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The Level of Analytical Thinking, Problem Solving and its Relationship to some Variables among the Students of Karbala University

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Abstract--- *The current research aims to reveal the level of analytic thinking and problem solving and its relationship to some variables among the students of Karbala University. The research sample consisted of (400) male and female students distributed on (8) colleges for the academic year (2018 - 2019) chosen in a random and natural manner with proportional distribution. In its five fields and consisting of (22) paragraphs, the researcher developed five alternatives for the two scales, and after conducting the validity, reliability and psychometric properties of the two scales, then applying them to the research sample. The results showed that the University of Karbala students have analytical thinking at a level (average) as well as in the scale of problem solving at the same level and that the link between the level of analytical thinking and problem solving in males is stronger than the link among females either in terms of specialization there is no difference in the strength of the link between scientific and human specialization to the level of thinking Analytical and problem solving for the students of Karbala University, Based on these results, the researcher put some suggestions and recommendations.*

Keywords--- *Analytical Thinking, Problem and Solving.*

I. INTRODUCTION

Thinking is one of the characteristics that distinguished man from other beings, and it is a concept that has many dimensions and opinions about which reflect the complexity of the human mind and the complexity of its operations.

The researcher's work in the field of education and her field experience occurred about (34) years and her meetings with university teachers, supervisors, and teaching students and students in Karbala governorate. I sensed that there is a difficulty in solving the problem situations faced by students that need to be resolved to high levels of intellectual and qualitative skills, and this indicates the general weakness that Students suffer either in thinking skills in general or in problem-solving skills in particular. It is certain that the inability to form an educational and analytical system constitutes a problem that has now become global raised by experts as it has not become a problem confined in the framework of school education and even inclusive education. Consciousness. Perhaps not everyone uses the methods of analyzing the problem to get to its details since the methods and level of people's thinking are related to the way in which information and experiences are received and how they are organized and analyzed when facing a problem.[1]

From here emerges the main problem of the current research, as it became an urgent need to raise an educated generation armed with analytical thinking that enables it to solve the problems facing it, and therefore the research

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problem is determined by the following question:

What is the level of analytical thinking in the method of solving problems and its relationship to some variables among the students of Karbala University?

The process of research in analytical thinking and obtaining a comprehensive and holistic picture of it is no less important than in other types of thinking. Knowledge of analytical thinking enables students to form mental perceptions of their methods of problem solving, because it enables the individual to divide the situation into sub-or sub-parts and to understand the relationships between them and organize them To help him understand and make sound decisions, analytical thinking follows a sequential approach in steps and with a scientific, methodological approach to reach the desired goal.[2]

Therefore, analytical thinking helps learners to solve problems and face situations that require them to develop appropriate solutions, evaluate them and choose the best ones, whether in their academic or public lives. Consequently, the acquired experiences are transferred to new situations or problems that they may encounter. The importance of analytical thinking in that it helps an individual to:

1. Isolating the main problem from the rest of the problems.
2. Realizing the precise relationships that link the elements of the problem.
3. Use the largest number of senses to perceive and understand the problem.
4. Defining the problem in the context of the surrounding context.

The importance of the research can be summarized as follows:[3]

1. The current research provides a measure of analytical thinking and another for solving problems, as they constitute a qualitative addition to the theoretical side.
2. Disclosure of the importance of learning about the level of analytical thinking and problem solving for the students who are enrolled in the university and who are the main nerve in the process of developing and progressing society.
3. The importance of studying the correlation between the level of analytical thinking and problem solving because analytical thinking is the key to success in university education.
4. The results of the research may benefit those responsible in developing undergraduate curricula to develop their mental perceptions and their ability to analyze and solve problems.

Research objectives

The current research aims to know:

- The level of analytical thinking in the method of solving problems and its relationship to some variables among the students of Karbala University.

Hypothesis

1. Knowing the level of students of Karbala University owning analytical thinking.

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2. Knowing the level of awareness of Karbala University students about their methods of solving problems.
3. There is no statistically significant difference between the averages of the degree of ownership of students of Karbala University in the level of analytical thinking according to the variables of type and specialization.
4. There is no statistically significant difference between the averages of degrees of ownership of Karbala University students in the method of problem solving according to the variables of type and specialization.
5. There is no correlation between the level of analytical thinking and problem solving for the students of Karbala University, depending on the type and specialization variable.

Research Limits

The current research is determined by the following:

1. Karbala University students for central admission in the morning study for the academic year (2018-2019).
2. All academic stages for the students of Karbala University for central admission in the morning study of the scientific and humanitarian specializations for the academic year (2018-2019).

Define search terms

First, analytical thinking known to each of:

- (Gregory, 1988): "The individual's ability to face problems through dismantling their parts, in a systematic way, paying attention to detail and planning carefully before making a decision. As well as gathering as much information as possible and the ability to contribute to clarifying things."[4]
- (Katame, 2000): "Consistent and sequential thinking with steady steps in its development, as analytical thinking runs through multiple stages with criteria."[5]

The researcher defines analytical thinking in theory:

That it is the individual's ability to confront and identify problems using systematic and sequential mental processes, dismantle their parts in a systematic way, and plan before making a decision to reach appropriate solutions within specific criteria. The researcher defines it procedurally as the degree to which students obtain during their response to all paragraphs of the analytical thinking scale prepared by the researcher for this purpose.

Second, problem solving:

a. The problem was defined by (Good, 1979): "It is an ambiguous and complex position that calls for a challenge, whether it is a natural or an artificial situation, and that needs careful thought."[6]
b. Solving the problem: It was defined by:

- (Krulik 1987): ((The process whereby the individual uses the knowledge and skills acquired in order to achieve what is required in an unfamiliar situation).[7]
- (Jarwan, 1999): "A complex process of thinking in which an individual uses his past knowledge and skills in order to carry out an unfamiliar task, to address a new situation, or to achieve a goal for which there is no ready-made solution to achieve it."[8]

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The researcher knows theoretically solving problems

It is a thinking process in which the individual uses all his information and skills to define and define the ambiguous situation, generate alternatives and make the appropriate decision to reach and evaluate the most appropriate solution.

The researcher knows to solve problems procedurally:

It is the degree to which students obtain during their answer to all paragraphs of the scale of problem solving that the researcher prepared for this purpose.

II. METHODOLOGY

Research Procedures

Determine the Research Community

The current research community consists of Karbala University students for the central morning admission for the academic year (2018 - 2019) and their number is (12767) students and students are divided into (16) colleges, including (4) for the human specialization and (12) for the scientific specialization. There are (5228) male and female students in the humanities specialization, and (7539) male and female students in the scientific specialization.

The research sample

The research sample was chosen in a stratified random method with a proportional distribution. The research sample was chosen from the students of Karbala Al-Sabahi University by random method. As the sample reached (400) male and female students. The sample was distributed according to gender by (260) students and students for scientific specialization and (140) students and students for human specialization as in table (1).

Table 1: Shows the distribution of students in the research sample

Scientific colleges	Type		Total	Humanities colleges	Type		Total	Total summation
	Male	Female			Male	Female		
Engineering	25	40		Education for Islamic Sciences	15	20		
nursing	25	40		Law	15	20		
Pure science	25	40		Humanities Education	15	20		
Agriculture	25	40		Tourism	15	20		
Total	100	160	260		60	80	140	400

Preparation of the research tools

To achieve the goal of the research, the researcher did the following:

1. Building the analytical thinking scale

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a. After reviewing the literature in the field of education and psychology in the light of the theoretical definition that the researcher defined.

b. The adoption of the classical theory of measurement because it depends on a basic hypothesis in constructing psychological and educational tests and scales and analyzing its paragraphs, according to which the distribution of individual grades in the trait or the property that it measures takes the form of a moderate distribution that is affected by the nature of the characteristics of the individual sample and the characteristics of the sample paragraphs of the (Brown test).[9]

Three areas were defined for the concept of analytical thinking scale:

1. Define features and components.
2. Define relationships and patterns.
3. Define the main ideas.

c. Formulating Paragraphs of Analytical Thinking Scale (22) Paragraphs of analytical thinking scale have been formulated in its preliminary form. Where it was presented to a group of arbitrators and specialists in education and psychology attached (1) and in the light of their observations and the adoption of a standard 80% of the agreement amended and deleted some paragraphs and thus the scale became composed of (18) paragraphs in its final form. Appendix (2) has five alternatives (often, frequently, sometimes, rarely, never). In degrees (5, 4, 3, 2, 1).

d. The exploratory application of the scale: It was applied on Sunday, 6/1/2019 on a random sample consisting of (30) male and female students from the University of Karbala. As it turned out that the paragraphs of the scale and instructions were clear, and the average response time was (25) minutes for the scale.

E- Statistical analysis of the paragraphs of the analytical thinking scale

e. Statistical analysis of paragraphs is an important step in that it reveals the ability of the paragraphs to measure what they were actually measured.[10]

f. Statistical analysis sample

The sample of the statistical analysis included (400) male and female students who were chosen by the stratified random method, motivated by (160) for males and (240) for females.

g. Criteria that become the measure of analytical thinking

After applying the scale to the statistical analysis sample and to answer it, the researcher determined the cut-off point for all the sample individuals, based on the actual extent between the highest value and the lowest value, where the answer to the scale is graded according to a five-point scale (1-5) in all items and when calculating the cut-off point the lowest degree It is (18) and the highest degree is (90). Therefore, the range is (72) and half of the range (31). Accordingly, the cutting point is equal to 31 + 18 = 49.

Accordingly, if the student obtains less than 49, his level of thinking is weak, and if the score (49 - 67) his level of thinking is average. If the degree (68 - 86), his level of thinking is good. And who got (87) and more, his thinking level is excellent.

* The discriminatory power of the paragraphs of analytical reasoning

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The forms are arranged according to the total score for each male and female student in descending order as indicated by the literature, as higher (27%) of the grades were chosen to be the highest group and lower (27%) of the grades to represent the lower group.[11]The size of each of them (108) male and female students. It was found that all paragraphs of the scale are distinct and statistically significant.

Psychometric properties of the analytical scale of thinking

First, validate the scale

The scale was validated during

1. Al-Dhahri: The scale, along with its fields, was presented to a group of arbitrators and specialists in education and psychology attached (1), and as we mentioned earlier.
2. The sincerity of the building: it means examining the theoretical background for it, meaning determining (the psychological meaning) and determining the degree to which the scale gives it .[12]

The relationship of the paragraph to the scale

The second method of paragraph analysis is to find the correlation between the degree of the paragraph and the overall degree of the scale .[13] Pearson correlation coefficient was used to extract the correlation between the degree of correlation of each of the paragraphs of the scale and the overall degree of the scale, and the t-test for the correlation function was used to measure Statistical significance of the correlation coefficient, where the tabular (t) value is the criterion for accepting or rejecting the paragraph as in Table (2).

Paragraphs	Mean	SD	Mean	SD	(t) Calculated	Type of indication
1	3.44	1.57	2.47	1.24	5.14	Sig.
2	3.46	1.51	2.60	1.27	4.53	Sig.
3	3.26	1.32	2.36	1.21	5.21	Sig.
4	3.80	1.21	2.58	1.34	6.97	Sig.
5	3.43	1.28	2.61	1.32	4.60	Sig.
6	3.69	1.27	2.54	1.32	6.52	Sig.
7	3.45	1.32	2.15	1.20	7.61	Sig.
8	3.34	1.38	2.39	1.29	5.25	Sig.
9	3.58	1.22	2.24	1.29	7.85	Sig.
10	3.26	1.36	2.30	1.25	5.42	Sig.
11	3.51	1.26	2.25	1.20	7.53	Sig.
12	3.19	1.38	2.55	1.17	3.72	Sig.
13	3.48	1.36	2.58	1.34	4.88	Sig.
14	3.32	1.33	2.58	1.32	4.11	Sig.

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15	3.23	1.34	2.39	1.43	4.46	Sig.
16	3.73	1.24	2.55	1.35	6.72	Sig.
17	3.71	1.35	2.40	1.19	7.60	Sig.
18	3.49	1.36	2.59	1.21	5.14	Sig.

Second / persistence

Stability is one of the effects of the accuracy of the scale, and the stability of the scale was verified in more than one way, as follows:

Re-test method

It was applied to a sample of (100) male and female students randomly chosen from the sample of statistical analysis of the paragraphs after their forms were numbered according to the sequence of their names in their college register. It was applied again and with a two-week interval between the two applications .[14]

A Pearson correlation coefficient was used between the two application scores. The stability coefficient of the scale was (0.87), and the coefficient of stability is good if the correlation coefficient between the first and second applications (0.70) or more.[15]

h. Internal consistency method: the stability of the analytic thinking scale was calculated using the Alphakronbakh equation with a value of (0,82) and Alphakronbakh believes that the test with a high stability factor is accurate test.[16]

Building a scale to solve problems

After reviewing the educational and psychological standards within the limits of the theoretical framework and the theoretical definition that the researcher defined, (5) areas were defined for the concept of the scale of problem solving, namely:

1. General orientation 2. Defining the problem 3. Generating alternatives 4. Decision making 5. Evaluation

A. Formulation of Paragraphs of Scale: Paragraphs of Scale for Problem Solving consisting of (25) paragraphs were formulated in its primary form and in five alternatives:

(Often, Too Many, Sometimes, Rarely, Never). The grades are (1,2,3,4,5) for the positive paragraphs, and vice versa for the negative paragraphs.

B. Apparent honesty

The researcher presented the scale in its preliminary form with its fields to a group of arbitrators and specialization in education and psychology, Appendix (1). In the light of their observations, some paragraphs were modified and deleted, and the scale became component (22) paragraphs, as finalized, Appendix (4). The positive paragraphs were represented by (2 - 3 - 4 - 5 - 6 - 7 - 11 - 12 - 13 - 15 - 16 - 17 - 19 - 20 - 21 - 22). And negative paragraphs (1-4-8-9-9-10-14-18).

C. The exploratory application of the scale of problem solving

It was applied to the same sample of the exploratory application of the analytical thinking scale and on the same

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day. It was found that the measurement paragraphs with instructions are clear and the approximate average time to answer (30) minutes.

D. Criteria for correcting the scale of problem solving

To answer it, the researcher determined the cut-off point for all the individuals of the sample, based on the actual range between the highest value and the lowest value, where the answer to the measurement is graded according to a five-point scale (1 - 5) in all items and when calculating the cut-off point, the lowest score is (20) and the highest degree (110) Therefore, the range is (90), and the half-term is (45). Accordingly, the cut-off point is equal to 45 + 20 = 65. Therefore, if the student gets a score less than (65), then the problem-solving method is weak and if he gets a score of (65) -84) He has an intermediate level to solve problems and if he gets a score of (85-104) he has a good level and if he gets (105) then more is an excellent level and uses the analysis methodology To solve the problem with precision.

E. The sincerity of the building

The Person correlation coefficient was used to calculate the relationship of the vertebra with the scale and its relationship to the general total and the relationship of the field with the general total of the scale. The researcher also used the T-test to confirm the significance of the correlation. As the calculated second values were greater than the tabular of (1.96) at the level of significance (0.05) and degree of freedom (398). As in Table (3)

Table 3: T-paragraphs correlation with field

Area	*Paragraphs*	*Paragraph correlation with its field*	*Correlation (t) function*
The first area	1	0.23	4.66
	2	0.28	5.79
	4	0.32	6.76
	5	0.26	5.39
	7	0.39	8.39
	12	0.20	4.13
	13	0.29	6.08
	15	0.26	5.43
Total area		0.25	5.05
The second area	6	0.34	7.28
	8	0.29	6.13
	9	0.37	7.89
	16	0.35	7.45
	17	0.40	8.83
Total area		0.33	6.99
The third area	3	0.21	4.30
	10	0.28	5.88
	11	0.37	7.94
	14	0.25	5.19
	18	0.21	4.38
Total area		0.35	7.47

Statistical analysis of the paragraphs

The same sample of statistical analysis was chosen for the paragraphs of the analytical thinking scale, and the discriminatory power of the problem-solving scale paragraphs was calculated and it became clear that all paragraphs

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are indicative at the level (0.05) and the degree of freedom 214.

F. the stability of the scale

Stability was calculated in two ways (as in the stability of the analytical thinking scale)

1. The Alphakrobakh equation, where its value (0.77)
2. Retest The scale has a coefficient of stability of the scale (0.84), which are good values for stability of the scale.

G. The final application of the scale

The analytical thinking scale was applied to a sample of Karbala University students, on Wednesday 6/2/2019, and the problem-solving scale was applied on the same day and on the same sample.

Statistical means

Using the SPSS software for statistical packages, the following was used:

1. Using (t-test) program for two independent samples to calculate the discriminatory strength of the vertebrae.
2. The Alphakrobakh equation for calculating the stability of the two scales.
3. Pearson correlation coefficient for the use of the correlation between the degree of correlation of the vertebra with the overall degree of the scale.
4. Use a binary variance analysis test with an interaction to identify the differences in the level of analytical thinking and problem solving.
5. Calculating the Fischer equation to ensure the significance of the difference in the strength of the correlation between the two study variables according to type and specialty.

Presentation and interpretation of results

To know the level of analytical thinking among the students of the University of Karbala, the results showed that the mean for each sample was (50.57) with a standard deviation (6,96) and when compared to the degree of severity, it is clear that the level of analytical thinking among the students of Karbala University with a degree (average) as in Table (4).

Table 4: Shows the relation of the T-paragraphs with the field

Area	*Paragraphs*	*Paragraph correlation with its field*	*Correlation (t) function*
General orientation	2	0.20	4.06
	9	0.25	5.16
	13	0.29	6.08
	18	0.28	5.77
Total area		0.31	6.52
Definition of the problem	5	0.16	3.30
	11	0.22	4.58
	17	0.27	5.50
	19	0.22	4.49
Total area		0.26	5.39
Generate solutions		1 0.15	2.99

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		4	0.19	3.96
		6	0.33	6.97
		7	0.30	6.22
		22	0.25	5.05
Total area		0.22		4.51
Make decision	8	0.20		4.10
	12	0.32		6.73
	16	0.34		7.18
	20	0.25		5.05
Total area		0.33		6.99
Evaluation	3	0.21		4.25
	10	0.11		2.11
	14	0.27		5.52
	15	0.32		6.80
	21	0.27		5.50
Total area		0.31		6.52

This result is consistent with the results of the study [17]and the study[18] , and this indicates that students think about the situations after analyzing them, and this helps them to have the ability to keep information, and on the other hand, most students may be satisfied with the knowledge they obtained and did not They continuously develop themselves academically and do not use the research for the information they obtain to realize the delicate relationships that link the elements of educational material and its organization.

Knowing the level of problem solving for the students of Karbala University. The results showed that the arithmetic mean reached (67.27) with a standard deviation (7.27), and when compared to the degree of severity, it is clear that the level of ability of the students of Karbala University to solve problems was a degree (average) as In Table (4), this result came in line with the study and the study.

It is clear from the result that students at this stage are overwhelmed by passion and rapid response without careful thinking and analysis to help them look at the problems a closer analytical view and awareness Relationships to reach the optimal solution to the problematic situation.

To know the significance of the difference between the averages of students 'degrees in the level of analytical thinking according to the variables of type and specialization.

A. Type variable (male, female): The second variance analysis was used and it appeared that the calculated F value (0.24) is less than the tabular value of (3.84) at the level of significance (0.05) (not significant) as in Table (5) and this result Not consistent .[19]

That is, there are no statistically significant differences between males and females in the level of analytical thinking and thus accept the third zero hypothesis of the gender variable and this result can be explained in the light of the educational process that students undergo in the academic levels in general and the university in particular and through which the information and knowledge are provided in an equal manner for both Gender according to their academic level. This indicates that both Gender have the same level of analytical thinking.

B. The variable of specialization (scientific - human): Binary variance analysis was used and it appeared that

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the calculated value of (3.90) is greater than the tabular value of (3.84) at the level of significance (0.05), i.e. a statistical function of how much in Table (5) and thus rejects the third hypothesis For the variable of specialization, the results indicated the superiority of students of scientific specialization to students of human specialization, and the reason is due to the nature of the study subject to which students are exposed as interactive groups, which provides them with scientific information based on analysis and examination of the parts and linking them logically in order to absorb them, unlike the human curricula, most of which focus on conservation and indoctrination The results were not revealed The impact of the interaction between (type - specialization) in the level of analytical thinking as in the **table (5)**, has attributed the reason to look at the style of education and society, including university students to give their right to freedom of decision-making and style in solving their problems.

Table 5: Shows the calculation of the discriminatory force of the paragraphs of the problem solving scale

Paragraphs	Mean	SD	Mean	SD	(t) Calculated	Type of indication
1	3.28	1.27	2.63	1.40	3.56	Sig.
2	3.38	1.39	2.75	1.35	3.39	Sig.
3	3.39	1.33	2.70	1.39	3.70	Sig.
4	3.29	1.30	2.71	1.33	3.22	Sig.
5	3.19	1.35	2.64	1.33	2.99	Sig.
6	3.58	1.25	2.49	1.31	6.27	Sig.
7	3.50	1.29	2.69	1.39	4.47	Sig.
8	3.64	1.28	2.93	1.26	4.13	Sig.
9	3.54	1.13	2.87	1.25	4.10	Sig.
10	3.36	1.38	2.92	1.33	2.41	Sig.
11	3.38	1.45	2.65	1.29	3.91	Sig.
12	3.59	1.25	2.54	1.38	5.89	Sig.
13	3.44	1.35	2.53	1.40	4.89	Sig.
14	3.31	1.45	2.45	1.19	4.76	Sig.
15	3.78	1.31	2.68	1.38	6.03	Sig.
16	3.85	1.14	2.79	1.36	6.23	Sig.
17	3.49	1.31	2.71	1.27	4.44	Sig.
18	3.49	1.36	2.59	1.21	5.14	Sig.
19	3.41	1.39	2.68	1.30	4.00	Sig.
20	3.24	1.39	2.52	1.26	3.99	Sig.
21	3.27	1.36	2.48	1.31	4.32	Sig.
22	3.41	1.22	2.56	1.21	5.15	Sig.

To get to know the significance of the difference between the averages of students 'scores in the method of solving problems according to the variable (type * specialization) using the analysis of variance, it appeared that the result is not indicative as in Table No. (6) of the type variable, as well as the result is not a function of the specialty variable.

Table 6: Shows the level of analytical thinking for the students of Karbala University

Variables	Mean	SD	Hypothetical medium	(t) Calculated	Type of indication
Analytic	50.57	6.96	54	-9.91	Non sig.
Problems	67.27	7.27	66	3.50	Sig.

Thus, the fourth zero hypothesis is accepted, meaning that there is no difference (in gender) between male and female students in the method of problem solving as well as specialization, and the result explains that the research

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sample belongs to one environment that adopts the same social systems and follows almost similar customs and traditions and often they are subjected to the same pressures which makes the pattern Their thinking to solve the problem affected each other, while the result emerged as a function to know the effect of the interaction between (type * specialization) in the method of problem solving, as in Table (6). This indicates the ability of students to solve problems and their way of thinking is close to the difference in content.

To know the differences in the correlation between analytical thinking and problem solving according to (type * specialization). The Pearson correlation coefficient was calculated and its significance was confirmed by using the t-correlation test, then a Fischer equation was calculated to ensure the significance of the difference in the strength of the correlation between the two study variables by type and specialization and to compare the difference with the tabular (t) of (1.96) at the level of significance (0.05) and degree of freedom (398) As in Table (7).

Table 7: Shows the level of analytical thinking

Sources of variance	Sum of squares	df	Average squares	(f) calculated	Type of indication
Gender	11.78	1	11.78	0.24	Non sig.
Specialization	189.92	1	189.92	3.90	Sig.
Gender * major	41.19	1	41.19	0.85	Non sig.
The error	19286.30	396	48.70		
Kidney	19529.20	399			

The results showed that the association between the level of analytical thinking and problem solving in males is stronger than that of females.[20] As for specialization, the result emerged that there is no difference in the strength of the link between the scientific and human specialization to the level of analytical thinking and problem solving for the students of Karbala University and it is clear from that that thinking among students is random and irregular and may be due to reasons including a difference Curricula in terms of their presentation of the problem, or that students do not use sound higher-minded methods in their method of solving the problem, but rather deal with it through real life without having an organized analytical thinking.[21]

III. CONCLUSIONS

1. Karbala University students have an average level of analytical thinking and problem solving.
2. University students have the ability to form mental awareness of their methods of problem solving.

IV. THE PROPOSALS

1. Conducting a study in the field of analytical thinking on the secondary stage and comparing its results with the results of the current research.
2. Carrying out other scientific studies dealing with different patterns of thinking and their relationship with decision-making, motivation, or direction towards the subject.

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