



---

## Learning Difficulties In Mathematics And Its Relationship To Cognitive Failures Among Middle School Students

**Dr. Ruqayah Hadi Abdulsahib** University of Babylon - College of Education for Human Sciences, Department of Education and Psychological Sciences  
[ruqayah@gmail.com](mailto:ruqayah@gmail.com)

---

### Abstract

The aim of the current research is to know the mathematics learning difficulties Of middle school students, the cognitive failures of middle school students, the correlative relationship between mathematics learning difficulties and the cognitive failures of middle school students. The current research is limited to students of the intermediate stage of schools in the center of Babylon governorate for the academic year 2019-2020. To achieve the objectives of the research, a random sample of (410) male and female students was selected, then they were distributed according to the percentages in the community, i.e. (46%) of the males, whose number reached (189) And (54%) of the female students, who numbered (221) students. To achieve the goals of the research, the researcher built a mathematics learning difficulties test. The test includes seven domains. In its final form, it consisted of (28) paragraphs from two alternatives, where a score of (1) is given for the correct answer (0) for the wrong answer. The Cognitive Failures Questionnaire, prepared by Broadbent and his colleagues (Broadbent, Cooper, FitzGerald & Parkes, 1982), was adopted and translated, modified and adapted to make it suitable for the Iraqi environment. Happens Always, Happens A Lot, Happens Sometimes, Happens Little, Never Happens) The student can choose one of those alternatives and the alternatives are given scores from (1-5) respectively. The researcher verified the validity of the tool by the method of apparent validity and construct validity, and verified their stability by re-testing.

There are a number of middle school students who suffer from difficulties in learning mathematics.

Math learning difficulties and cognitive failures in the intermediate stage can be detected through tests prepared for that.

The problem facing those with learning difficulties mathematics and cognitive failures is how to process information.

4. There is a relationship between difficulties in learning mathematics and cognitive failures in terms of the level of students' cognitive abilities

### **Research problem:**

The field of learning difficulties is an important area, in which the differences between students are clear, as it is clear that students with learning difficulties are completely

healthy in most psychological manifestations, but they suffer from a clear disability in one field of learning or another. ( Meshali, 2008, 12)

It may occur when an individual's numeracy skills such as acquiring facts about numbers, forming and writing numbers, thinking about the field of calculation, or the general ability to calculate is significantly lower than the expected level of intelligence. (Safa Beheri, 2001,.) (16-15)

The concept of learning difficulties is a partial concept of the concept of the inability to learn, as it is specific to a group of students who suffer from academic difficulties, which is evidenced by the decrease in achievement, while the second concept is specific to a group of students who suffer from academic and developmental difficulties, as well as students who are covered by the first concept, which is inferred from the decrease in their academic achievement, while those who are covered by the second concept are not necessarily low achievers . (Wael Farrag, 2002, 15)

Usually low achievement tends to form negative attitudes towards himself and his school as a result of a sense of failure, lack and feeling ostracized from school or home, which leads to frustration that drives some of them to aggression towards colleagues or towards the teacher or school. As for some of them, they may turn into introverts in school or society, and we find that low achievement accepts itself as a failure or rejection of any negative concept of self ( Mahmoud Atta, 1978, 1)

Mathematics learning difficulties are the most important and common types of learning difficulties, as they often start at the primary level, continue until the secondary level, and perhaps the beginning of the university stage, and even extend

Its impact on the daily and professional life of the individual may be due to the abstract and synthetic nature of mathematics, that is, it starts with the simple tangible ease, and develops until it reaches the abstract difficulty. " From the set of axioms, results and theories are derived by going through deductive steps governed by the laws of logic (Al-Mutta, 1995)

Fear of mathematics is now more widespread than before among individuals, and that a large percentage of them do not like mathematics, do not enthusiastically study it, and even hate it, and this can be seen through the feeling that these individuals show when they face a simple math problem.

(Ahmed, 1986)

Mental processes such as sensation, attention, perception, thinking and remembering are one of the main axes of the individual's cognitive organization, as these processes interact and are linked to each other until it becomes impossible to imagine mental activities in one of them . (John, 2007, 300 )

In daily situations, the individual faces multiple difficulties that generate problems that prevent the individual from reaching a specific goal or goal, and the quality of these problems varies in terms of the degree of difficulty, as there are simple and complex ones, and they vary in nature to include all aspects of psychological, social, academic and other life (Youssef, 2011, 225)

And that cognitive failures make students unable to create continuous relationships with their teachers, which generates sensitivity with their colleagues and may go beyond that to weaken the student's self-confidence, which leads to psychological disorders that negatively affect cognitive processes such as understanding and remembering. These cognitive failures may lead to observational deviations in mental ability tests in general (Tuma & Angelhs, 2000 , 721-31)

Cognitive functions, concentration, discrimination, recall, learning and problem solving, abilities for the motor effects of mental and other processes. (Robinson & Riley, 1999,291)

**Hence the problem of searching the answer to the following question:**

**1- Is there a relationship between the academic difficulties of science and the cognitive failures of middle school students?**

### **Research importance.**

The subject of learning difficulties is one of the areas of research that has attracted much attention from researchers in recent times, especially with the increasing complaints of many parents and teachers about the inability of their children to achieve educational attainment appropriate to their age, despite the high indicators of their general mental ability and the absence of any disabilities or disorders noticeable to them, in addition to the availability of all financial means and modern technological means that qualify them and help them to progress and academic advancement.

Each person has unique abilities, and these abilities can be developed and developed. There are those who resemble the human brain as a sleeping giant, because the potential of the mind is much greater than can be imagined ..(Pozan:1996 :145)

The weakness in cognitive abilities or the lack of proper training leads to the student's slowdown and academic delay, while the availability of appropriate training opportunities leads to helping him to progress in study . (Weiner, 1996 :14).

(Mathews,al,al, 1988) confirmed that there is a relationship between cognitive failures and student performance in the exam and its impact on the academic level of students, as the study showed that there is an inverse relationship between them, as the higher the levels of cognitive failure, the lower his level of performance in the exam (Mathews,al,al, 1988, 123)

Cognitive failures arise as a result of dysfunction or deficiency in the work of mental and cognitive abilities, which include attention, cognition, recall, and other cognitive processes that directly affect the impaired ability to learn . (Davidoph , 1976,125 )

Some studies have confirmed that there is a close correlation between attention and cognitive failures, that is, students who suffer from attention impairment are unable to receive environmental stimuli, which leads to impairment in the cognitive process, and then lack of recognition of these stimuli and distinguish between them, and thus are unable to explain and perceive these stimuli (Muhammad, 2006, 3)

(Al-Atoum , 2004) confirmed that there are many indicators for most learners, as they do not complain about difficulties in the learning process as much as they suffer from difficulties in the process of remembering and retrieving information, as the information does not disappear from memory, but we fail to retrieve it, and that the ability to remember previous information is due to the factors of failure to encode it or the inability to store it. (Atom, 2004, 147)

The phenomenon of cognitive failures among middle school students is a major challenge towards advancing the academic process and its success and refining their personality so that they have the ability to organize their performance and perform their duties properly. (Dewitte, 2002,110 )

Thus, it is necessary to provide opportunities to prepare students, highlight their abilities, overcome all the difficulties they face, which is a major obstacle to the progress of the educational process, and help them reduce cognitive failures (Muhammad, 1988, 18).

**Research Objectives:** The current research aims to identify: -

Math learning difficulties among middle school students

Cognitive failures among middle school students

Correlation between mathematics learning difficulties and cognitive failures among middle school students

#### **search limits**

The current research is determined by the middle school students of Babylon Governorate Center for the academic year 2019-2020.

#### **Define terminology**

First :: Learning difficulties Mathematics : Defined by: -

COSEC 1970 (Kosc, 2000): - It is a difficulty in producing effective calculations, particularly accurate, or the difficulty of learning mathematical tables, conducting operations such as addition, subtraction, multiplication and division, or the inability to form the concept of number and read and write the setting correctly) or the difficulty of identifying mathematical symbols, remembering numbers, and the difficulty of understanding some mathematical concepts such as the concept of mono-symmetry or disorders of the ability to process the number (Kosc, 2000 :56) .

Al-Zayat 2002 is a term that expresses dysfunction or difficulties in the areas of arithmetic understanding, numerical reasoning, and mathematical. Use and understand mathematical concepts and facts and perform and process mathematical calculations. (Al-Zayat, 2002, 569)

Naji Deskouris/ It is difficulties in the skills of conducting and recording the solution for addition, subtraction, multiplication and division

**Theoretical definition:** The researcher will adopt the definition of oils as a theoretical definition to test the difficulties of learning mathematics

**Procedural definition of mathematics learning difficulties-**

It is the score obtained by the student in the Math Learning Difficulties test.

**Second : Cognitive failures/ defined by: -**

Broadbent, 1982) : That the individual fails to deal with the information that confronts him, whether in the process of paying attention to it or perceiving it, in remembering it, or in the processes of hiring it to perform a specific task . (Broadbent, 1982, 114)

Wallace & Vodanovich, 2003)

is the failure of an individual to accomplish a certain task, which is usually associated with the failure of a process of recall.

( Wallace & Vodanovich, 2003, 22)

Daniel & Jessica , 2005 .

Diminished interest in everyday events, accompanied by memory errors and cognitive distortions. ( Daniel & Jessica , 2005 , 104 )

Theoretical definition: The researcher will adopt the definition of Broadbent as a theoretical definition of the measure of cognitive failures

Procedural definition of learning difficulties -

It is the degree that the student obtains in the measure of cognitive failures

**Chapter Two / Theoretical Framework**

First : Math Learning Difficulties

Before the researcher begins to clarify what learning difficulties are, she notes that this field has appeared in many Arabic and foreign literature with several different names such as Learning Disorder, Learning Difficulties, and Learning Disabilities Disability, but as the American Psychological Association (2015, 594 ) explained, there are no fundamental differences between these three names, and the researcher adopts the term "learning difficulties" in her current study.

**The concept of learning difficulties:**

Defining learning difficulties is one of the issues that have preoccupied most specialists in this field and arriving at a specific description of the manifestations and nature of this disorder, and perhaps this is due to two main reasons ( Fletcher et al., 2007, 27 ).

The first is that it is a latent psychological variable that is not observable or observable, which makes it difficult to measure it, such as intelligence and achievement and ADHD disorder. The second is that it involves several different dimensions and the difficulty of agreeing and determining the common characteristics that are characteristic of each

dimension, and whether they exist on the basis of a continuous or separate classification.

This is also supported by the two researchers ( Tilly, 2004, 528-529; Taylor, 2014, 4 ) in their view that one of the major challenges in this field is the difficulty of agreeing on a specific definition of learning difficulties due to the diversity of problems related to them. People with learning difficulties do not all have the same problems, and the areas of these problems are very wide. Although reading difficulties represent ( 80% ) of them, some of them may be accompanied by either difficulties or problems in memory, perception, or attention . Thus In the period from 1960 to 1975, researchers disagreed about the specific or distinctive nature of learning difficulties, and this remained until the Federal Government of the United States began to pay attention to learning difficulties and work on a specific definition of them. It enacted the Education of the Handicapped Act ( EHA ) in 1975, which provided for the provision of education services for people with special needs. Learning difficulties at that time were defined as a term that refers to "a disorder in one or more of the main psychological processes involved in understanding or using spoken or written language, which is evident in the lack of ability to listen, think, speak, write, spell, or perform calculations, including cases such as cognitive difficulties, brain injuries, simple brain dysfunction, dyslexia, developmental aphasia."

(Kamphaus & Hendry, 2000, 26 ) indicated that most specialists use the term learning difficulties to describe a set of academic difficulties experienced by the child, and the educational psychologist Samuel Kirk is the first of the instruments of this term in ( 1962 ) when he presented it in his book on the child with special needs, where he defined learning difficulties as "a disability, disorder, or developmental delay in one or more speech, language, reading, writing, arithmetic operations, or other study material as a result of a psychological disability resulting from a brain dysfunction and/ or emotional or behavioral disorders, and this term does not include learning problems that are due to mental, visual, auditory, or motor disability or from emotional disorder or environmental, cultural and economic deprivation."

Researchers (Gulli & Mollary, 2005, 477 ; Fletcher, 2007, 21 ; Salkind, 2008, 585 ) also agreed to adopt the federal definition of idea ( 1975 ) that learning difficulties reflect a "significant distance between achievement and an individual's general mental ability in one or more areas of oral expression, auditory comprehension, written expression, basic reading skill, reading comprehension, arithmetic, mathematical reasoning", and similarly, a child is not diagnosed as having specific learning difficulties if this distance between the two abilities is primarily due to visual, auditory, motor, mental disability, emotional disorder, environmental deprivation, cultural, and economic impairment.

In this regard, it is worth mentioning what the American Psychological Association (2015, 594 ) said in distinguishing between the terms learning disability and learning disorder, as follows :

(a) Learning Disability : means " any condition of neurological origin characterized by severe impairment in the acquisition of specific academic or study skills, especially those associated with written or expressive language, and includes learning problems resulting from cognitive impairments, brain injuries, simple functional brain impairment, but excludes those resulting from visual impairment or hearing loss, mental disability, emotional disturbance, or environmental, cultural or economic factors" .

(b) Learning Disorder : means " any neurological disorder in the processing of information characterized by a low achievement below the expected level appropriate to the age and level of education and intelligence of the individual, which is measured by standard tests in reading, mathematics and writing tasks", and in standard practices a variation is required between the scores of the general intelligence test ( as measured by a standard test for the IQ ) and the scores of academic achievement ( as measured by standard achievement tests) . The Association pointed out that the term learning disorder is synonymous with learning disability, and that in DSM-5 it is called "specific learning disorder".

Accordingly, it can be said that learning difficulties reflect the existence of a fundamental deficiency in the child's ability to acquire and use the knowledge and skills of a specific educational field such as mathematics, reading or writing, despite the fact that the intelligence coefficient is in the normal range or higher. Therefore, the existence of a large difference between the degree of intelligence and academic achievement is a major test in the diagnosis of learning difficulties, and these difficulties do not result from or are associated with the existence of a mental, visual or hearing disability to any degree, nor even because of cultural or economic deprivation in the child's upbringing environment.

### **Genesis of the term learning difficulties:**

Although the term learning difficulties has only recently been highlighted, this area has long historical roots; Taylor, 2014, 9 ) explained that the term learning difficulties dates back to the nineteenth century for European doctors, and Joseph Gall is the first to submit a study on disorders that today are described as language disorders and classified as one of the types of learning difficulties, in which he attributed these problems to specific areas of the brain, and then at the end of that century came the observations of Pierre Broca and Carl Wernicke to describe and express the receptive language functions that lie in the left frontal lobe and the upper gyrus of the brain .

( Tilly, 2004, 527 ) added that learning difficulties began with early attempts to match the function of some areas of the brain with human behavior, as doctors noticed that some patients with certain types of brain injuries have specific types of behavioral problems, and that learning difficulties exist in patients with injuries in the left hemisphere of the brain who had many problems such as slow speech, feeling stressed while speaking, and being unable to name things or people . In the late nineteenth

century, many cases were identified in which the ability to speak and write remained intact but had a deficiency in the ability to speak or write in understandable words. These cases were then called word deafness or word blindness .

Researchers ( Fletcher, 2007, 9 ; Taylor, 2014, 12 ) agreed that in the early twentieth century, doctors began to notice children and adults who had difficulty recognizing ( perceiving ) words and letters despite the absence of any obvious damage or exposure to brain injury. This was evidenced at the time by the fact that these individuals may suffer from some neurological disorders whose symptoms simulate the same symptoms as those with brain damage. Moreover, I later realized similar cases within families, which provides more evidence of a possible physical cause. The medical diagnosis of such cases was known as "Congenital Word Blindness " . Based on this work in medicine and neuroscience, a team of American pioneers ( 1920 ), including Samuel Orton, Grace Fernald, Marion Monroe, and Samuel Kirk, sought to identify key milestones for understanding reading difficulties, following which a range of pedagogical therapeutic aspects emerged for these pioneers in teaching students with learning difficulties.

In 1963, Samuel Kirk introduced, as indicated by ( Tilly, 2004, 527 ), the term learning disabilities to describe children who have a disorder in the development of language, speech, reading and related communication skills necessary for social interactions, and does not include those who have sensory disabilities such as blindness, deafness, or mental disability, and on this basis he established the American Learning Disabilities Association of America, which is the most famous association of learning disabilities in the United States.

### **Prevalence of learning difficulties:**

(Gulli & Mollary, 2005, 477 ) indicated that the prevalence of learning difficulties ranges between ( 5 - 10% ), and that ( 50% ) of them are classified as having reading disorder, while the remaining ( 50% ) are classified as a disorder of written expression and a disorder of mathematics ( or atypical learning disabilities ), and indicates that learning difficulties are more common in males than females by ( 2 : 1 ) or ( 4 : 1 ) . He added that children with learning difficulties have an increased risk of behavioral emotional problems and common morbidity ( 50% of 1.5 million children have ADHD who are unable to acquire educational tasks at school and at home ), ( 2-5 ) % of primary school children have dyslexia, and Speech disorder (10% ) of children under the age of eight .

### **Causes of Learning Difficulties:**

(Gulli & Mollary, 2005, 477 ) explained that the techniques of functional neuroimaging of brain activity show that the causes of reading difficulties are due to the lack of activity of the posterior area of the left upper side of the temporal lobe of the brain, called (planum temporale). The region is responsible for the phonological treatment



and symbolic relations associated with sound. The results of genetic studies showed that reading difficulties are inherited in more than ( 50% ) of cases, as well as reading difficulties found in identical twins by ( 71%) and in asymmetric twins by ( 49% ). The results of genetic studies also confirmed that reading difficulties are due to defects in chromosomes No. 6 and 15 .

(Mamen, 2005, 11 ) considers that learning difficulties result from deficiencies in one or more processes related to perception, thinking, remembering, or learning, which include, but are not limited to, language processing, phonological processing, visual-spatial processing, processing speed, memory and attention, and executive functions such as planning and decision-making .

Julie (Gulli & Mollary, 2005, 478 ) sees that the difficulties of mathematics have different patterns and therefore have different symptoms and causes, but all of them are mainly due to the deficiency of verbal processing as a deficiency in the process of visualization and visual organization of concepts and mathematical treatments, or the deficiency of working memory entrusted with the treatment of different calculations, and learning difficulties may appear as a deficit or deficiency in performing calculations, which is called dyscalculia or acalculia), and therefore patients with dyscalculia are overly dependent on memory and tangible aids due to their deficiencies in mental treatment of calculations, and the difficulties of mathematics may appear in some patients as a deficiency in short-term memory or as a deficiency in visual organization and perception of mathematical concepts.

Maternal smoking, alcohol and drug use during pregnancy are among the causes of neurological problems leading to learning difficulties in children, as well as the effects related to childbirth such as premature birth, low birth weight and forceps in childbirth are possible causes of learning difficulties, as well as the effects after childbirth such as head injury, meningitis, diabetes, exposure to environmental toxins such as lead, and malnutrition can be possible causes of learning difficulties.

### **Types of Learning Difficulties:**

( Fletcher, 2007, 9 ) indicated that the US federal legislation identified ( 1977 ) seven different areas of learning difficulties, namely : (1) auditory comprehension (receptive language) Listening comprehension, (2) oral expression (expressive language) Oral Expression, (3) basic reading skills (coding and word recognition) Basic reading skills, (4) reading comprehension, (5) written expression, (6) mathematics calculation, (7) mathematics reasoning .

Researchers (Kamphaus & Hendry, 2000, 28 ; Gulli & Mollary, 2005, 477 ) agreed with what was determined by the American Psychological Association ( American Psychological Association, 2015, 594 ) that learning difficulties are classified in three main patterns according to the criteria for diagnosis in the Diagnostic and Statistical Manual of Psychiatric Disorders - Fourth Edition DSM-V as follows :

(1) Reading difficulties : Her diagnostic criterion is determined to be “Reading achievement as measured by individual standardized tests of reading and comprehension is below the level expected for the individual's age, intelligence and appropriate educational level.

(2) Mathematics difficulties: The criterion for its diagnosis is that “mathematical ability as measured by individual benchmark tests is lower than the level of expectation of the individual's age, intelligence and appropriate educational level.

(3) Written expression difficulties: The criterion for her diagnosis is that "Writing skills as measured by individual standardized tests ( or functional measurement of writing skills) are lower than the expected level of chronological age, intelligence and appropriate educational level of the individual.

### **Definition of Math Learning Difficulties:**

This difficulty is sometimes called arithmetic dysfunction because it needs to use symbols and the ability to

High on the correct recognition of these symbols.

The difficulty is shown in the student's inability to deal with numbers, calculations, and mathematical laws

correctly, or in the logical order of the solution steps in mathematical and computational operations, or the use of

Terms and abstract symbols.

Al-Zayat (1998) considers that it is a term that expresses hardship or difficulties in the following areas:

- 1: Mathematical comprehension, numerical reasoning, and mathematical reasoning.
2. Use and understand mathematical concepts and facts.
3. Performing and processing mathematical calculations. (Al-Zayat 1998 , 569)

### **Causes of Math Learning Difficulties**

Researchers in the field of mathematics learning difficulties agree that the curriculum for teaching mathematics to students with learning difficulties is not allocated enough time to teach it in terms of training applications that bring these students to the level of ordinary students. ( Carine, 1997, 37 - 57)

Researchers agree that teaching the basic rules of mathematics in comprehensive schools has

Many of the weaknesses are as follows:

1. Insufficient attention to the need for the availability of previous information.
- 2 - The speed or rapid pace in presenting many concepts, and the uncertainty of digestion or absorption.
3. Lack of coherence in the presentation and presentation of strategies for dealing with mathematics.

4. Poor communication and communication and lack of focus and sufficient practice during many activities

Teaching

5. Lack of interest in introducing the practice of transferring pupils to mathematics autonomously and independently

### **Manifestations of Math Learning Difficulties**

#### **A- Weak pre-preparation for learning mathematics:**

The difficulties of learning mathematics in many students occur as a result of the poor preparation of mathematics in the primary stage, which is represented in the basics of mathematics such as addition, subtraction, multiplication and division, as well as the basic concepts in engineering, and it extends beyond that, which is the inability of many students to read, which is evidence that a good preparation of mathematics learning may reduce the difficulties of learning mathematics in the later stages.

#### **B- Disorders of spatial relationship perception:**

Studies and research conducted in the field of mathematical learning difficulties indicate that students with difficulties have significant disorders in perceiving spatial relationships when playing with objects that can overlap with one another or are fitted with one another, and these activities develop in the student a sense of size, distance, greater than, smaller than.

Some studies indicated that parents of students with learning difficulties decide that their children do not enjoy and do not play with cubes, models or structures like other normal peers in the same age range. Students with learning difficulties usually lack such experiences, and that they often acquire difficulties in learning mathematics because of their confusion and confusion and not distinguishing between concepts such as above / below, high / low, near / far, in front of/ behind, beginning/end bigger/smaller/equal, longer / shorter. The disruption of spatial relationships can interfere with pupils' understanding of these concepts. (Fathi Al-Zayat, 1998,) 550 – 500

#### **C- Visual perception and symbol recognition disorders:**

Students with mathematics learning difficulties acquire difficulties in activities that require visual motor abilities, and visual cognitive abilities, and this appears through the inability of some of these students to count things in a series of pictured things by pointing to them by saying (1 – 2 – 3 – 4 ) where these students have to learn these numbers or by training on tangible real things, i.e., holding things, which is an early skill based on cognitive growth ( Fathi Al-Zayat 1998, 550)

Students with mathematics learning difficulties have a visual difficulty in receiving and perceiving engineering objects, which is a difficulty stemming from visual perception

difficulties, as it is difficult for them to perceive spatial relationships and then make judgments or estimates of two-dimensional or three-dimensional shapes and in perceiving numbers and letters.

These students perform significantly less in arithmetic and handwriting than their peers, and they cannot read their numbers and letters correctly. As a result, they fall into many arithmetic errors; therefore, they must be continuously trained to write numbers or numbers so that they are mastered correctly, especially in addition, subtraction, multiplication, division, and differentiation between the ones, tens, and hundreds, where they represent the most common errors among students with

Learning difficulties in general and arithmetic learning difficulties in particular **(Bley , N. S & Thomton, 1989, 83)**

#### **D- Language disorders and difficulties reading and understanding mathematical problems:**

The difficulties of learning mathematics can arise from the difficulties of the student's interpretation of concepts or mathematical or computational words, the student may acquire some of the result of the overlap of many mathematical concepts or not distinguishing between them such as +), -, addition and subtraction, and ones, tens, hundreds of thousands).

It has been observed that these students find it difficult to solve mathematical problems that present or formulate in a verbal form, while they can solve some of these problems when presented as abstract calculations.

These difficulties are also represented in their inability to represent the determinants of the issue or problem or to translate these formulations or linguistic structures into mathematical or mathematical formulas, rates, values or concepts .(Cawley, et al., 1992, 40-43)

#### **E - Memory Disorders:**

Achieving success in mathematics and in learning to perform calculations is related to the student's understanding of the numerical system and the rules governing dealing with it. Facts about operations related to addition, subtraction, multiplication, division and performing them are automated. Students who suffer from deficiencies or memory disorders, or the information processing system may understand the facts of the numerical system and the rules that govern it, but they find it difficult to retrieve a number of these facts with the required speed, efficiency or effectiveness, and students who do not deal with these facts at the level of mechanism or automation consume a lot of time and effort in conducting many different types of calculations ( Fathi Al-Zayat 1998, 553)

#### **Diagnosis of learning difficulties.**

Researchers (Kamphaus & Hendry, 2000, 27 ; Gulli & Mollary, 2005, 477- 478) agreed that the diagnosis of learning difficulties depends on the existence of a great distance between the degree of intelligence test ( ability to learn) and the degree of academic achievement test (actual achievement of education ), which is a complex process due to the lack of agreement of researchers on how or criteria that can be relied upon in determining the degree of this variance, as well as the sensitivity of the relationship between intelligence and achievement on the other hand; children with mental disabilities are not diagnosed as learning difficulties, and they explained that most cases of learning difficulties are discovered between kindergarten and the first and second primary grades, often their symptoms are shown in the delay in the development and learning of new concepts at home or the delay in school performance, as the child is observed to be slow in learning and the difficulty of completing and mastering school assignments compared to his peers .

In this regard, he recommends ( Kamphaus & Hendry, 2000, 27 ) not to rely on a specific direction but to use three directions in diagnosing learning difficulties, as follows :

The first trend: This disparity is determined by the low rate of academic achievement than the expected level of the classroom; the fifth grade child who reads in the style of the first grade child is diagnosed as learning difficulties, but this trend is ignored by individual differences in intelligence, which causes a problem, especially with the talented child with high intelligence, who has difficulty in keeping pace with the level of education of his class, this is not necessarily determined as learning difficulties.

The second trend: It depends on the use of mathematical prediction formulas to determine the level of predicted grade achievement, and thus taking into account the scores of the intelligence test, which makes it better than the first trend, but it is taken on this trend that it depends on an ordinal criterion, which varies from one test to another, so it is not possible to adopt a comparison method based on one order only .

The third trend: It depends on comparing the standard scores of intelligence tests with achievement tests, where it is necessary to have a difference between them ranging from one to one and a half ( or 15 – 22 points ), but two things are taken on this trend: (a) It tends to identify those high in intelligence; for example, a child with an IQ of 130 – this gap widens compared to a child with an IQ of 90, as he will be less likely to get a score of 70 or less in reading, which will exclude him from diagnosing him as a learning difficulty compared to a high IQ . (b) This trend does not take into account the fact that SAT scores are strongly correlated with IQ scores.

While ( Tilly, 2004, 529 ) confirmed that the US Department of Education has defined the criteria for diagnosing learning difficulties in two main areas, as follows

**First :** The child is diagnosed with specific learning difficulties if he/she:

(1) He does not achieve the level of achievement or ability appropriate to his chronological age in one or more of the areas mentioned in the following clause if he has access to education services appropriate to his age and abilities.

(2) If it is found that there is a severe distance between academic achievement and the child's general mental ability in one or more areas (oral expression, auditory comprehension, written expression, basic reading skill, reading comprehension, mathematical calculations, and mathematical thinking).

**Second** : The child is not diagnosed as having specific learning difficulties if the extreme distance between mental ability and achievement is primarily the result of visual, hearing or motor disability, mental disability, emotional disorder, environmental deprivation, cultural, economic .

### **People with learning difficulties**

(Kamphaus & Hendry, 2000, 29 ) stressed the importance of early interventions to treat learning difficulties not only to reduce them but also to prevent the development of possible disabilities in children at risk, and that treatment of these includes special education with the provision of other educational services, and educational interventions and methods used with learning difficulties: ABA, behavioral interventions, self-monitoring, meta-cognition strategies, attribution exercises, collaborative learning, peer learning, the use of memory aids, active thinking skills training, feedback, relaxation exercises, multisensory education ( visual, auditory, kinetic, tactile )

Tilly, 2004, 532, also emphasized school therapeutic interventions for learning difficulties, which he classified in three axes according to the support of experimental research, as follows :

**First** : Therapies were not supported by large-scale research: teaching methods, psycholinguistic training, sensory-motor training, employment of special education technicians

**Second** : Effective educational interventions in general : teacher organizing, student participation, providing response opportunities, intensifying learning overlearning .

### **Second : Cognitive failures**

Cognitive failures are one of the most important problems facing the educational arena, which are reflected in one way or another in the cognitive system, which leads to disruption in the educational process, causing many problems and disorders that disrupt the student's academic consensus.

Those involved in the field of cognitive psychology pointed out that the process of processing information represents an organized and harmonious series of mental events, from sensation and attention to perception, memory and all other mental

events. Since perception as a cognitive process regulates the information received by the individual at a given moment or is the process of interpreting and organizing the sensory data with which we receive sensations to increase our awareness of what surrounds us and he does not realize this information until after the attention process (Attention) occurs where the selected stimulus is placed in what is known as the center of consciousness . Therefore, any confusion, interruptions, or deficiencies in the mechanisms of sensation, attention, cognition, and even memory represent a mental disability or cognitive failure that affects to unforeseen degrees in the processes of information processing ( Saleh, 1982, 19 ) .

These cognitive processes are characterized by characteristics that may be different between them, but they are similar and overlapping in order to bring the required response (behavior). This overlap shows traces of cognitive functions, which are a set of mental processes that aim to know things and their characteristics. In the event of a defect in one of these processes, it leads to a disability in all these mental processes, as cognitive failures are the most prominent manifestations of the failure of mental processes for individuals ( Association, 1994,97)

And that these cognitive processes of (attention, perception, thinking and remembering ) are the main axes of the individual's cognitive organization and are linked to each other and do not work independently of each other . ( Zaghloul, 2001, 22)

Any difficulty in absorbing the subject leads to a low level of performance in examinations and to a sense of fatigue, weakness and loss of ability to focus, as well as weak deductive thinking and the escape of ideas, in addition to a disturbance in understanding in the transmission of learned concepts and knowledge within the classroom or during educational and social situations. ( Awad, 2007, 59)

Therefore, the occurrence of any malfunction or delay in such processes leads to the occurrence of cognitive failures, which is represented by learners committing many cognitive errors in their daily lives, such as forgetting , failing to pay attention to road signs, disagreeing with people , and distracting. The tendency to commit these failures seems to be surrounded by a general factor that sheds its influence through types of memory failure and errors in behavior ( Larson et al , 1997 , 29 )

The term cognitive failures ( 1982 ) was introduced by Broadbent et al., 1982, who found that cognitive failures were associated with many characteristics . ( Broadbent , 1987, 1-16 )

### **Theories that explained cognitive failures.**

1: Broadbent's Filter Theory (Broadbent, 1958) .

This theory is based on the basic premise that human attention to stimuli and information received through sensory channels occurs in a targeted and specific manner (Limited) and selectivity (Selection) and that there is a filter (Filter) within humans that removes or eliminates (Elimination) stimuli, stimuli or information that was not noticed (Unimportant) (Margaret, 1994, 48) .

This selection is made by the sensory channels (Constitute), which are a separate channel for the transmission of information to the filter (Filter). If the individual receives two different auditory stimuli at the same time, the ears are separate channels for each of them based on the physical characteristics of one or the other of them ( Baron , 1980 , 270 ).

Broadbent (1957) describes his theory through the mechanical model of a Y-tube. He refers to only one type of stimulus that passes through the tube at a single moment. An interesting entry at the same moment means that one will pass (pay attention to it) and the other will be neglected ( Broadbent , 1957 , 205 )

## 2. Triesman's theory of (attenuation or weakening) . (Treisman Theory , 1960)

Despite the theoretical evidence that supported the refinery theory, it could not explain the fact that some meanings (Meaning) and information may pass from the refinery through the inattentive channel. Although the examiner does not pay attention to the channel or the inattentive message, there is some information that can leak into the consciousness (feeling) . Examiners on bilateral missions note that their names have been mentioned in the inattentive channel ( William , 1980 , 402 ).

3. Deutsh-Deutsch theory (Deutsh-Deutsch, 1976) The late transitional candidate model suggests that all inward information is recognizable and that the human system is limited in its ability to organize responses to all sensory input in the sense that we cannot focus on all information that activates memory and that we have to choose a portion of the stimulus information to respond to (Ellis & Hunt , 1993,58)

## Dissociation Theory -Cognitive Failures

This theory indicates that people face information in their daily lives from several sources, so they try to deal with that information, and disintegration is one of the most prominent means that individuals resort to when they face difficulties in dealing with information taken from many sources, including experiences, memories, emotions, physical sensations and behaviors, and daydreams are one of the means of disintegration that individuals resort to ( Carlson & Putnam , 1993 , 16-27 ).

( Harnish feger, 1995 ) suggested that the difficulties that appear in obstructed operations are somewhat responsible for cognitive failure, because there is a large amount of information flowing into working memory at once, and because disintegration is linked to the difficulties that deal with the many information flow, this theory predicts that there is a positive correlation between disintegration and cognitive failure, and this is confirmed by the results of studies conducted by Merkelbach, 1999 ), which proved that failure is linked to disintegration . ( Merckelbach H , et al., 1996 , 961-967 )

Because there is a relationship between disintegration and cognitive failure, it is necessary to reveal whether the recordings on the cognitive failure scale are related to deficiencies caused by secondary tasks, and this was supported by studies that found



that high scores in cognitive failure are negatively related to dealing efficiently with two things at once (Harris & Wilkins, 2003, 123 – 136) .

## 9. Previous studies

First : Studies dealing with the difficulties of learning mathematics

Rom. Study (2004)

(The effectiveness of a program that adopts computer technology to increase the capabilities of mathematical education for students

Core Expanded Core Portfolio )

The purpose of the study is to learn about the effectiveness of the program that adopts the computer program to achieve the objectives of the program to achieve the objectives of the education programme for the Arab States in order to achieve the objectives of the European Union in order to achieve the objectives of the European Union and the European Union. And the study outcomes of the following outputs:

1- The level of achievement of the request for collection/diagnostic testing is extended before the implementation of the program

2- All test paragraphs for the tax and division units constitute a difficulty .

3- It is determined through the questionnaire of the teachers in all areas of the questionnaire that they are actually real reasons

For the rationale and the position of the areas of materiality, education, education and the textbook .

4- The effectiveness of the computerized program to implement a program that adopts computer technology to the ninth basic bank in mathematics .

Ziad Barakat Study ( 2010)

The objectives of the current study are to cause impairment of achievement in mathematics in the field of education in the field of education in the field of education in the field of education in the field of education. This is the purpose of the questionnaire to measure the impairment of student achievement in mathematics materials, and the component of (28) each of which is based on the probable impairment of the achievement of mathematics. The study may be requested to be conducted on a sample of (150) national, regional and international education, education and development indicators, in proportion to (65%) of the national, social and cultural community. And after analyzing the data of the study of the following results:

1. Months of the milestone estimates for the five largest EBFs for the lowest collection in the five most advanced years of the coming reporting period:

- Health impairment affects the achievement of demand for mathematics materials
- Behavioral problems affecting mathematics achievement demand
- Lack of schooling at the lower level in women's education
- No sense of belonging to the school pays for not attending school

- The number of educators in educational and psycho-educational and psycho-educational institutions is not included in the student body.

2. Whereas the minimum five minimum milestones for achieving the following low-achievement milestones have been achieved:

- Impairment of demand is subject to reduction in demand collection
- Lack of availability of new bodies and means to reduce collection
- The low social status of the family pays the demand to not meet the study
- The increase in the text of the quota affects the decline in the level of collection
- The lack of allocation of the teacher in mathematics material affects the decline in the third level

3. The presence of functional branches in the levels of basic education in accordance with the reasons for the low achievement of the student in the materials of the basic education process according to the change of the genre of education.

4. The presence of functional branches in the levels of basic education in accordance with the reasons for the low achievement of students in the materials of the basic education process according to the reasons for the change in the planning of the educational process.

5. Lack of functional fruits within the levels of the teachers' estimates for reasons of low achievement in mathematics at the basic stage of the educational process.

6. There are no significant fur within the levels of the teachers' estimates for reasons of low achievement in the mathematical level in the basic stage according to the change in the risk .

## **Second : Studies dealing with cognitive failures**

1. Study: (Al-Nuaimi, 2007) .

The Effect of Cognitive Failures and Mid-Limits of the Brain in Solving Verbal Analogies in Elementary School Students

This study was conducted in Iraq in (2008). The research sample consisted of (80) children from the primary stage of the fifth grade. The study aimed to identify the impact of cognitive failures (cognitive failure - cognitive success) and gender (males - females) in solving verbal analogies in primary school students. The researcher adopted the experimental approach in this study. Statistical methods such as (testing two independent samples and analysis of the first degree variation of unequal samples) were used, and the results showed the following:

1. There are significant differences in the resolution of verbal analogies among primary school students according to the cognitive failure variable (success – failure) .
2. There are significant differences in the resolution of verbal analogies among primary school students according to gender (males and females) .
3. There is no significant effect in measuring the resolution of verbal analogies in primary school students for the interaction of both cognitive failure variables (success – failure) and gender (male – female) .

4. Students with cognitive success are better than peers with cognitive failure in measuring the resolution of verbal symmetries.

5. There are significant differences in the resolution of verbal analogies in primary school students according to the hemispheric dominance variable and in favor of left hemispheric domains.

6 Left hemispheric students are better than right hemispheric students in solving verbal symmetries (Rugby, 2010 , p. 61 ) .

2- Study : (J. Craig Wallace, Vodanovich , 2003 .

The relationship between cognitive failure and some personality traits.

This study was conducted in (a university in the southeast of the United States), the research sample consisted of (385) students, and the study aimed to (reveal the relationship between cognitive failure and the state of living conscience and neuroticism in the five factors of personality among male university students). The tools of (cognitive failure measure CFQ) were used, and appropriate statistical methods such as (Pearson and Cronbach's Alpha correlation coefficient) were used, and the study showed the following results:

A. The relationship was negative between the state of living conscience and cognitive failure (as the trait of living conscience reflects reliability, organization, compliance and alertness to work tasks, so they did not have a major cognitive failure.

B. The relationship between neuroticism and cognitive failure has been positive as neurotic individuals are exposed to stress, fear, and resentment experiences that put them near a high degree of risk that shows behaviors outside the scope of the task ( Wallace , Vodanovich, 2003) .

### **Research Methodology and Procedures:**

This chapter includes a presentation of the research methodology and procedures represented in identifying the research community, its sample, the method of its selection, the identification of its tools and measurement procedures, as well as the identification of statistical methods used in the processing and analysis of data .

### **Research Methodology:**

The current research requires a quantitative description of the difficulties of learning mathematics and cognitive failures of the second intermediate grade students for the purpose of identifying the correlation between them, and this requires following the descriptive approach in the associative manner that is designed to identify the facts related to the current situation and describe them to clarify some aspects of it by scanning and describing it as an explanatory description in terms of the available facts. Descriptive research is more than just data, as the researcher follows these data carefully and accurately, interprets them, and discovers their relationships (Oudha,1998: 54).

### Second: The research community:

The current research community is determined by the average of male and female second graders in middle schools \* in the center of Babylon Governorate, which are (4188 ) male and female students, with a total of (1932) male students and a percentage of 46%, and (2256) female students and a percentage of 54%, distributed over (26 ) schools, with a total of ( 12 ) schools for boys, and ( 14) schools for girls, and the data on the number of schools and the number of students were obtained from the Directorate of Education, and a task facilitation book was obtained for the purpose of applying tests to students as shown in Appendix (1) . Table (1) shows this finding:

Table (1) The research community distributed among middle schools in the center of Babylon Governorate according to gender

The large numbers of students	Boys' schools	No.	Preparing students	Girls' schools	No.
168	S / Al-Morouj	1	147	S/ AL murkazia	1
136	S/ faddah	2	130	S. /Safieddine	2
260	S/ AL etimaad	3	135	S/ 14 July	3
185	S/ Al-Nasr	4	141	S. Dabel Al-Khuzaie	4
250	S/ Rasafi	5	127	S/ Damascus	5
135	S/ Jenin	6	89	S/ Riyadh	6
147	S. Al-Bushra	7	120	S./ Al-Bahtari	7
157	S/ Al furat	8	78	S/ Al zafar	8
83	S/ Al siada	9	120	S. Ibn Al-Nama	9
150	S/ Ahl AL biet	10	250	S. Jaber Al-Ansari	10
137	S. Safia bint Abdelmotaleb	11	155	S/Al-Iman Road	11
131	S/ Al-Rabab	12	220	S/ Sharkia	12
127	S/ Albushraa	13	100	S. Al jumhoria	13
190	S/ Al waqar	14	120	S. Nafi bin Hilal	14
2256	Total		1932	Total	

### Third : Sample of the research:

The sample is part of the community so that in this part the characteristics of the community itself are available, so the selection of the sample is in order to reach results that can be circulated to the community and this becomes possible .

(David, & Abdul Rahman, 1990, 79)

\* Evening and co-educational schools where there is no second grade have been excluded.

In order to obtain a more representative sample, the researcher adopted the proportional method. This method requires the researcher to choose randomly a vocabulary from each layer in proportion to its true size in the entire original community (Van Dalen, 1985, 393). Therefore, the researcher resorted to choosing a randomly stratified sample to be representative of the different classes (males, females ) in the original community. After determining what 10% of the research community was attributed to it, which numbered (410) male and female students, then they were distributed according to the percentages in the community, i.e. (46%) of males, who numbered (189), and (54%) of females, who numbered (221) female students, as shown in the table below

Table (2) Distribution of the research sample according to gender variable

Number of female Students	Boys' schools	No.	Number of students	Girls' schools	No.
17	S / Al-Morouj	1	13	S/ Al markazia	1
11	S/ Faddah	2	21	S . Safieddine	2
21	S/ Al etimaad	3	13	S/ 14 July	3
19	S/ Al-Nasr	4	18	S. Dabel Al-Khuzai	4
24	S/ Rasafi	5	7	S/ Damascus	5
11	S/ Jenin	6	10	S/ Riyadh	6
13	S. Al-Bushra	7	14	S./ Al-Bahtari	7
21	S/ Al furat	8	14	S/ Al zafar	8
20	S/ Al siada	9	15	S. Ibn Al-Nama	9
15	S/ Ahl AL biet	10	16	Mr. Jaber Al-Ansari	10
25	S. /saida Zainab	11	13	S/Al-Iman Road	11
11	S/ Al-Rabab	12	18	S/ Sharkia	12
13	S/ Al bushraa	13	17	S. Nafi bin Hilal	
221			189	Total	

#### Fourth : Research tools

Achieving the objectives of the current research required the existence of two tools, one to measure the difficulties of learning mathematics and the other to measure cognitive failures. After reviewing the previous studies, a measure was obtained to measure the difficulties of learning mathematics from the preparation of the researcher and the measure of cognitive failures. The Cognitive Failures Questionnaire, prepared by

Broadbent, Cooper, FitzGerald & Parkes, 1982, was adopted. Below is a description of each of them and the procedures adopted by the researcher in finding the psychometric properties of each of them.

### **Math Learning Difficulties Test**

This test was built based on the definition of the zayat of the difficulties of learning mathematics, which is (the weakness in the use and understanding of concepts and mathematical facts, numerical and mathematical reasoning, and the conduct and processing of mathematical and computational operations). The test includes seven areas, namely (the difficulty of acquiring basic numerical and mathematical facts, the difficulty of mathematical coding, the concept of preparation, the difficulty of verbal learning, the confusion in determining the direction, the difficulty in visual-spatial perception of geometric shapes, and the cognitive style). Its final form consisted of (28) paragraphs of two alternatives, where a score (1) is given to the correct answer (0) for the wrong answer.

### **Validity of paragraphs (apparent validity)**

The test was presented to a sample of (10) arbitrators specialized in educational and psychological sciences to indicate their views on the possibility of taking the test to measure the difficulties of learning mathematics among second-grade students and the suitability of the paragraphs and alternatives to answer. After analyzing their views, it was found that there was complete agreement between the arbitrators and 100% on the validity of the test paragraphs and alternatives to answer.

### **Experience paragraph and instruction clarity**

For the purpose of identifying the extent of students' understanding of the test paragraphs and instructions and the time taken to answer them, it was applied to a random sample consisting of (20) male and female students, who are divided equally between the two sexes, as they were asked to read the instructions, paragraphs and the answer. It was found that all the paragraphs were clear to them and that the time taken to answer ranged between (18 - 22) minutes with a time average of (19) minutes.

### **Statistical analysis of test items**

For the purpose of analyzing the test items statistically, a sample of (410) male and female students was selected in a proportional, stratified randomized manner other than the schools that included them, and the test was applied to the aforementioned sample, and then the excellence of the paragraphs and internal consistency were calculated, as shown below.

### **Distinguishing Power**

It is an important characteristic that should be present in the vocabulary of the test where individual differences can be measured by the vocabulary of these tests. (Kaplan & Saccuzzo, 2005, 82 )

Differential strength is the indicator of the differences between respondents with high scores and those with low scores in the attribute to be measured . The discriminating power depends on the method of the two terminal groups, as the total scores of the individuals are divided into two categories (the upper group and the lower group), and then finding the coefficient of distinction between the two groups' scores for each paragraph separately . (Gregory, 2015,130) .

Where all the respondents' answers scores on the test paragraphs were collected to extract the total score and then arrange the forms downward starting from the highest grade and ending at the lowest and to obtain two groups that have the largest size and maximum variation possible between them and their distribution is close to normal distribution, 27% of the forms that obtained the highest scores (the highest group) were chosen, ranging between (98 – 71) and (27%) of the forms that obtained the lowest scores (the lowest group), which ranged between ( 35 – 60), so the upper group consists of (111) forms, and the minimum group consists of (111) forms, so the number of forms that were subjected to statistical analysis is (222) forms, and after analyzing the results of the students' responses to the test paragraphs using the discrimination equation to test the difficulties of learning mathematics, it became clear that all the discriminatory power coefficients of the paragraphs have a good level of discrimination because their values are higher than the value of the discrimination coefficient referred to by (Eble), which is (0.30) and above, which are good coefficients.

Table ( 3 ) Discrimination Factor for Math Learning Difficulty Test

No .	Discriminat ion index	Difficulty index	No .	Discriminati on index	Difficulty index
1	65	0.32	18	67	0,31
2	0.62	0.33	19	0,66	0.32
3	0,66	0.33	20	0 - +63.	0.35
4	0,61	0.30	21	0.59	0:37
5	68	0.35	22	0.60	0.33
6	0 - +63.	0.36	23	0.62	0.35
7	67	0.38	24	0.62	0.34
8	69	0.33	25	0,66	0.34
9	0.60	0.36	26	67	0,31
10	0.58	0.34	27	0.62	0.30

11	64	0.35	28	64	0.32
12	0.60	0,31			
13	0,61	0.32			
14	0,61	0.33			
15	0.53	0.32			
16	0.58	0.38			
17	67	0.33			

### **Test Internal Consistency**

The researcher verified the internal consistency of the mathematics difficulties test through the point biceryl correlation coefficient between the degree of each test item with the total degree of the test and for all members of the sample of (410) students. It was found that all the paragraphs are statistically significant at the level of significance (0.05) and degree of freedom (408), which is (0.098) .

### **Consistence**

Stability refers to the concept of confidence in the results of the test in the sense that the test's estimate of the apparent degree of the trait is a constant measure if it is repeated at different times as the fixed scale gives the same results if it measures the same thing successively . Therefore, stability is the extent to which the test measures the true amount of the attribute it aims to measure . Test scores are constant if the test measures a certain feature consistently in varying circumstances that may lead to measurement errors. (Coolican, 2014.40)

To estimate measurement errors to test math learning difficulties, a retesting method has been used.

### **Retest Method**

This method is used to assess the error related to the application of the test tool at two different times, where the importance of this method is highlighted in measuring the characteristics that do not change over time, that is, the constant psychological and neurological features, while this method does not fit the continuously changing characteristics. (Gregory, 2015,105 )

This method relies on re-applying the test to the same sample and under the same conditions as the previous test, and then calculating the correlation coefficient between the performance of individuals across the two applications (Faraj , 2012, 149). The test of difficulty in learning mathematics was re-applied to the sample of the exploratory application within a period of (15) days. Using the Pearson correlation coefficient, the value of the coefficient of stability was (0.78), a value that indicates high stability, and the standard error of the test was (3,984)

Cognitive Failure Scale



After reviewing many previous literature and studies related to the subject of cognitive failures

The Cognitive Failures Questionnaire (Cognitive Failures Questionnaire), prepared by Broadbent, Cooper, FitzGerald & Parkes, 1982, has been adopted, translated, modified and adapted to make it suitable for the Iraqi environment, and its psychometric properties have been extracted. The scale and its localization procedures are described below ([www.Cognitive Failure Questionnaire.org](http://www.Cognitive Failure Questionnaire.org), 2011).

### **1. Parameter Description**

The measure of cognitive failures consists of (25) paragraphs, and each paragraph tracks five alternatives, which are (always happens, often happens, sometimes happens a little, never happens). The student can choose one of these alternatives, and the alternatives have been given scores of ( 5-1 ) respectively .

### **2. Arabization of the scale .**

The paragraphs of the scale were translated from English into Arabic. \* The translated version was presented with the foreign text as in Appendix (1) to two experts in education and psychology who are fluent in English to re-translate it back into English for the purpose of verifying the authenticity of the translation. When this version was matched with the original version, it was found to be identical .

### **3. Prepare the scale instructions.**

The scale instructions are the guide that guides the respondent in his response to the scale paragraphs, since the measure of cognitive failures consists of (25) paragraphs and follows each paragraph five alternatives (answers). The instructions included the way that each student must take into account when answering the paragraphs of the scale, as the scale instructions ask each student to mark ( ° ) in front of the alternative that he believes applies to him of the five alternatives (always happens, often happens, a little, never happens) of each paragraph, noting that there is no correct and wrong answer, with an emphasis on filling in the required data such as the name of the school and gender, and clarifying that the information that we will obtain from student responses will be used for scientific research purposes only .

### **4. Validity of paragraphs (apparent validity) .**

The test was presented to a sample of (10) arbitrators specialized in educational and psychological sciences to indicate their views on the possibility of taking the test to measure the difficulties of learning mathematics among second-grade students and the suitability of the paragraphs and alternatives to answer. After analyzing their views, it was found that there was complete agreement between the arbitrators and 100% on the validity of the test paragraphs and alternatives to answer .

### **Experience paragraph and instruction clarity**

For the purpose of identifying the extent of students' understanding of the paragraphs of the scale and its instructions and the time taken to answer it, it was applied to a random sample consisting of (20) male and female students, who are divided equally between the two sexes, as they were asked to read the instructions, paragraphs and the answer. It was found that all the paragraphs were clear to them and that the time taken to answer ranged between (12 – 15) minutes with a time average of (13) minutes.

### **Statistical analysis of the scale paragraphs**

For the purpose of analyzing the paragraphs of the scale statistically, it was applied to a sample of (410) male and female students in a proportionate, randomized, clinical manner other than the schools included in the research sample and applying the scale to the aforementioned sample. The distinction of the paragraphs and internal consistency was calculated as shown in the below .

#### **a . Distinguishing power of vertebrae: -**

The two terminal groups method was used to calculate the discriminatory strength of the cognitive failures scale paragraphs. After the measure was applied to the final analysis sample of (410) male and female students , it was arranged in descending order and specified (27%) of the higher grades and(27%) of the lower grades, Kelly(Kelley, 1939) indicated that the optimal percentage for each of the two terminal groups is ( 27%) .

#### **(Anastasi & Urbina , 2010 , 182)**

Using the T-test of two independent samples to find out the significance of the differences between the upper and lower groups in the scores of each paragraph of the scale, the calculated T-value of the paragraphs ranged between (2.49) and(10.42), which is greater than the tabular T-value of (2) at the level of significance (0.05) and with a degree of freedom (220), which indicates that all the paragraphs of the scale are distinctive .

### **Internal Consistency**

**The internal consistency of the Cognitive Failure Scale paragraphs was calculated by finding the correlation between the score of each paragraph and the total score of the Cognitive Failures Scale. The results shown in the table below**

Table(4) Calculated T Values to Extract Discriminatory Power of Cognitive Failure Scale Paragraphs

Paragraph	Upper Group	Lower set	Calculated T
-----------	-------------	-----------	--------------

No.	Arithmetic mean	standard deviation	arithmetic mean	standard deviation	
1	3.43	0.87	2.68	0.97	6.88
2	3.85	0.45	2.38	0.90	5.98
3	3.88	0.35	2.02	1.25	7.98
4	2.91	0.32	2.00	1.13	9.32
5	2.86	0.47	2.49	0.88	4.47
6	3.36	0.80	2.04	1.28	10,42
7	2.70	0.74	2.43	1.02	2.49
8	3.10	1.17	2.16	1.32	6.34
9	3.47	0.96	2.05	1.24	7.68%
10	2.97	0.52	2.04	1.00	11.99%
11	3.69	0.73	2.23	1.26	9.42
12	3.34	0.93	2.57	1.30	8.32
13	3.29	0.93	1.95	1.30	10.00
14	2.98	1.31	1.92	1.24	7.06
15	2.84	0.50	2.04	1.29	6.95
16	3.65	1.55	2.51	1.49	6.38
17	3.43	1.04	2.76	1.34	4.70
18	2.78	1.42%	2.23	1.60	3.06
19	2.84	0.43	1.97	1.23	6.56
20	3.94	0.70	2.52	1.16	9.91
21	3:17	1,00	2:15.	1.17	7,86
22	3.63	0.68	2.77	1.10	7.96
23	3.63	1.21	2.12	1.34	8.64
24	3.47	0.96	2.81	1.31	4.95
25	2.95	0.36	2.45	0.17	4.08

It appears that all correlation coefficients values are higher than the tabular value of (0.098) at the significance level (0.05) and degree of freedom (408), so keep the scale on all its paragraphs of (25) paragraphs

Final application of the test

After ascertaining the psychometric characteristics represented in honesty and stability to test the difficulties of learning mathematics and the measure of cognitive failures, the research sample was applied in the center of Babylon Governorate, as they numbered (410) male and female students, and it was explained how to answer the tests for students, and after answering them, the forms were collected and corrected, and the

total score of the answers for each student was determined and these grades were statistically processed according to the objectives of the research .

### **Psychometric properties :**

#### **Validity :valuation**

Oppenheim points out that validity indicates the measurement of the vertebrae of what they are supposed to measure (Oppenheim, 1973:69-70) . Cronbach defines validity as the process by which a researcher collects evidence that supports the inferences he or she has drawn from test scores. (Crocker,2009, p. 291). The Imam and others indicate that the scale is not a valid tool for measurement unless certain conditions are met and these conditions are considered as goals that the designer or user of the scale is trying to achieve, and the most important of these conditions are honesty and stability (Imam and others, 1990 :123)

#### **Verified by :**

#### **First : Apparent validity:face validity**

The term apparent validity is used to indicate the extent to which the test appears to measure it, that is, that the test includes clauses that are relevant to the variable being measured and that the content of the test is consistent with its purpose. (Faraj,2012 :271) . The best way to measure it is for a group of specialists to evaluate the validity of the content of the paragraphs of the scale in measuring what has been prepared to measure it (Ebel, 1972: 55 ), and the scale has been presented to a group of arbitrators specialized in education and psychology. In light of the opinions of the arbitrators, all the paragraphs were accepted because the calculated value of (KA2) ranged between (5,33 - 12 ), which is all higher than the value of (KA2) at the level of significance (0.05) and degree of freedom (1) .

#### **Second : Building Validity Indicators**

The researcher verified the internal consistency of the cognitive failures scale through the correlation coefficient of the degree of each paragraph of the scale with the total degree of the scale. It was found that all the paragraphs are statistically significant at the level of significance (0.05)

#### **Stability: (Reliability )**

Stability represents consistency in the measurement of the feature or phenomenon that is prepared to be measured . It is a necessary indicator of objective scale along with validity ( Melhem,2000 :273 ). Stability is an important psychometric characteristic of the scale, so stability is another indicator of the accuracy of the scale in measuring what

has been prepared to measure it (Brown, 1983: 27), and the stability of the measure of cognitive failures has been verified through the method of retesting as follows:

### **Retest Method**

This method is used to assess the error related to the application of the test tool at two different times, where the importance of this method is highlighted in measuring the characteristics that do not change over time, that is, the constant psychological and neurological features, while this method does not work with the constantly changing characteristics. (Gregory, 2015, 105)

This method relies on re-applying the test to the same sample and under the same conditions as the previous test and then calculating the correlation coefficient between the performance of individuals through the two applications

(Faraj , 2012, 149) The measure of cognitive failures on the sample of vertebral clarity experience was returned within a period of (15) days and using the Pearson correlation coefficient, the value of the stability coefficient was (0.78), a value that indicates high stability and the standard error of the test was (3,984)

### **Final Application of Testing Tools**

After verifying the psychometric properties represented by the validity and stability of the research tools, the application was applied to the research sample in the center of Babylon Governorate, as they numbered (410) students, and it was clarified how to answer the tests for students, and after answering them, the forms were collected and corrected, and the total score of the answers for each student was determined and these grades were statistically processed according to the research objectives.

### **Statistical means**

**Chi box 2** : To extract the statistical significance of the agreement of the arbitrators to judge the validity of the paragraphs of the scale .

The distinction and difficulty equation to calculate the distinction and difficulty of the mathematics learning difficulties test items.

T-testing for two independent samples: to extract the discriminatory power of the cognitive failures scale vertebrae and to verify the third goal of the research objectives.

**Pearson correlation coefficient: To calculate the** stability coefficients to test the difficulties of learning mathematics and the measure of cognitive failures as well as the internal consistency of the research tools as well as to calculate the correlation with the difficulties of learning mathematics and cognitive failures.

Test (**t-test**) for one sample: To find the significance of the differences between the arithmetic averages calculated from the responses of the sample members, and the theoretical average for both the test of learning difficulties of mathematics and the measure of cognitive failures.

**Statistical indicators to test the difficulties of learning mathematics and the measure of cognitive failures**

To recognize the moderate distribution of the sample members' scores through their responses to the two research tools, there must be some statistical characteristics or indicators such as the mean and standard deviation . The first represents the sum of the values of the scores divided by their number (coolican, 2014, 347 ; Reynolds & Livingston, 2014, 47 ), while the second expresses the amount of deviation of the scores from its arithmetic mean, as the degree (degree of deviation ) approaches zero whenever it indicates a convergence between the values of the distribution scores (coolican, 2014, 355 ; Reynolds & Livingston, 2014, 52 ) .

While the decrease in the values of skewness ( which examines the extent of concentration or distribution of scores between the positive and negative terminal values of the trait or property compared to the moderate distribution of scores ) and Kurtosis ( which examines the peak of scores and the extent of their conglomeration in a specific range compared to the normal distribution) of the moderate distribution is a positive indicator of the distribution of the research sample moderately (coolican, 2014, 401 - 402 ) . As shown in the table below: -

Table (5) Descriptive characteristics of research tools

No.	Descriptive Properties	RESEARCH TOOLS	
		Math Learning Difficulties	Cognitive failures
	Platyplasia	.918	937!
	Normal error of planum	247	.733
	Twisting!	-868	-139
	Standard fault of torsion	124	374
	Intermediary	13	114
	Mean	11,46%	112
	Mode	12	109
	Variance	288,3204	452,54
	Divaition	16,98	21,273
	Almada	19	78
	The high point.	28	123
	Lowest score	94	45

## Chapter Four

It includes a presentation of the results of the current research according to the objectives of the research and discussing those results in the light of the theoretical framework and previous studies related to the research variables as follows:

### **The first goal/ Know the difficulties of learning mathematics among middle school students.**

To achieve this goal, the answers of the second intermediate grade students were analyzed on the test of learning difficulties of mathematics and for the purpose of identifying students who have difficulty learning mathematics. A cut-off point was adopted, which was represented by calculating the mean of the answers of the second intermediate grade students on the test of learning difficulties of mathematics in addition to the standard deviation, as the arithmetic mean reached (10,54) and with a standard deviation (7,55). Accordingly, the cut-off point became the separation between students with learning difficulties of mathematics and their peers, as shown in the table below

**Table (6) The calculated and tabular value of the mathematics learning difficulties test**

Sample	Students Number	Mean	standard deviation	Cutting point Mean + standard deviation	Number of students with difficulties	
					Males	Females
410	63	10:54	7h 55m	18,09	35	28

It appears from the above table that the number of students who have difficulties learning mathematics has reached (63) male and female students and the reality of (35) male and (28) female students according to the cut-off point that has been identified (18,09) This is due to the deficiency of verbal processing as a deficiency in the process of visualization and visual organization of concepts and mathematical treatments, or the deficiency of working memory entrusted with the treatment of different calculations, and learning difficulties may appear as a deficit or deficiency in the conduct of calculations, which is called dyscalculia or acalculia), (Gulli & Mollary, 2005, 478 )

The second goal/ the level of cognitive failures among middle school students

To achieve the second goal, the answers of the students were analyzed on the cognitive failures scale, who were diagnosed as having difficulties in learning mathematics, which reached (63) students, and it appeared that the arithmetic mean of their grades on the cognitive failures scale was (69,45) and with a standard deviation (18,93). For the purpose of identifying the statistical significance of the apparent differences between

the achieved arithmetic mean and the hypothetical mean of the scale, which is (75), the ( T test ) was used for one sample, and the results shown in the

table below showed (7) the calculated and tabular value of the cognitive failures scale

Sample	Students Number	Mean	standard deviation	Calculated T Value	Table T Value	Significance
410	63	69,45	18,93	2,322	2	Function

It appears from the above table that the calculated value of (T) reached (-2,322), which is higher than the value of (T) the tabular value of (2) - regardless of the indication - at the level of significance (0.05) and degree of freedom (62). This means that diagnosed students with difficulties learning mathematics have cognitive failures, due to the fact that any deficiency in the mechanisms of sensation, attention, cognition, and even memory represents a mental disability or cognitive failure that affects to unforeseen degrees in information processing processes ( Saleh, 1982, p. 19 ).

- The third goal/correlation between the difficulties of learning mathematics and the cognitive failures of middle school students

To define the correlation between the difficulties of learning mathematics and cognitive failures, the Pearson correlation coefficient was used and it appeared that the calculated value reached (0.744). For the purpose of defining the statistical significance, it was compared to the tabular value at the level of significance (0.05) and degree of freedom ( 61 ). The results shown in the table below .

Students Number	Pearson correlation coefficient calculated	Freedom degree	Pearson correlation coefficient tabular value	Significance
63	744	61	254	Significant

The above table shows that the calculated Pearson correlation coefficient of (0,744) is higher than the Pearson correlation coefficient of (0,254) at the significance level of (0.05) and the degree of freedom ( 61 ). This indicates a statistically significant correlation between mathematics learning difficulties and cognitive failures.

### **Conclusions:**

The presence of a number of intermediate students who suffer from difficulties in learning mathematics.

Math learning difficulties and cognitive failures in the intermediate stage can be detected through tests prepared for this .



The problem facing people with learning difficulties in math and cognitive failures is how to process information .

There is a relationship between the difficulties of learning mathematics and cognitive failures in terms of the level of cognitive abilities of students

### **Recommendation**

Detecting students with mathematics learning difficulties in the intermediate stage to develop appropriate programs for them .

Opening courses for teachers in these stages and training them on therapeutic programs in order to deal with students with difficulties in learning mathematics correctly .

The need to take into account these difficulties in the curricula of this group

### **Suggestion**

Preparation of the computerized training program for the intermediate stage student in mathematics

Study the impact of each of the mental abilities on the difficulties of learning mathematics

### **Sources**

Ahmed, Shoukry( 1986 )Trends in Mathematics and its Relationship to the Type of Educational Achievement Test and Some Other Variables in Some Students " , The Arabian Gulf Letter, p. 8

Busan,Tony, (2009)The Mind and Its Utilization, www.docstoc.com

John, Anderson, 2007, Cognitive Psychology and its Applications, Translation of Mohamed Sabri Selit and Reza Masoud Gamal, Dar Al Fikr, Oman .

Al-Zaaloul, Imad Abdul Rahim (2001 ), Principles on Educational Self, Jordan, University Book House.

Al-Zayat,Fathi, (1998), Learning Difficulties - Fundament, Theory, Diagnosis and Therapy, 1st Edition, Al-Nahda Library, Egypt.

-----, (2002), Mentally Excellent People with Learning Disabilities,1st Edition, Anglo-Egyptian Library,Egypt .

Saleh, Qasim Hussein (1982), Psychology of form and color perception,Dar Al Rashid Publishing, Baghdad

Al-Atoum, Adnan Youssef, (2004), Cognitive Psychology, Theory and Practice, Dar Al-Masirah for Publishing and Distribution, Amman, Jordan .

Awad, Youssef Thiab ( 2007), Psychology of Academic Delay Therapeutic Analytical Perspective, 1st Edition, Dar Al-Mahaj for Publishing and Distribution, Amman, Jordan .

Mohammed, Adel Abdullah, (2006) : Some cognitive variables for kindergarten children with skill deficiencies before the academy as an indicator of learning difficulties, Faculty of Education, Kuwait University.

Mufti, Muhammad (1995). Readings in Mathematics Education, Cairo : The Anglo-Egyptian Library.

Yousef, Sulaiman Abdul Wahid 2011, Individual Differences in Cognitive Mental Processes, Dar Al Masirah for Publishing and Distribution, Amman

American Psychological Association (2015). APA dictionary of psychology (2th ed.). Washington : American Psychological Association.

Baron ,A. R. & et al. (1980): Psychology Understanding Behavior. 2ed. Halt-Sanders, U.S.A.

Broadbent D. E., Cooper, P. F., Fitzgerald, P., & Parks, L. R. (1982): The Cognitive Failures Questionnaire (CFQ) and its correlates, British Journal of Clinical Psychology.

Coolican, H. (2014). Research methods and statistics in psychology (6th ed.). New York : Taylor & Francis Group.

Daniel ,M & Jessica, L(2005): cognitive failure in every life,New York, Guilford Press.

Davidoph, Linda (1976) Introduction to Psychology M.C., Grow Hill Book Co. New York, U.S.A.

Dewitte, S., & Schouwenburg, H. (2002). Procrastination,temptations, and incentives: The struggle between the present and the future in procrastinators and the punctual,European Journal of Personality.

Ellis. D (2011). Becoming a Master Student. Thirteenth Edition. United States of America Wadsworth. Cen gage Learning.

Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2007). Learning disabilities: From identification to intervention. THE GUILFORD PRESS

Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2007). Learning disabilities: From identification to intervention. THE GUILFORD PRESS

Gregory, R. (2015). Psychological testing: History, principles, and applications (7th ed.). England : Pearson Education Limited.

Gulli, L. & Mollary, N. (2005). Learning disorders. In s. Chamberlin & B. Narins (Eds.), The Gale Encyclopedia of Neurological Disorders(pp. 477-480). New York : Thomson Gale.

Harris, R. (2003). Traditional nomothetic approaches. In S. Davis (ed.), Handbook of Research Methods in Experimental Psychology (pp. 41-65). Australia: Blackwell Publishing Ltd.

Kamphaus, R. & Hendry, C. (2000). Learning Disabilities. In A. Kazdin (Ed.), Encyclopedia of Psychology, Vol (v) (pp. 26-30 New York: Oxford University Press

Kaplan, R. & Saccuzzo, D. (2013). Psychological testing: Principles, applications and issues (8th ed.). Canada: Thomson Wadsworth. Belmont, CA.

Mathews, G., & Wells, A. (1988): Relationships between anxiety, self-consciousness and cognitive failures. Cognition and Emotion., 2.

Merckelback , H. Murivs .p , Nijman .H , Schmidt .H , Resin .E & Horseleberg .R (1998):De creative Ervringen vragenlijst meat over fantasy proneness "The creative experience Question air (CEQ) as a measure of fantasy prone ness De psychology 33 .204-208

- Robinson, M. E. & Riley III, J. L. (1999): The role of emotion in pain. In R. Gatchel & D. Turk (Eds.) Psychosocial factors in pain: Critical perspectives (pp. 2-3) 74 – 88). New York: Guilford Press.
- Taylor, A. E. B. (2014). Introduction/History of Learning Disability Assessment. In Diagnostic Assessment of Learning Disabilities in Childhood (pp. 1-18. Springer: New York.
- Tilly, W. (2004). Learning Disabilities. In Ch. Spielberger (Ed.), Encyclopedia of applied psychology, vol. 2. pp. 527-536). Elsevier Inc.
- Treisman, A. M. (1960): Contextual cues in selective listening Quarterly . Journal of Experimental Psychology: (12)
- Tuma ,R ,De Angelis ,L.M (2000): Altered mental status in patients with cancer Arch Neural 57: 1727-1731.
- Wallace, J. C., & Vodanovich, S. J. (2003): Can accidents and industrial mishaps be predicted? Further investigation into the relationship between cognitive failure and reports of accidents.Journal of Business and Psychology.
- Wallace, J. C., & Vodanovich, S. J. (2003): Can accidents and industrial mishaps be predicted? Further investigation into the relationship between cognitive failure and reports of accidents.Journal of Business and Psychology.