

RESEARCH METHODOLOGY AND ITS PROCEDURES

First: Research Methodology/The descriptive approach was adopted; Being more appropriate to achieve the research objectives and problem.

Second: The research sample population/The original community consists of: All students of the second stage / Department of Life Sciences / College of Education for Pure Sciences for the academic year (2023-2024). And it has Selected Sample an actress to search in an intentional manner From the community of students of the second stage / Department of Life Sciences at the College of Education for Pure Sciences / University of WasitWhen I reached (55) male and female students.

Third: AdaTa Search

1- Scientific thinking scale:

For the purpose of measuring scientific thinking among students (the research sample), the researchers prepared the scale items, which consist of (20) items and have five alternatives, which are (strongly agree, agree, not sure, disagree, strongly disagree). The student must choose one of these alternatives in accordance with His way of thinking.

Validity of the scientific thinking scale:

The validity of a measure means its ability to measure the purpose for which it was developed.Ebel,1972:555), the researchers prepared to verify the apparent validity by presenting the items to a group of experts and arbitrators who have experience that enables them to judge the validity of the items before applying it, in addition to extracting constructive validity, which is known as hypothetical formative validity, as it indicates the extent of the psychological measure, and this type is concerned with theory. proposed in addition to the measurement method (Al-Zuhairi, 2017: 272).

The researchers prepared to verify the construct validity of the Scientific Thinking Scale through the scores of the exploratory sample used in the statistical analysis of the scale. This is shown in Table (1)

Table (1)\ Correlation coefficients between the item score and the total score of the scientific thinking scale

Significance at level (0.05)	Degree of freedom	Pearson correlation		Paragraphs
		Tabulation	Calculated	
Function	98	0.197	0.783**	1
Function			0.490**	2
Function			0.783**	3
Function			0.805**	4
Function			0.813**	5
Function			0.805**	6
Function			0.586**	7
Function			0.805**	8
Function			0.783**	9
Function			0.337**	10
Function			0.664**	11
Function			0.677**	12
Function			0.693**	13
Function			0.805**	14
Function			0.459**	15
Function			0.630**	16
Function			0.374**	17
Function			0.424**	18
Function			0.363**	19
Function			0.437**	20

The discriminating power of paragraphs:
The scale items were analyzed using the two extreme groups, where individuals were selected based on the total scores they obtained on the scale, with (27) samples in the upper group and (27) samples in the lower group (54 male and female students in each group). Each group was analysed. One of the items using the t-test (T-test) for two independent samples to test the significance of the difference between the upper and lower groups, and I found that the calculated T-value ranges from (2.726-8.379), as this value is considered a distinction for each item of the scale, by comparing it to the tabular value of (2.007) at a degree of freedom (52) and a significance level (0.05) Through this, the results showed that all items are statistically significant and their calculated T-value is greater than the tabulated value, as shown in Table (2)

Table (2)
Discrimination coefficients for items in the scientific thinking scale

Significance at (0.05)	Degree of freedom	T value		Minimum group		Senior group		Paragraph
		Tabulation	Calculated	standard deviation	SMA	standard deviation	SMA	
Featured	52	2.007	8.379	0.620	2.00	0.000	3.00	1
Featured			5.213	0.534	2.15	0.396	2.81	2
Featured			8.379	0.620	2.00	0.000	3.00	3
Featured			6.008	0.609	2.30	0.000	3.00	4
Featured			6.008	0.609	2.30	0.000	3.00	5
Featured			6.008	0.609	2.30	0.000	3.00	6
Featured			5.648	0.602	2.15	0.320	2.89	7
Featured			6.008	0.609	2.30	0.000	3.00	8
Featured			8.379	0.620	2.00	0.000	3.00	9
Featured			3.010	0.192	2.96	0.000	3.00	10
Featured			4.914	0.509	2.52	0.000	3.00	11
Featured			5.000	0.577	2.44	0.000	3.00	12
Featured			7.273	0.577	2.11	0.192	2.96	13
Featured			6.008	0.609	2.30	0.000	3.00	14
Featured			4.192	0.643	2.48	0.000	3.00	15
Featured			7.127	0.649	1.96	0.267	2.93	16
Featured			2.726	0.424	2.78	0.000	3.00	17
Featured			4.507	0.641	2.44	0.000	3.00	18
Featured			6.532	0.526	2.26	0.192	2.96	19
Featured			5.000	0.577	2.44	0.000	3.00	20

stability Scientific thinking scale:
And he means Steadily the test that is Be tools Measurement on degree High from Precision And mastery And consistency And the trends, at Getting Data Belonging to behavior Individuals examined, And it is done account Consistency In many ways, it was adopted The two researchers To calculate Factor Consistency method (alpha_ Crow nbach) and the value of the stability coefficient was(0.91), as shown in Appendix No. (3).

Capacitance meter Mentality:
After reviewing a set of scales, the researchers prepared to build the scale's paragraphs to suit the research sample, as the number of items was (25) and five answer alternatives were placed in front of each paragraph based on a Likert scale (Likert(The pentagon, which is)Always applies to me, often applies to me, applies to some extent, does not apply to me, does not apply to me at all).

Validity of the mental capacity scale:
Honesty is considered an important characteristic, as it indicates the ability of the scale to measure what it was designed to measure, as the more indicators of the scale's validity, the greater the degree of confidence in it. Therefore, the researchers used two indicators of validity: face validity and construct validity. In order to verify face validity, the scale was presented to a group of arbitrators and experts in the field of teaching methods, educational psychology, measurement and evaluation, and the life sciences specialization. Appendix (1)For each of them to express his opinion on the items of the scale, the structural validity was verified by calculating the correlation of the item score with the total score of the scale using the Pearson correlation coefficient. The results showed that all correlation coefficients are statistically significant at a degree of freedom (123) and a significance level (0.05), as shown. In Table (3)

Table (3) Evaluate the correlation coefficients of the item score with the total score of the mental capacity scale

Significance at level (0.05)	Degree of freedom	Pearson correlation		Paragraphs
		Tabulation	Calculated	
Function	123	0.176	0.411**	1
Function			0.389**	2
Function			0.869**	3
Function			0.383**	4
Function			0.316**	5
Function			0.313**	6
Function			0.176*	7
Function			0.877**	8
Function			0.872**	9
Function			0.848**	10
Function			0.861**	11
Function			0.845**	12
Function			0.424**	13
Function			0.334**	14
Function			0.877**	15
Function			0.807**	16
Function			0.774**	17
Function			0.825**	18
Function			0.850**	19
Function			0.414**	20
Function			0.309**	21
Function			0.356**	22
Function			0.400**	23
Function			0.643**	24
Function			0.287**	25

The discriminating power of paragraphs:

The discrimination coefficient was calculated for each item of the scale using the two extreme groups of (27%), the upper and lower, with an average of (34) in each group. The T-value was found to range between (2.796-19.122) at a degree of freedom (66), which is therefore higher than the tabular value of (1.997) and at a significance level of (0.05). Thus, the results showed that all paragraphs are statistically significant, as shown in Table (4)

Table (4) Discriminatory power and T-value calculated for mental capacity scale

Significance at (0.05)	Degree of freedom	T value		Minimum group		Senior group		Paragraph
		Tabulation	Calculated	standard deviation	SMA	standard deviation	SMA	
Featured	66	1.997	4.871	0.563	2.53	0.000	3.00	1
Featured			5.668	0.589	2.32	0.239	2.94	2
Featured			19.122	0.493	1.38	0.000	3.00	3
Featured			4.586	0.508	2.50	0.239	2.94	4
Featured			4.044	0.551	2.62	0.000	3.00	5
Featured			5.151	0.609	2.41	0.171	2.97	6
Featured			2.796	0.589	2.68	0.171	2.97	7
Featured			17.602	0.507	1.47	0.000	3.00	8
Featured			16.925	0.507	1.53	0.000	3.00	9
Featured			15.223	0.563	1.53	0.000	3.00	10
Featured			15.506	0.564	1.50	0.000	3.00	11
Featured			13.519	0.609	1.59	0.000	3.00	12
Featured			5.022	0.615	2.47	0.000	3.00	13
Featured			5.169	0.564	2.50	0.000	3.00	14
Featured			17.602	0.507	1.47	0.000	3.00	15
Featured			11.414	0.691	1.65	0.000	3.00	16
Featured			13.002	0.563	1.47	0.343	2.94	17
Featured			12.729	0.660	1.56	0.000	3.00	18
Featured			13.519	0.609	1.59	0.000	3.00	19
Featured			4.200	0.613	2.56	0.000	3.00	20
Featured			4.951	0.563	2.47	0.171	2.97	21
Featured			4.311	0.557	2.59	0.000	3.00	22
Featured			3.774	0.613	2.56	0.171	2.97	23
Featured			8.559	0.812	1.65	0.288	2.91	24
Featured			3.527	0.535	2.68	0.000	3.00	25

The stability of the mental capacity scale:

The researchers extracted the reliability of the scale by using the (Cronbach's alpha) method, also called the internal consistency method. This equation gives us a good reliability estimate in most situations, as the degree of reliability coefficient reached (0.93), which is a good reliability coefficient. And as Described in Appendix No. (5)

Means Statistics:

Use Finder those Statistical methods in research procedures, analyzing its data, and interpreting its results using the statistical program (Spss).

1- Equation The second test (t-test) for two independent samples to calculate the discriminatory power of the items of the two scales.

2- Equation The second test (t-test) For one sample to test the differences between the hypothesized mean and the arithmetic mean.

3-Pearson correlation coefficient (Pearson correlation) To identify the relationship of the paragraph grade to the total grade.

4-Cronbach's alpha coefficient (Cronbuh Alpha)To determine the stability of the two scales .

RESEARCH RESULTS AND DISCUSSION

The first goal : level Thinking Scientific

When using a test (t. test(For one sample, it appeared that the arithmetic mean is greater than the hypothesized mean, and the calculated T-value is greater than the tabulated. This indicates the presence of reflective thinking at an average rate among the students, and Table (5) shows this.

indication	level indication	degree Freedom	T value		deviation Standard	Average Hypothetical	Average Arithmetic	size the sample
			Tabulation	Calculated				

Statistically significant	**0.05**	**54**	**1.674**	**5.160**	**10.479**	**60**	**67.29**	**55**

Second goal: level Capacity Mentality

And at use a test(t.test) Damn one Back that Average Arithmetic Larger from Average Hypothetical And the value T Calculated Larger from Tabulation this indicates on Existence Capacity mental rate Medium when Students. And the table (6) It is clear that

indication	level indication	degree Freedom	T value		deviation Standard	Average Hypothetical	Average Arithmetic	size the sample
			Tabulation	Calculated				
Statistically significant	**0.05**	**54**	**1.674**	**6.428**	**13.090**	**75**	**86.35**	**55**

Third goal: level Collection Cognitive I have Students to divide Sciences life/college Education For pure science in material Chemistry

And at use a test(t.test) Damn one Back that Average Arithmetic Larger from Average Hypothetical And the value T Calculated Larger from Tabulation this indicates on Existence Collection in the rate of Good when Students. And the table(7)It is clear that

indication	level indication	degree Freedom	T value		deviation Standard	Average Hypothetical	Average Arithmetic	size the sample
			Tabulation	Calculated				
Statistically significant	**0.05**	**54**	**1.674**	**24.410**	**6.993**	**50**	**73.02**	**55**

Fourth objective: The relationship of scientific thinking to students' achievement

Direct correlation middle (average positive), as the calculated Pearson value was (0.41) and tabular (0.187) When comparing them, it indicates that there is a relationship between them (positive, statistically significant).. And the table (8) It is clear that

Type Link	indication	level indication	degree Freedom	the value Correlation coefficient		Relationship
				Tabulation	Calculated	
middle	**Function Statistically**	**0.05**	**52**	**0.268**	**0.41**	**scientific thinking Collection**

Fifth goal: relationship Capacity Mentality is attainable Students

Direct correlation middle (average positive), as the calculated Pearson value was (0.66) and tabular (0.187When comparing them, it indicates that there is a relationship between them (positive, statistically significant). And the table (9) It is clear that

Type Link	indication	level indication	degree Freedom	the value Correlation coefficient		Relationship
				Tabulation	Calculated	
middle	**Function Statistically**	**0.05**	**52**	**0.268**	**0.66**	**fitness Mentality**

RECOMMENDATIONS

In light of the results of the current research, the researchers recommend the following:

1. Working to direct educational institutions to pay attention to the scientific thinking and mental capacity of students in order to advance the educational and learning process.
2. Holding training courses for teachers in educational institutions to raise their awareness of different thinking methods, including scientific thinking, and how to practice the skills of this thinking in different teaching methods and educational activities.
3. Working to hold workshops to train students to practice scientific thinking skills and mental capacity by providing educational and guidance programs.
4. Activating the role of female counselors in universities, especially in the field of seeking academic assistance.

Proposals

To complete this research, the researchers propose to conduct a number of the following studies and research:

1. Procedure More studies and research for the purpose of assessing the level of mental capacity and scientific thinking among students at different academic levels.

2.Conducting a study aimed at identifying the causes of difficulties in learning scientific thinking and the extent of their spread in our society.

3.Conducting other studies on mental capacity, but with other variables (personality types, psychological compatibility).

REFERENCES

1- Abu Bashir, Asmaa Atef, (2012):The effect of using metacognitive strategies in developing reflective thinking skills in technology curricula among ninth grade students in Al Wusta Governorate,(A magister message that is not published),Al-Azhar University - Gaza.

2- Abu Jado, Saleh Muhammad Ali, (2014): Educational Psychology, 3rd edition, Dar Al-Masirah for Publishing and Distribution, Amman, Jordan.

3- Ahmed,Farah,(2016):Degree of three-dimensional intelligence (analytical, practical, creative) among middle school students,Journal of the Islamic University for Educational Studies, Gaza.

4- The left-handed,Safa Youssef (2002): Education for thinking,1st edition, Qubaa Publishing House, Cairo, Egypt..

5- Al-Amiri, Ahmed Al-Baraa, (2007): The Six Liaqat, 1st edition, Dar Al-Nahda for Publishing and Distribution, Cairo, Egypt.

6- Barakat,Ibrahim ,(2011):The impact of using visual thinking networks in teaching science on academic achievement and the development of reflective thinking skills among third-year intermediate female students in the Kingdom of Saudi Arabia.,(Published master's thesis), Scientific Education Journal, Volume 14, Issue 1.

7- Wild,Marwa Abdel Qader Muhammad(2016):The relationship between positive thinking and academic achievement,Middle East Research Journal, Egypt-

8-Al-Bakri, Mafaz Ghassan Jassim, (2017): "The effectiveness of the overlapping waves strategy in the achievement of second-year intermediate students in physics and their deductive thinking."(A magister message that is not published), College of Basic Education, University of Babylon, Iraq.

9- Al-Harithi,Ibrahim Ahmed Muslim,(2002):Mental habits and their development among students, 1st edition,Al-Shaqri Publishing Library,Al Riyadh, Saudi Arabia.

10-Hadda, Lounes, (2013): The relationship of academic achievement to learning motivation among adolescents, a field study of fourth-year intermediate students, (unpublished master's thesis), Faculty of Social and Human Sciences - Akli Mohand Oulhadj University, Bouira, Algeria.

11- Hadiwi et al., (2022): Contemplative thinking and suicidal tendencies among adolescents in general and technical secondary school, International Journal of Technological Curricula and Education, Volume 8, Issue 12, Cairo, Egypt.

12- Al-Hamwi,Mona ,(2010):Academic achievement and its relationship to self-concept (a field study on a sample of fifth-grade students in the second cycle of basic education in Damascus public schools),(Unpublished master's thesis), Damascus University Journal, Syria.

13- My livelihood,Raad Mahdi and Soha Ibrahim Abdel Karim(2015):Thinking and its patterns, 1st edition, DarFacilitationPublishing and Distribution,Oman,Jordan.

14- Main,Noura bint Hamad(2016):Psychological hardiness among a sample of psychologists in the Sultanate of Oman,College of Education Journal,Banha university,Oman.

15- Al-Zubaidi,Mohamed Ali ,(2019):strategy impact ((SWOMIn developing reflective thinking skills among second-year secondary school students in Al-Qunfudhah Governorate,(Published master's thesis), Umm Al-Qura Journal for Educational and Psychological Sciences, Volume 10, Issue 2.
16-Al-Zuhairi, Haider Abdul Karim Mohsen, (2017): Educational Research Methods, 1st edition, Debono Center for Teaching Thinking, Amman, Jordan.
Sahib, Wejdan Anad, (2016): Mental fitness and its relationship to cognitive processing and positive thinking among female students in the kindergarten department, (unpublished doctoral dissertation), University of Baghdad, College of Education for Girls.
17- Al-Sammadi,Warrior Ali Muhammad,(2023):The effect of using the self-questioning strategy in teaching science on developing reflective thinking skills among sixth grade female students,(Published master's thesis), Mu'tah Journal for Humanities and Social Studies, first issue, Jordan.
18- Abdul Wahab,Fatima Mohammad ,(2005):The effectiveness of using some metacognitive strategies in achieving physics and developing reflective thinking and the trend towards using them among eighth-grade Al-Azhari students,(Published master's thesis), Journal of the Faculty of Education - Ain Al-Shams University, Volume 8, Issue 2, Egypt.
19- Alwan,Musaab Muhammad Shaaban, (2009):Processing information and its relationship to the ability to solve problems among secondary school students,(Unpublished master's thesis), Islamic University, Gaza.
20- Al-Issawi,Abdulrahman ,(2006):Psychology of the contemporary Muslim adolescent, 1st edition, DardocumentsFor publishing,Kuwait.
21- Muhammad, Suleiman Khadr, (1993): Contemplative thinking as a method of education, 1st edition, Arab Renaissance House for Printing and Publishing, Cairo, Egypt.
22- The guide,Youssef bin Aqla and Saleh Muhammad Saleh(2015):Levels of reflective thinking among Al-Jouf University students, a developmental study,(Published master's thesis), Journal of the College of Education in Assiut,Volume 31, Issue 2, Egypt.
23- Moussa, Farouk Abdel Fattah, (1981): Educational Psychology, 1st edition, Dar Al-Thaqafa for Printing and Publishing, Cairo, Egypt.

24-Costa & Kallick.(2002): Discoering Exploring Habits of Mind ASCD, Alexandria USA.
25. Petter, B.F. (2003). Fitness of mind, publishing company, New York.
26.Ebel.R.L. (1972): Essentials of education measuring euglewood chiffs prentice, Hill, new, Jersey.