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The cognitive structure of graduate students

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Abstract---The current research aims to identify the cognitive structures of graduate students in the universities of the Middle Euphrates as well as the statistically significant differences in the cognitive structures of graduate students according to gender (male-female), specialisation (scientific-human), and study (Master-PhD), and to achieve the objectives of the research, the researchers built a research tool: the cognitive structure scale, so the tool was applied to the basic research sample (643) of male and female graduate students in the universities of the Middle Euphrates (Karbala, Babylon, Kufa, Al-Muthanna, Al-Qadisiyah) and to the scientific and humanitarian specialists. After stratifying the original population by 10% using the stratified random method, and after collecting and analysing data statistically using the SPSS statistical package for social sciences, the researchers reached the following results: The postgraduate students in the universities of the Middle Euphrates are characterised by cognitive structures. They know that the knowledge structures in their educational world, knowledge structures in their information world, and knowledge structures in their social world did not show any clear structures in their economic world, that PhD students are more than master's students in cognitive structures. The students of the humanities specialisation have more knowledge structures than the students of the scientific specialization. This means that the female students of higher education are close to each other and the students in postgraduate studies in the knowledge structures.

Keyword---cognitive structure, graduate students, universities, humanities specialization.

Introduction

Search problem

At a time when the accumulation of cognitive experience and the formation of mental structures that help them pass this stage of postgraduate studies in the

universities of the Middle Euphrates today are subject to study and psychological examination, which may indicate the shallowness of the knowledge structures in their scientific and human specialties, and this scientific problem bears witness to the decline in achievement and the abandonment of study for a large number of them, at a time when it was necessary to put these students to the test of knowledge structures to verify their competencies in scientific practise in terms of concepts, methodology, and application, and remained At the present time, it is sufficient to accept and expand it in the interest of results, achievement, and the benefit of society. The more solid and highly specialised knowledge structures are, the more a generation is produced that enjoys proper knowledge and is able to develop the country in which they are passing, and vice versa, when the knowledge structures are weak if not nonexistent. It was lacking in specialization and produced a generation that was unable to practise scientific practise and develop society properly. From the foregoing, the research problem can be formulated as the following question:

Do graduate students at the universities of the Middle Euphrates have the right structures for specialised knowledge that help them learn?

Research importance

The concept of cognitive structures has a genetic basis, but they grow and change through the interaction of the individual with the environment in which he lives, and its change is constantly continuing the same growth path and controlling his thinking and directing his behaviour and building and rebuilding this structure (Al-Anani, 2001: 112). According to Piaget, the cognitive structure is a unified total organisation whose parts cannot be identified except according to their relationship to each other. It is self-organizing, and the cognitive structure grows and changes from a simple act to a complex mental structure and from an unstable state to a more stable state (Mansour 1991: 247). From this, cognitive psychologists raised the following question: Does the development of the individual's cognitive structure system match or be consistent with his cognitive growth? Adams (1970) answered this question when he referred to a number of issues that are consistent with Piaget's view of cognitive development based on the increasing use of abstract concepts that enable an individual to summarise different types of knowledge or information and progress from a comprehensive system undifferentiated into a comprehensive and differentiated system, as well as the individual's evolving and adaptive response to the new elements entering his cognitive system (Pervin, 1980:300). However, Adams points out that the development of an individual's cognitive structure according to a (Kelly) perspective differs from his cognitive growth according to a (Piaget) perspective.

Research Objectives

The goal of the research is to find out how graduate students in the universities of the Middle Euphrates think. Statistically significant differences in the cognitive structures of graduate students according to gender (male-female), specialisation (scientific-human), and study (Masters-PhD).

Practical Part

First, the research method

In this study, the researchers used the descriptive method because they thought it would help them reach their research goals.

Second, the research population

The current research community consists of students in the universities of the Middle Euphrates. Each of the universities (Karbala, Qadisiyah, Babylon, Kufa, Muthanna) for the academic year (12022–2022) according to (university, specialization, gender, study), distributors The scientific and humanities faculties in it, where the total number of the research community reached (6429) male and female students from postgraduate studies, and the number of male and female students reached (3045) male and female students (3384), the number of students of the humanitarian specialisation was (3066) male and female students, and the number of students of the scientific specialisation was 3363) male and female students. Also, the number of master's students reached (4418) male and female students, and the number of doctoral students reached (2011) male and female students.

Research Samples of the current research include the following

The exploratory sample (clarity of paragraphs and instructions sample)

The purpose of the exploratory sample is to verify the extent to which the sample members understand the paragraphs of the scale and its instructions (Faraj 100: 1997), to calculate the time taken to answer it, and to identify the difficulties facing the respondent (Letter: 2009: 43). The exploratory sample size was characterised by 40 students from the universities of Karbala and Kufa, distributed randomly among (20) male and (20) female students equally.

Statistical analysis sample

The statistical analysis sample for the paragraphs was chosen in a stratified random manner with an equal distribution since the size of the current research community is considered one of the medium-sized communities (6429). The researchers took the sample size in proportion to the (400) male and female students that the researchers used in extracting the psychometric properties of the items and the scale as a whole, to extract the differences between the two end groups. Given that the process of statistical analysis of the scale items is one of the basic steps, and the adoption of items that have good psychometric properties to become The scale is more honest and consistent (Al Douri 2004: 68).

Therefore, the basic research sample (final application)

Therefore, the basic research sample was chosen with a percentage of 10% from the original community, which amounted to (642.9643) male and female students. The basic (643) male and female graduate students, distributed over the number of male students (305) and (338) female students, the number of

humanitarian students (307) male and female, and the number of scientific specialisation (336) male and female students, the number of master's students reached (442) male and female students, and the number of doctoral students reached 201 male and female students.

Tool: Cognitive Structure

Before starting to build the scale, the two researchers looked at the available studies and measures that dealt with variables that are close and similar to the concept of cognitive structures, which, of course, are difficult to fit into the local environment, so the researchers found a need to build a scale that measures this concept and according to the Iraqi environment in light of the current conditions for students of studies. From this, the two researchers built a cognitive structure scale based on the theoretical orientations of George Kelly (1955), adopting his definition as an abstract concept that expresses the cognitive interpretations that the individual places on the world around him (Bur & Butt 1992:12), or It is a person's way of looking at events in his world and interpreting those events; and every person presents a hypothesis that the special structure that he sees will harmonise with a certain reality of his world; and the person, like the world, begins to choose this hypothesis by working to match it with the event (Schultz 1983: 317). Based on that, the fields of knowledge structures for postgraduate students are represented in the cognitive structures that he formed around the fields of his world: (social, economic, informational, educational).

Drafting the cognitive structure scale items

After reviewing the literature and previous relevant studies, the two researchers formulated a number of (verbal declarative) paragraphs, taking into account the conditions for drafting the paragraphs that were also indicated by the researchers. (Psychometric properties of vertebrae). It was divided into five alternatives: (represents me always; often represents me; sometimes represents me; rarely represents me; does not represent me).

The apparent validity of the cognitive structure scale and its validity

The two researchers presented the cognitive structure scale with its paragraphs for (48) to a group of arbitrators and specialists in the field of psychology, measurement, and evaluation (Iraqis and Arabs) shown in Appendix (2), and the questionnaire prepared for that in Appendix (4), where the researchers relied on the percentage, which is to obtain a percentage (80%) or more of the arbitrators' opinions, and excluding the paragraph that got a lower percentage than that, and a square like any to judge the validity of a square, such as the tabular value of (3.84) at the significance level (0.05) and with a degree of freedom of one, Accordingly, eight paragraphs have been deleted.

Setting the Cognitive Structure Scale

The two researchers sought to make the scale's instructions clear and accurate for postgraduate students, and the marking should be with () under the alternative that applies to the respondent among the five alternatives (represent

me always, often represent me, sometimes represent me, rarely represent me, not represent me), if I asked the respondents Answer it frankly and honestly for the purpose of scientific research; there is no right or wrong answer as long as it expresses their opinion; the answer is not visible to anyone other than the two researchers; and there is no need to mention the respondent's name in order to reassure him of the confidentiality of his responses (Al-Nabhan 2013: 85). In order to ensure the clarity of the scale's instructions and paragraphs, the clarity of response alternatives, the detection and avoidance of difficulties facing the respondent, and the time taken to respond on the scale, it was field-applied to (40) graduate students at random, which was previously referred to in the exploratory sample. The scale and its instructions were clear to the sample members, and the time taken for their responses on the scale ranged between 32 and 38 minutes.

Cognitive Structure Scale Correction

After preparing the scale items, the Likert method was adopted in formulating response alternatives as: It allows the respondent to indicate the degree of the intensity of his feelings; allows the greatest variance between individuals; provides a more homogeneous scale; collects a large number of items related to the behavioural phenomenon to be measured; is flexible and easy to construct and correct; stability tends to be good due to the large range of permissible responses for respondents (Stanley & Hopkin 1972:288). Where the two researchers set the level of the examinee's response to each of the scale's items and then added them up to get the scale's total score. They did this by putting a five-point scale in front of each item and giving it the right score based on the respondent's answer, with the weights going as follows: (It always represents me 5, often represents me 4, sometimes represents me 3, represents me rarely 2, does not represent me). Statistical analysis of the items of the cognitive structure scale The following are the procedures for verifying them.

The Discriminating Power of Items

The two researchers verified the discriminatory power of the paragraphs using the Contrasted Groups method by first determining the total score for each of the respondents' forms, then arranging the forms in descending order according to the total score, from the highest degree to the lowest degree, and finally assigning (27%) of the forms with higher degrees and (27%) of the forms with lower degrees, and the number of members of each of the upper and lower end groups was (108) male and female students. After applying the t-test (t-test) for two independent samples, to find out the significance of the differences between the upper and lower groups for the scores of each item of the scale, all items of the scale by comparing them with the tabular T-value of (1.96) are distinguished at the significance level (0.05) and at the degree of freedom (214). So, it was found that paragraphs (1-43) aren't telling, but the rest of the paragraphs still have statistical significance. This means that there are 38 paragraphs total, which is the maximum number for this procedure.

The construct validity of the cognitive structure scale

Correlation of the score of each paragraph with the total score of the scale

To determine the relationship between two continuous variables, use the Pearson Correlation coefficient. Using the same analysis sample referred to in the previous paragraph, the statistical analysis sample consisted of (400) male and female students. After using the t-test for correlation significance and comparing it with the tabular t-value of (2.58) at the significance level (0.01) and the degree of freedom (398), the scale was considered constructively true according to this indicator, and it became clear that all items achieved a statistically significant correlation. Thus, the number of paragraphs for this procedure has reached 38. Second, Factorial Validity: The two researchers calculated the factorial validity of the scale by conducting the confirmatory factor analysis of the total scale of the cognitive structure of its paragraphs to the limit of this procedure (38 paragraphs), and it was done according to the Principal Components method with oblique rotation by the Oblimin method, after applying it to the sample of statistical analysis consisting of (400) male and female students (illustrated in the statistical analysis), and oblique rotation is appropriate for practical life due to the overlapping and correlation of variables in the same subject and the inability to explain it by factors completely independent of each other (Gouda 2008: 161).

Among them, the results of the analysis revealed factors (4) and explained the total variance of the factorial matrix, so that the extracted factors are considered statistically significant as long as their latent roots have a value greater than (1) (Athanasius and Al-Bayati 1977: 276). It is clear that it is not possible to obtain one factor for the cognitive structure, as its saturated paragraphs are distributed over four factors, with a latent root of (4.781) and explained by a value of (2.011) of the variance. Thirty-eight paragraphs are composed according to the paragraph number: (1-3-4-5-6-8-9-10-12-14-15-16-17-18-19-21-22-24-25-26 28-29-30-31-32-34-35-37-38-39-40-41-42-44-45-46-47-48) Its ramifications ranged between 0.897 and 0.359, all of which are statistically significant. The results showed that rotation did not lead to any supportive results for the one factor hypothesis, which supports the correctness of the psychometric orientation of the current research in dealing with the cognitive structure of its four fields (social, economic, informational, and educational).

Statistical analysis of the cognitive structure scale

Indicators of Validity Scale

Honesty is one of the most important psychometric characteristics that should be available on the psychological scale, as it indicates the scale's ability to measure what should actually be measured (Harrison 1983: 11), so the validity of the current scale was confirmed through the following two types of honesty: This indicator of honesty is the general appearance of the scale or its external image in terms of the type of paragraphs, how they are formulated, and the clarity of these paragraphs (Al-Chalabi 2005: 92). The two researchers made sure of this by following the steps in the paragraph about checking the validity of the scale. Stanley & Hopkin (1972:111) explain that construct validity means analysing the scale's scores based on the psychological construct of the characteristic to be measured; that is, it shows the extent to which the scale contains a specific

theoretical construct or characteristic (Stanley & Hopkin 1972:111). Or it is the extent to which we can determine that the scale measures a specific theoretical construct or a specific characteristic (Anastasi 1988:151).

Statistical indicators of the cognitive structure scale

Psychological phenomena are moderately distributed among the members of the community, and accordingly, the extraction of statistical indicators works to clarify the extent to which the distribution of the degrees of the sample members is close to the normal distribution, which is considered a criterion for judging the sample's representation of the studied community, allowing the generalisation of the results (Mansi and Sharif 2014: 182), and after extracting the statistical indicators for the degrees of the responses of the research sample, On the cognitive structure scale, the statistical analysis sample's distribution of degrees was closer to the average distribution. A description of the cognitive intention scale in its final form: After verifying the standard characteristics represented by the indicators of statistical analysis, validity and reliability of the scale, the cognitive structure scale in its final form became (38) items distributed over four domains: the social domain includes (9) items, the economic domain includes (9) paragraphs, the information field includes (9) paragraphs, and the educational field includes (11) paragraphs, and in front of each paragraph there are five alternatives: A grade, representing me rarely taking a grade of (2) degrees, does not represent me when I take a grade of (1) grade. Accordingly, the highest total score for the scale is (190), and the lowest score for the scale is (38), with a hypothetical average of (114). According to the fields.

Results

Objective: The cognitive structure of graduate students in the universities of the Middle Euphrates

The results of the research showed that the average degree of the cognitive structure of the research sample of (643) postgraduate students in the universities of the Middle Euphrates reached (151.73) degrees, with a standard deviation of (19,412) degrees, while the hypothetical average amounted to (114), and in order to know the significance of The difference between them is that the t-test for one sample was used, as the calculated t-value reached (49.288), which is greater than the tabular t-value of (1.96), at a significance level of (0.05) and a degree of freedom (642), and this result indicates that the postgraduate students in the universities of the Middle Euphrates are characterised by cognitive structures, according to the data available in Table (1)

Table 1
Shows the one-sample t-test results in graduate students' cognitive structure

variable	Sample	mean	Standard deviation	Hypothesis mean	degree of freedom	T value		Significance level
						Calculation	Tabular	
Cognitive Structure	643	151.73	19.412	114	642	49.288	1.960	0.05

It indicates that postgraduate students at the universities of the Middle Euphrates enjoy the knowledge structure, and the two researchers explain that this is due to the fact that structures develop with age through the interaction of these individuals with many different experiences and life situations, and the fact that the postgraduate stage has a high level of cognitive awareness. The moral is that the graduate student is aware of his own characteristics, abilities, potentials, physiological needs, and motives. The statistically significant differences in the cognitive structures of graduate students according to gender (male-female), specialisation (scientific-human), and study (Masters-PhD) were extracted from the differences in the sub-variables of the cognitive structures of graduate students in the universities of the Middle Euphrates according to the variables (gender, specialization, study, and university). The two researchers used the analysis of variance by interaction to reveal the results of statistically significant differences for the variables (gender, specialization, study, university), and for the two interactions between (study * university), (study * specialization), and (study * gender). In addition, there is (university * specialization), (university * type), and (specialization * type). And the following has been demonstrated for the triple interactions in (study * university * specialization), (study * university * type), and (study * specialisation * type):

The values are indicative of the cognitive structure scale

With regard to what was produced by the analysis of triple variance by interaction, the two researchers found that the significant values were: First, the statistical differences in the studies (Master and Ph.D.). where the calculated t-values of (5.662) were greater than the tabular t-value of (3.841) at the level of significance (0.05). This indicates that there is a difference for postgraduate students between the two types of study, master's and doctorate, in the cognitive structures and which of the two studies (master's or doctorate) is more representative of cognitive structures. The two researchers used Scheffe's equation to extract the differences between them. The difference was a value of (4.000), which means that there is a difference between the averages in the type of study in relation to the cognitive structures, and by reference to the same averages, the two researchers found that the average of the PhD degree, with a value of (158.730) with a standard deviation of (5.433), was greater than the arithmetic mean of a master's degree, with a value of (137,835) with a standard deviation of 5.067. This indicates that doctoral students are more than master's students in cognitive structures.

Statistical differences in specialisation (scientific-humanitarian)

where the calculated t-values of (6.252) were greater than the tabular t-value of (3.841) at the level of significance (0.05). This indicates that there is a difference for postgraduate students between scientific and human specialisation in the cognitive structure, and which type of specialisation (scientific or human) more in the cognitive structure. The two researchers used Scheffe's equation to extract the differences between them. The difference was a value of (5.032), and this means that there is a difference between the averages in the type of specialization and by reference to the same averages, the two researchers found that the average of students in the humanitarian specialisation numbered (307), with a value of (184.101) and a standard deviation (4.528) was greater than the arithmetic mean of the students. In the scientific specialisation of (336), with a value of (174.909) and a standard deviation of (4.880), this indicates that students of the humanities specialisation have more knowledge structures than students of scientific specialization.

Conclusions

The postgraduate students in the universities of the Middle Euphrates are characterised by cognitive structures. They know that the knowledge structures in their educational world, knowledge structures in their information world, knowledge structures in their social world, did not appear in any clear structures in their economic world, that PhD students are more than master's students in cognitive structures, that students of the humanitarian specialisation have more knowledge structures than students of the scientific specialization, and that the female students of higher education are close to the students in postgraduate studies in cognitive structures.

References

- Abdo, Shehadeh Mustafah. 2003. Lectures from the Master's Course in Measurement and Evaluation, An-Najah National University, Nablus, Palestine.
- Al-Anani, Hanan Abdel Hamid (2001): Educational Psychology. Dar Safaa for Publishing and Distribution: Amman, Jordan.
- Athanasius, Zakaria, and Al-Bayati, Abdul-Jabbar Tawfiq (1977): Introduction to Factor Analysis, Baghdad, Al-Mustansiriya University.
- Cevallos, M. A. S., Rosado, C. A. Z., & Terán, O. V. T. (2019). The procedure used on diagnostic evaluation process. *International Journal of Health & Medical Sciences*, 3(1), 1-10. <https://doi.org/10.31295/ijhms.v3n1.98>
- Faraj, Safwat (1997): Theoretical and scientific factor analysis in the humanities and educational sciences, 1st edition, Alam Al-Kutub, Cairo.
- Fathi Mustafa Al-Zayyat (1996): The Psychology of Learning Between the Relational and Cognitive Perspectives, Universities Publishing House, Cairo.
- Ghoneim, Sayed Muhammad (1973): Child Mental Development in Piaget's Theory, *Annals of the Faculty of Arts at Ain Shams University: Volume Thirteen*, Ain Shams University Press, Cairo, pp. (125–183).
- Gouda, Mahfouz (2008): Advanced Statistical Analysis using Spss, 1st Edition, Wael House for Publishing and Distribution, Amman.

- Khattab, Ali Maher (2009): *Inferential Statistics in Educational, Psychological, and Social Sciences*, Cairo, Egypt: Anglo-Egyptian Library.
- Mansour, Ali (1991): *Educational Psychology*, 2nd Edition, University Book, Khaled Ibn Al-Walid Press, Damascus, Syria.
- Mansour, Ali Al-Rifai, and Ismail (2002): *The psychological foundations of educational techniques*, Al-Resala Institute, Beirut, Lebanon.
- Mohamed, Adel Abdullah (1990): *The Mental Development of the Child*. Eastern House, Cairo, Egypt.
- Musa Al-Nabhan (2013), Dar Al-Shorouk for Publishing and Distribution, Amman, Jordan, *Basics of Measurement in Behavioral Sciences*.
- Qatami, Youssef (2000): *A Child's Cognitive and Linguistic Development*, Al Ahlia for Publishing and Distribution, Amman, Jordan.
- Salim, Maryam (1980): *The Science of Knowledge Formation and Education*, Journal of Arab Thought, Al-Moaser Lebanese, Nos. 4-5, pp. (105-130).
- Widana, I.K., Sumetri, N.W., Sutapa, I.K., Suryasa, W. (2021). Anthropometric measures for better cardiovascular and musculoskeletal health. *Computer Applications in Engineering Education*, 29(3), 550–561. <https://doi.org/10.1002/cae.22202>