ISSN NO: 2770-2367
Date of Publication: 20-05-2022

Cognitive failure among students of the mathematics department in College of Basic Education

Aswan Saber Majid
University of Maysan / College of Basic Education
aswan_saber_majed@uomisan.edu.iq

Annotation: This research aimed to measure the cognitive failures of the research sample, and the research sample was (270) students from the Mathematics Department, College of Basic Education, and the research community was (1438) male and female students for the academic year 2021-2022. The cognitive failure scale was used.
And came up with the following recommendations
- Applying the cognitive failure scale to students in primary and secondary schools.
- Reducing the reluctance of mathematics departments in the first place ,To increase the efficiency of future teachers.
- Urging university professors to address cognitive failures while teaching mathematics department students
The results of the current search were:
The presence of cognitive failures among students of the mathematics department in the faculties of basic education

Keyword: Cognitive Failures

Introduction

First: the research problem

The subject of cognitive failures is related to the subject of knowledge, which indicates that all mental processes through which the inputs are developed, abbreviated and stored in the mind of the individual until he calls them to be used in different situations, and these processes can be explained within the framework of what is now known as information processing, a concept that can accommodate all activities and mental processes , which starts from the stimulus (sensation, then attention, then perception) to the occurrence of the response that is commensurate with the situations that the individual is exposed to (Qatami, 1998: 168).
Accordingly, the study of cognitive failures contributes to a large degree in understanding how failures are repeated and in determining who also falls into them (Norman, 1981: P 58) Psychologists have termed cases of lapses and errors committed by individuals in the context of their daily life activities, such as forgetting names or places, failing to notice and explain things, and intellectual dispersion that accompanies cases of mental responses or unintentionally wasting things, as cognitive errors in the name of executive failure (Reason, 1988: pp.405-421) The study of (Hamza, 2020:30) also concluded that there are cognitive failures among university students. Therefore, the current research tried to answer the question that:
Are there failures among the students of the Mathematics Department in the College of Basic Education?

Second: the importance of the Research:

The importance of the research can be summarized in two aspects:
First: Theoretical importance
1. The importance of this research is attributed to the fact that it is one of the researches on cognitive failures that can be employed in the educational process

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

2. Employing this research to help motivate students to address cognitive failures, through which their educational reality is changed

Second: The practical importance

1. May develop teaching methods, curriculum construction and assessment methods for university students by knowing the level of cognitive failures
2. The cognitive failure scale may help to address a problem in the mathematics department for students, which is an important segment of society
3. Students may know the causes of cognitive failures and ways to address them

Third: Objective of the research:-

2. Knowing the level of cognitive failures among students of the Department of Mathematics in the college of Basic Education.

Fourth: the research hypothesis

- There is no statistically significant difference at the level (0.05) between the hypothetical average and the arithmetic mean of the students' scores for the cognitive failure scale for students of the Department of Mathematics in the college of Basic Education.

Fifth: Research limits

This search is determined by the following:

1. Spatial boundaries: Colleges of Basic Education, Departments of Mathematics, Iraq (2021-2022).
2. Human limits: Students of the Mathematics Department, College of Basic Education
3. Objective limits: cognitive failures

Sixth: terms definition

Cognitive Failures:

- Broadbent, 1982 defined it as: ((the failure of the individual to deal with the information that confronts him, whether that is in the process of perceiving it, or in remembering the experience associated with it, or in the process of employing it to perform a task)) (Broadbent et al, 1982). :114)

The researcher defines it as the individual's loss of the abilities to focus, pay attention, perceive and remember verbally, or emotionally, and in employing and recalling events.

Chapter two
Theoretical background and previous studies

First: Cognitive Failures

The life of the individual is a large theater on which events and experiences are presented, and he must live with them with whatever capabilities and information he possesses. And that the human being is a storehouse of experiences and events and has a great role in how to deal with them, and our world today is full of events and many stimuli that attract the attention of the individual at every moment, making it difficult for the individual to pay attention to all these moments (Atkinson & Other, 1996: 170).

Cognitive failures have psychological and cognitive effects on the individual, and individuals who suffer from cognitive failures have a deficiency or loss of one or more cognitive functions, and cognitive failure may result in them having specific deviations in the general mental ability and cognitive functions include attention, focus, remembering, learning, and solving Problems, and the special ability of the kinetic effects of mental processes (Robinson, 1999: 292).

Cognitive failures occur as a result of external and internal factors that affect the performance of the individual and cause him to make mistakes, and external factors may come from the stimuli of the environment surrounding the individual and internal factors may come from the individual himself, such as trauma or hitting the head or infectious diseases, which contribute to cognitive

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

failures, and the individual is affected By other factors such as physiological factors such as stress, insomnia and psychological disturbances, which are considered an influential factor in cognitive failures. However, these cases and disturbances are not the result of cognitive failures. They may mediate in the occurrence of errors and accidents that affect the individual himself and others. Houston, (1997; 142-145)

(Lusciano , 2002) found that cognitive failures are more frequent in the research sample who have higher degrees in the neurotic dimensions and anxiety. The high neuroticism sample showed a greater amount of cognitive failures than the low neurotic sample, and he sees that the cognitive failure of the morning types is more than the Evening types, There are no statistically significant differences according to the gender variable, with the exception of neuroticism, which found females to have high degrees of cognitive failure (Daniel, M. Jessica, 2005: 17).

Cognitive failures and mental processes:

The increasing interest in mental processes (Cognitive Processes) and the cognitive structures of the individual and the distinctive way in how he receives and processes stimuli, distinguishes, transforms and stores them, and the quantity and how of the connections he uses, creates, derives or produces among the new information and information based on his cognitive structure (Abdul-Hassan, 2006: 52).).

And the interest by psychologists specialized and those interested in studying the mental abilities of the individual began after they had a set of questions, including, why do we remember things and forget others, and whether information fades and disappears or does it remain in memory, and among these and other questions alerted scientists to the study of mental processes and their characteristics and the way they work. Darwaza, 2004: 62).

Each of the aforementioned processes has characteristics that differentiate them from one another , but they are similar and overlap in showing the required response.This interference shows its effects in the cognitive functions, which are a set of mental processes leading to the knowledge of things and their properties, and if one of them is disturbed, it leads to a defect or disability in all mental processes, And cognitive failures are the most prominent manifestations of failure of the mental processes of the individual, and the feeling is the first substance and the basic step for the proper cognition of the individual and arises directly from the emotion of a sensory organ in the sensory organs, These organs transmit sensory nerve connections to nerve centers and sensory areas in the brain, which in turn show appropriate responses and reactions as diverse sensory-kinetics expressions (Abbas, 1998: 63-66).

There is a very strong connection between sensations and other cognitive processes. The lack of sensation leads to a lack of awareness. Sensation is the individual's being affected by external influences through the five senses, then the sensory nervous system is then transferred to the various centers of the brain to begin the process of perception. As for attention and awareness They were touched upon in the methods of information processing in the first (Al-Tayyib, 2009: 16).

As for the remembering process, it is the basis for the mental performance of the learner, as remembering experiences after saving them in memory plays an important role on both the conscious and subconscious levels (Al-Khouli, 1976: 193).

Remembrance is located in the memory, which can be described as a storage tool with several levels that can be summed up into two levels: short-term memory and long-term memory. Memory plays a very important role in the cognition, as it enables us to understand the nature of environmental inputs by comparing them with the individual's knowledge of his past experiences stored in long-term memory (Hassan, 2007: 164). Cognitive failures may occur in memory for the following reasons:

Causes of cognitive failures:

A reference (Eppinghaus, 1985) indicates that the individual retrieves new events better than the more distant events, and cognitive failures occur before learning, and the individual loses over time less and less other information from memory, and he loses information over time. The

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

following is a brief presentation of the most important reasons that lead the individual to failures cognitive is:

1- Encoding Failure: The reason for the individual's failure to retrieve information from memory is that the information sometimes is not well encoded, or because the information is neglected by the individual,
Failure to encode results if an individual does not process information well enough to initiate coherence and causes encoding failure and loss of information after a short period of processing and that information, even if it is properly encoded, can be lost later.
Decay: The decay theory sees that memories weaken and decay with time, and the relevant connections between neurons are lost, and if human neurons are the same, then memories decay through time (Al-Khairy, 2012: 175).
Interfernce: Interference is a disruption in the retrieval of information, even partially. There are two types of interference that can affect the retrieval of information:
• Etroactive: which fails to remember something that has already been learned.
• Proactive: It is what makes it difficult to learn something new from what has already been learned

Blocking: Since memory is associative and coding entails forming associations between mental representations and retrieval when needed requires model completion, Presenting a recall symbol reactivates the relevant representation, and failure can be caused by mental impairment (memory) by interception or obstruction that can occur when multiple associations are related to a symbol, and one of those associations may be stronger than the others This is a failure to retrieve the information (Sternberg, 2003:215).
Selection failure: one of the types of failures occurs when there is a lot of information that is simultaneously presented to the individual, and the individual is not able to notice all of that information (Al-Khairi, 2012: 177).

Theoretical models that explain cognitive failures:
Psychologists have been interested in the different schools to which they belong to cognitive failures and their interpretation. The researcher presents some theoretical models that were available to him that dealt with cognitive failures, as follows:

First: Broadbent Filter Theory, 1952-1962
This model focuses on the way information flows between the stimulus and the response, as it begins with a stimulus and the "sensory register" and then reaches the filtering area, which he calls "selective filter" that leads to a channel in which the "perceptual analysis process" takes place. Then the information passes on the short-term memory and then reaches the desired response (Strnberg, 1999: 93).
This model is based on a basic premise that human attention to stimuli and information through sensory channels is limited and selective, and that there is a filter inside the human being that removes or deletes stimuli, or information that he did not pay attention to (unimportant) (Margaret, 1994). :48).

Second: Treisman Theory, 1969.
Treisman (1960) indicated that there is a high probability that the subject will repeat the words contained in the non-stimulating message, especially if the content of it's words is similar to the content of the words contained in the alarming message that he repeats (Treisman, 1960: 242). Triesman believes that selective attention works on two levels:

The first level: It is a selection that occurs through specific sensory channels of information, as it is in the Broadbent model.

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

The second level: It is the level of meanings, as the examinee must identify the stimuli before he rejects or selects them. (Atkinson, 1996: 172).

Third: The Dissociation Model - Cognitive Failures

(Merckel Bach, 1996) The author of this model indicates that people face in their daily lives information from multiple sources, so they try to adapt to that information, and disintegration is one of the most prominent means that individuals resort to when they face difficulties in Treating information obtained from many sources, including experiences, memories, emotions, bodily sensations and behaviors, and daydreaming is one of the disintegration means that an individual resorts to (Al-Nuaimi, 2007: 30).

At extreme levels, dissociation is associated with a diagnosis of dissociative identity disorder, which was previously called multiple personality disorder, which is associated with memory impairment, and as is the case with the association with dissociation with memory impairment, cognitive failure has been associated with memory impairment (Merckelbach T, et al 1996: 714-725).

Second: Previous studies: Studies that dealt with cognitive failures

1- J. Craig Wallace study. 2003),) aimed at knowing the relationship between cognitive failure and some personality traits

2- (Al-Khilani, 2008) the aim of the research is to reveal the relationship between social pain, traumatic memory, and cognitive failures among university students.

3- (Hamza, 2020) the aim of the research is to reveal the manifestations of cognitive failures in daily life tasks and their relationship to symptoms of depression among female students of the College of Education at Al-Qassim University.

Table (1) A studies that dealt with cognitive failures.

	Researcher name	Country name	Research year	Educational Grade	Sample size	Research tools	Research results
1	Craig Wallace	America	2003	University Males	385	Cognitive failure scale personality scale Alfakronbach Pearson correlation coefficient	Negative relationship between conscientiousness and cognitive failures Positive relationship between neuroticism and cognitive failure
2	Al-Khilani	Iraq	2008	University students	480	Cognitive failure scale Social Pain Scale Traumatic memory scale	No cognitive failures High level of social pain No difference in gender No traumatic memory

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

3	Hamza	Saudi Arabia	2020	University students	140	Cognitive failure scale depression scale	There are significant positive correlations between each of the total degree of cognitive failures and their three manifestations (attention, action performance, memory) and symptoms (somatic depression, and bad mood).

Chapter Three: -

Research rocedures:

This chapter includes a presentation of the research procedures followed by the researcher in terms of research methodology, population identification, sample selection, and construction of the tool used in the research, as well as the statistical methods used in it.

First: the research method

The current research used the descriptive approach to suit the nature of its objectives, as this approach is not limited to data collection and tabulation, but goes beyond that, It guesses a degree of interpretation, analysis, comparison and evaluation of these data, leading to generalizations.And the

The descriptive research method is a scientific diagnosis of a phenomenon and its quantitative insight into linguistic and mathematical symbols. (Anwar and Adnan, 2007: 37-38).

Second: the research community

1. The current research community is determined by male and female students in the faculties of Basic Education / Department of Mathematics in Iraq for the academic year 2021-2022 AD. Their number is (1438) male and female students.

2.Third: Research Sample

3. The research sample was chosen by the intentional method, and it consisted of (270) male and female students of the third stage in the faculties of Basic Education / Department of Mathematics.

Table (2) A sample of students in the faculties of basic education/mathematics department

Students number	Educational grade	University
72	Third stage	Al-Mustansiriya University
147	Third stage	University of Maysan
51	Third stage	Diyala University
270	Total	

4. Fourth: the search tool

The current research required the availability of a cognitive failure scale that has the conditions of psychological and educational scales, and it was carried out in the following steps:

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

Cognitive failure scale

Since the current research deals with the cognitive failures of the research sample, which required the adoption of the cognitive failure scale, which is carried out on scientific and educational foundations that the researcher took into consideration when adopting this scale, which includes (distraction of attention and awareness (10) paragraph, failure to employ events and information (20) Paragraph, errors in memory (20) paragraphs.

The validity of the cognitive failure scale:

The tool is valid if it actually measures the thing for which it was placed and does not measure something else as a substitute or addition to it. (Al-Esawy, 1975:54). In order to verify this, the researcher relied

Apparent honesty: - It represents the extent to which the content of the paragraphs belong to the measured feature. The paragraphs were presented in their initial form to a group of experts specialized in teaching methods, mathematics and educational sciences. Their number reached (23) experts, appendix (1) to indicate their opinion on their validity, clarity and language integrity. To verify the validity of the tool, the researcher relied:

1- The literature and previous studies that the researcher reviewed, and the researcher reported through her review of some Arab and foreign studies related to cognitive failures and her review of some educational sources related to cognitive failures in educational situations to form a general idea such as (Al-Khilani, 2008) scale and (Al-Rakibi, 2010) scale Which the researcher adopted in this research, and the number of paragraphs in this research reached (50) paragraphs, which represent paragraphs of cognitive failures, a list of appendix (2) was organized.

The five-item distribution was adopted for each paragraph in the cognitive failure paragraphs, as follows:
(Very good (5) grades, - good (4), grades - average (3), grades - below average (2 grades), - poor (1 grade) (Hall, 1980: 146)

Consistency of the cognitive failure scale

After verifying its validity and in order to rely on it as a tool for the current research, it is necessary to ensure its stability, that is, it gives the same results when repeatedly applied to the same individuals and under the same circumstances. (Landville, 1968: 82), and that extracting the stability coefficient is a prerequisite for obtaining objectivity. (Van Dalen, 1984: 513)

In extracting the stability coefficient of the tool, the following method was used:
1- Retest : in measuring cognitive failures if it was applied to the exploratory sample (70) male and female students (morning study) and were randomly selected from among the students, and the time between using the first and second scale was between (14-18) days, and this is what Adams confirms it, as the scale was applied for the first time on 2/8/2021, and the scale was applied again on 2/24/2021. And by using the Pearson correlation coefficient, the reliability coefficient (87, 0) appeared, which is a good stability coefficient. Thus, the stability of the research tool, represented by the cognitive failure scale, was verified.

Final application of the scale:

The statistical analysis of the cognitive failure scale was conducted and it was ready to be applied in their final form to the research sample.
As the researcher applied the cognitive failure scale on Monday and Tuesday due to the Corona

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

pandemic, because the work was limited to specific days at the university and for the different stages in Maysan 7-8-11-13/ 4/2021
Statistical means: ssps program was used.

Chapter Four
Presents and interprets the results

It is presented in light of the research objective and hypothesis:

First: Presentation and interpretation of the results

• For the purpose of verifying the hypothesis stated
- There is no statistically significant difference at the level (0.05) between the hypothetical average and the arithmetic mean of the students' scores for the cognitive failure scale for students of the Department of Mathematics in the faculties of Basic Education.
The average score of the third stage students in the mathematics department on the scale was (150.216), with a standard deviation of (31.513), and by comparing this mean with the hypothetical average of the scale (150) and using the t-test for one sample, it was found that the difference is significant in favor of the hypothetical mean.

Table (1)
The results of the T-test to calculate the significance of the difference between the mean scores of the sample of students and the hypothetical mean of the cognitive failure scale

Significance at 0.05 . level	T value		average hypothetical	deviation normative	Arithmetic mean	Sample
	tabular	calculated				
nonfunction	1.96	0.1167	150	31.513	150.216	270

It is noted that the calculated "t" value is (0.1211) which is less than the tabular "t" value at the significance level (0.05), which means that the hypothesis is correct and that the significance of the difference between the arithmetic mean and the hypothetical mean indicates the presence of cognitive failures for students of the mathematics department in the faculties of basic education. This is due to:

1. The fragility of the inputs of the faculties of basic education, according to the planning of the Ministry of Higher Education and Scientific Research
2. The lack of sufficient time due to the Corona pandemic to employ cognitive abilities in new situations.

Second: The conclusions

In light of the research results, the researcher can conclude the following:
1- The existence of cognitive failures for students of the mathematics department in the faculties of basic education.
2- Knowing the level of cognitive failures in the educational environment is noticeable to improve the level of academic achievement in order to achieve educational goals

Third: Recommendations

In light of the results of the current study, the researcher can recommend the following:
- Applying the cognitive failure scale to students in middle and middle schools.
Reducing students' reluctance to study mathematics departments by knowing their fear and the difficulties they face in the educational process
- Employing coding and synchronization in the process and teaching methods .

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

- Treatment of decay, interference and selection among students due to the large number of dispersions within the environment
-Urging teachers to address cognitive failures in light of the Corona pandemic and the cognitive damage it has left.

Fourth: Suggestions

The researcher suggests doing the following:
1- A study similar to the current study on middle school students
2- The relationship between cognitive failures and other variables such as (formal thinking, creativity ladder, etc.).
3- The impact of developing athletic strength among students of the College of Basic Education on cognitive failures

Sources

1. Anwar Hussein Abdel Rahman, Adnan Zangana (2007): Methodological patterns and their applications in the humanities and applied sciences, first edition, Dar Al-Wefaq, Baghdad.
2. Hassan, Al-Harith, Abdul Hamid (2007). Psychological Language in Architecture, Introduction to Architectural Psychology, Pages for Studies and Publishing.
3. Hamza, Jihan Ahmed (2020): The manifestations of cognitive failures in daily life tasks and their relationship to depression symptoms among female students of the College of Education at Qassim
4. University, Saudi Arabia, The Egyptian Journal of Psychological Studies, Volume 30, Issue 107.
5. Al-Khouli, William (1976) Dictionary of Education, 2nd Edition, Dar Al-Qalam, Beirut.
6. Al-Khairy, Arwa Muhammad (2012). Cognitive Psychology, 1st Edition, Afkar for Studies and Publishing House, Syria
7. Al-Khilani, Kamal Muhammad Sarhan (2008). Social pain and its relationship to traumatic memory and cognitive failures, unpublished PhD thesis, College of Arts, University of Baghdad
8. Darwaza, Afnan Nazir (1991). Cognitive strategies stimulants as specific cognitive means to improve the educational process, Bethlehem University Journal, No. (10), Palestine.
9. Al-Rikabi, Anaam Majid (2010): Cognitive failure and its relationship to the thinking center in the Engram system among university students, an unpublished master's thesis, College of Education for Girls, University of Baghdad
10. Al-Tayyib, Abdel-Rahman (2009). Mental Powers and the Five Senses, Eligibility for Publishing and Distribution.
11. Abbas, Adnan Muhammad (1998). The Basics of Modern Psychology, Al-Khwarizmi Press for Publishing and Distribution, Jordan.
12. Abdel Hassan, Ghada Thani (2006). The effect of mental fatigue and its reduction in problem solving among university teachers, unpublished doctoral thesis, College of Arts, Al-Mustansiriya University.
    - Al-Esawy, Abdel Rahman (1974) Measurement and Experimentation in Psychology and Education, Dar Al-Nahda Al-Arabiya for printing, Beirut.
13. Van Dalen, Demo Born (1984) translated by: Nabil Nofal and others, Research Methods in Education and Psychology, 3rd Edition, Anglo-Egyptian Library, Cairo
    Qatami, Youssef (1998). The psychology of classroom learning, Dar Al-Shorouk, Amman, Jordan
14. Landville, S. M. (1968): Methods of Testing and Evaluation in Education, translated by: Abdul-Malik Al-Nashef and Saeed Al-Tal, Franklin Foundation, Beirut, Lebanon.
15. Al-Naimi, Muhannad Muhammad Abdul-Sattar (2007). The effect of cognitive failures and hemispheric mastery of the brain in resolving verbal analogies among primary school students (conference research) The participation of educational and psychological sciences and their sustainable role at the University of Diyala, College of Basic Education, Diyala, Iraq

ISSN NO: 2770-2367
Date of Publication: 20-05-2022

Atkinson,R.&Others(1996).Hhilgard In troduction to psychology . Harcoyrt-Brace College publishers .
16. Broadbent ,D .E,Cooper,P,F.Fitzgerald,P & Parks ,K ,R (1982). The Cognitive Failure Questionnaire(C,F,Q) and its Correlates British Journal of Clinical Psychology
17. Broadbent,D,E.(1957).Mechanical of Human Attention and Immediate Memory . psychology Review (64) p205-207).
18. Daniiel,M,&Jessica,L(2005).Cognitive in Every Life,New York ,Guiford Press.
19. Houston,D.M.(1997).Psychological distress and error making among junior house officers heath .
20. Merckelbach , H , Muris P,Nijman and Jong (1996).Self-repted Cognitive Failures and neurotic symptomology . Personality and Differences ,20 N
21. Norman, D.A. (1981). Categorization of action slips. psychological Review. 88, 1-15
22. Reason, J. T. (1988) : stress andcognitive failure in S fisher & J. Reason (Eds) Hand Book of life stress cogiaition, and health, New York
23. Robinson, M.E (1999). The role of emotion inpain in R.Gatchel & turk(EdS) Psychosocial in pain : Critical Perspes ,Newyork gutiford pres.
24. Sternberg , (1999) . Cognitive psychology .3rd ed, Newyork ,Academic press
25. Sternberg . R. (2003) . Cognitive Psychology. Aliyn &Bacon .
26. Treisman,A.M.(1960).Contextual cues in selective Listening . Journal Experimental Psychology .12, .
27. Wallace, J.C., & vodanovich, S.J. (2003) can accidents and industrial mishaps be predicted ? Further investiyation into the relation ship between cognitive Failure and reports of accidents Journal of basiness and psychology