Gene Cerillo Test Numbers to Measure Mental Ability in University Students Using the Rash model

By

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Abstract

The current research aims to use the Rasch model in the preparation of the Jane Cirillo test of the mental ability of university students . To achieve this goal, the researcher followed the steps of preparing the test, starting with the translation of the test items and instructions from English into Arabic, and then re-translating them from Arabic into English. The researcher took the amendments made to the translation when presented to the translation experts, and then presented the instructions of the test and its items to an expert specialized in Arabic, and after taking his observations, it was presented to the arbitrators in educational psychology, measurement and evaluation, to ensure the availability of the appropriate characteristics for it and for it's alternatives in terms of form and content, and the researcher took their opinions, and made some amendments in light of their observations, and all the test items are logically valid to measure what they developed in order to measure. To ensure the clarity of the instructions and items of the test and to determine performance time , the test was applied to a survey sample of (50) students, and it appeared that the instructions and items of the test are clear, and the performance time was limited to (43) minutes. The test was applied to a sample of (400) male and female students (Baghdad University/Morning Study) who were selected in a multi-stage random sample method, and the researcher relied on the one parameter Rasch model, which is one of the models of Latent Trait theory to analyze the test items , and to verify the assumptions of the model, the researcher followed the following:

1- One-dimensionality: To verify this assumption, the researcher conducted a factor analysis of the test using the basic components method, as one factor with an explanatory meaning was obtained for the test, and the same factor relied on Guttman lower bounds, which is the significant factor. Statistically, when the explainable latent root is equal to or greater than (1), and a ratio of (0,30) and above is adopted as the percentage of saturation of item s with the general factor according to Guilford's criterion.

3- The independence of measurement to achieve the objectivity of measurement as represented by the Rasch model, as no item was excluded because it did not achieve the independence of measurement .

4- The test Reliability coefficient was reached at.0.84

5. The researcher converted the logit unit to estimates of difficulty and the ability of individuals to dispose of fractures.

6- WINSTEPS did not delete any of the test items, so the number of items was (50). The results showed a low level of mental ability among university students, while the results did not show any statistically significant differences in mental capacity according to gender and grade variables.In the light of the results of the current research, the researcher reached a set of conclusions and came up with some recommendations and proposals.

Keywords: Model, Preparation, Test , Mental Ability, Rush Model

Research problem

The change and development that has taken place in human societies clearly indicates the need to measure and develop the mental abilities of individuals in modern ways and methods, because most of the goals of people can only be achieved based on mental abilities (Raschid,2005: 2)

Despite the existence of tests concerned with the measurement of mental abilities, these tests have been built and prepared in light of the traditional theory of measurement(classical theory), whose philosophy is based on the standard measurement of reference, where the grades are interpreted by reference to the criteria of the group to which the test recipient belongs, that standard may change with the change of the group (Hambleton & Swaminthan, 1985:70), according to this philosophy, an individual can get two different rates of intelligence, for example, if he is tested with two different tests that measure intelligence, because of the difference in the degree of standard error in both cases. This made that there is a need and an urgent need for new methods of psychological measurement so that the results of measurement are not affected by the tool used,nor are they affected by the group through which the individual's performance is explained (Domino &,Domino, 2006:34).

The item response theory (IRT)to the item or modern theory of measurement, which has already become a basic and common means of building and developing tests, and the emergence of computer programs has encouraged the application of different models of this theory in the field of tests and measures (Ahmed, 2014: 47), and these computer programs rely on a solid mathematical basis and complex algorithms through which data can be analyzed more accurately (84: 2008 , Adedoyin).

Thus, the item response theory aims to overcome the drawbacks of conventional measurement theory by providing a gradual measurement of the abilities of the examiners, and this graduation is independent of the characteristics of the test items used (Hambleton, 2004:698).

As mentioned above, the problem of the current research can be summarized in

First: The absence of a test to measure the mental ability (of Jane Cirillo) at the university's request is prepared according to The item response theory (IRT)to the item , as far as the researcher is aware, so the researcher found that it is necessary to prepare the general mental ability test (of Jane Cirillo) according to The item response theory (IRT)to the item using the Rasch model.(Arnout,et al,2020)

Second: The need to develop measurement tools in order to become more objective and approach the standards used in the natural sciences.

Research Significance

Since the twentieth century, the mental abilities topic has received attention from scholars and specialists in psychology and education and clearly attracted their attention, given the importance of the topic of mental abilities in knowing the extent of the mental growth of individuals and finding the necessary means for their development(Al-Afari, 2015: 2), as measuring the level of cognitive development of students helps in evaluating the process of education, its methods and strategies, and hence the modern school must be interested in cognitive learning that takes into account the growth rate of the individual's cognitive abilities and experiences and the strength and organization of his knowledge resources that help him to

learn and solve problems inside and outside the school (Al-Zayat, 1995: 1).

Interest in the human mind and its methods of growth and development are among the most important concerns of societies at present. The progress of society and its progress depends to a large extent on the development of the mental capabilities of its members from the earliest stages of life (Abdulraouf, 2008: 55).

Therefore, psychologists made great efforts to study mental abilities and develop mental measures to measure them, so they were truly one of the most challenging topics in education and psychology (al zobaiey, 1954:1) .

The attention of psychometric factors has focused on preparing measures and tests in which measurement errors are reduced and reaching the desired accuracy of measurement, which has resulted in many scientific efforts and research aimed at developing an ideological theory, which overcomes the problems of accuracy and objectivity of the tool used in measuring the psychological phenomenon, especially when it comes to preparing and developing tests in the field of intelligence (which is the cornerstone of psychometric measurement), where a theory was arrived at when it was established called "latent features" because it was based on the assumption that the observed performance can be explained on testing what characterizes these individuals is not observed or directly measured (Khadija, 2018 : 16).

The models of the Theory of Attributes(response to the item), including (the Rasch Model) (and the Bernium Model) (the Lord's Model) and its applications, especially the single-teacher (Rasch) model, have been used in many studies in various countries of the world in building and developing tests that meet the requirements of objectivity that are based on the foundations put forward by this theory (Let's, 2002: 9), and the Rasch -Mode model is one of the most important one parameter models for The item response theory (IRT)to the item , the simplest and most common in practice in the construction and development of psychological and educational tests and measures because it is assumed that the individual's response to a specific single (item), is determined by: the individual's ability, and the difficulty of the item only (Khadija and Muhammad,2021:146).

From the above, the importance of the current research can be summarized as follows
Theoretical significance
1- The current study is an attempt to respond to the continuous and ongoing developments in the field of psychological and educational measurement, and the need to keep pace with them.
2- This research derives its importance in providing a test that has objective and accurate ideometric properties on an important sample of the classes of society, namely university students, which gives confidence in its future use for the purposes of scientific research.
3. Theuse of the Rasch model in the mental ability test gradient provides the demands of objectivity, that is, the availability of the requirements of honesty and consistency.

Practical significance
1- Providing an objective measurement tool suitable for the Iraqi environment to diagnose the general mental capacity at various university levels and to benefit from it for educational purposes.
2- This test and other similar tests can develop students' thinking to adapt to new cognitive situations.

Research Objectives: The current research aims to

1- The use of the Rasch model for logarithmic probability in the preparation of the (Jane Cirillo) test for mental ability in university students.

2- You know the level of mental ability of university students.

3. Identify the level of mental capacity of university students according to gender and grade variables.

4 - Identifying the significance of the differences in the mental capacity of university students according to gender and grade variables

Research Limits: The current research is limited by: -

1. Research tool: Original version of the 2008 Jane Cerrillo Mental Capacity Test.

2- University students for morning study in Baghdad Governorate (University of Baghdad) and for both genders   (males – females) and for both disciplines (scientific – humanitarian) and for grades (first – second – third – fourth) for the academic year 2021-2022

3- One parameter Rasch Model (WinSteps Program)

Terminology

Rasch 's model of logarithmic probability

- **Shih (Shih, 2013)**: One of the models of response to the singularity that aims to provide an objective measurement of behavior, this model is also called "the logarithmic model of one parameter, which is the simplest model in The item response theory (IRT)to the singularity, and requires that all vocabulary measure the inherent trait itself, and this is the one-dimensional hypothesis of the Rasch model (4:2013 , Shih).

preparation

Fillet and Zaki (2004): A set of specific measures and actions taken in order to achieve a specific goal(Fillet and Zaki,2004: 161).

Test :Test

- **Faiza (2021):** A group of stimuli (drawings, symbols and shapes, phrases or questions, problems or challenges and tasks) prepared in an organized way to measure a sample of an individual's behavior for the purpose of comparison between individuals or within an individual in light of a particular criterion or criterion (Faiza, 2021: 6).

Mental ability

Spearman (1904) : It is a general ability that includes perceiving relationships and belongings, "especially difficult and hidden relationships, or the ability to think abstractly (Abu Hammad,2007: 17).

Chapter Two: Theoretical Framework and Previous Studies

The concept of mental ability: The term for naming mental performance with ability and mood and emotional performance with personality traits and motor performance with manual skill, thus limiting the concept of mental ability to mental aspects (Visual , 1979: 28)

The mental ability to know or actual realistic skill that the individual has and the extent to which this individual is able to prove his ability by performing in the test or doing a specific job that requires a certain ability (Desouki , 1988 : 39).

Characteristics of mental abilities

1- The Reliability of abilities: Vernon indicates that Reliability is a characteristic of abilities,

but this Reliability is not expected to be complete. If they fluctuate in their numerical abilities, for example, from day to day, we would not be able to recognize the existence of numerical capacity, or any other ability (Vernon, 1979: 5).

2- **Abilities and chronological age**: Thurstone says that the mental abilities of children are not completely differentiated and do not appear clearly at young ages, but the impact of these abilities is clear and their appearance increases as children get older as children use a wider range of abilities in solving their problems with age(Thurstone, 1938:8).

3- **Differences in capabilities are quantitative rather than qualitative:** It means that all these capabilities are available in each individual and that the difference is limited to the amount of ability in each individual, so individuals for any ability cannot be divided in a sharp twofold division into those who have the ability and those who do not, but the possession of individuals for any ability is on a fully connected scale (Al-Sheikh, 1988: 9).

4- **capabilities are distributed among individuals moderatel**y: The quantitative differences between individuals are subject in their distribution and spread to what is called (normal distribution), as most of the cases fall in the middle of the range and the number of cases is regularly less than the average value and we turn to each of the parties .

5- **The range of mental abilities:** The range is the difference between the highest degree of the presence of any ability and the lowest degree of it plus one integer (1) . This range varies from ability to ability, and it also varies by sex (males and females). In the repeated distribution of the scores of both males and females in general ability, females are more homogeneous than males (Khairallah et al., 1981: 314).

The most prominent areas in which mental ability tests are used are

1- It is used in classifying students according to their ability to benefit from different types of education, and then the best educational methods are chosen for each group separately, and in identifying slow-learning and outstanding students alike, in diagnosing the causes of academic failure, and in selecting applicants for fields that require special abilities (Anastasi, 1976: 3) .

2- Helps in educational and vocational guidance, and in order to provide advice to those interested in additional education and appropriate professions after the school education stage. Mental ability test data are particularly valuable and can prevent many mismatches in professional aspects by a mentor interested in mental capacity data. (Henmonc& Nelson, 1957:5).

The theory adopted in this study

The Two Factor Theory

Spearman's theory is the first integrated theory of intelligence based on the statistical analysis of the results of tests, and his theory, known as (the theory of The two factors), was the basis for many of the developments that occurred after that in the study of intelligence and mental activity, as he is the legitimate father of the method of factor analysis.(Strnberg, 1990: 83).

Spearman's mental activity consists of two basic factors or dimensions

* The first factor: The general factor ((General Factor, symbolized by G)), which means the ability to perform different tasks, or the ability to perceive relationships, which is a factor that indicates the common destiny that exists between all cognitive mental activities, regardless of the form of this activity and its subject, it is a mental energy that people use in all their activities and work(Abu Ghazala,2015 :157).

* The second factor: (Special Factor), which is symbolized by the symbol (S), which means the ability to perform a certain type of tasks (vocabulary, calculation, memory), so the performance of certain verbal tasks differs from the performance of certain mathematical or mechanical tasks, and it is necessary to have some amount of the public factor in those three tasks, and it is believed that the private factor has nothing to do with intelligence because it does not provide information that shows the extent of the individual's superiority over the performance of a certain test, but the public factor has to do with intelligence, and Spearman believes that this factor is the key to intelligence, and that it consists of individual differences in mental activities as shown in Figure No. (1), (Sheikh, 1990: 138-148).

Accordingly, each mental activity uses one of the private factors, while the public factor is involved in all forms of mental activity, and mental activities vary in the extent to which each of them contains the public factor and the private factor (Al-Zayat,130, 1995), and the goal of mental measurement at Spearman is "to measure the amount of the public factor in the examiner because as the public factor is present in all human abilities, it becomes the only basis for predicting its performance from one situation to another, and it becomes unhelpful to measure the private factors because each of them is limited to one method of mental performance" (Abu Hatab, 1996:74).

The second axis:Psychometry and its theories

Theory of response to item (latent features)

They are called: Item Response Theory (IRT), Item Characteristic Curve Theory (- Item Characteristic Curve ICC), and Latent Attribute Theory, and Lazersfeld (1968 , Lazersfeld) is the first to use the term latent attribute in this sense (Bashir et al., 2018: 61).

This theory assumes the existence of features or characteristics called traits or abilities that lie behind the individual's performance on the test, as it is possible to predict the individual's ability through this performance on the test and through his degrees on the traits, and since these features cannot be observed or measured directly, they are called latent features, and the philosophy of this theory is based on the fact that the individual's performance can be predicted on a test item by an attribute or set of traits or abilities, and the relationship between the individual's performance on a test item and the set of traits that lie behind this performance can be described using an "incremental directional function" called the characteristic curve of the item (Al-Shafi,2014   :432).

The underlying attribute theory includes three basic models that vary according to the number and nature of the features, namely the Rasch Model, the Lord Two Teacher Model, and the Birnbaum Three Teacher Model (65 :2000,Embretson and Reise) .

One-Parameter Logistic Model

This model is the simplest model of response to the one-dimensional item , known as the Rasch model relative to the Danish mathematician GeorgeJ. Rasch at the University of Copenhagen (Alam,2005: 69), and it is called several names, including the simple probabilistic Rasch model, the one-parameter logarithmic model, the free parameter model for the analysis of items , where he was the first to publish it, as he used the theory of probabilities in the analysis of data and this achievement was different from what was familiar at the time, as the resulting model of the curve of the characteristics of the item is a logical model, (Enhancement 2013 :182), where George Rasch , the holder of this model, considers that the nature of human behavior and its various manifestations of behavior are characterized by change and in Reliability , which makes it impossible to confirm that a certain aspect of this behavior has

occurred, if special conditions and conditions are available, so there was a rational basis for accepting the probabilistic mathematical entry based on the theory of the Shafi probability (2008 :15).

The model of one parameter is used   in analyzing test vocabulary that the answer is either correct or wrong (biphasic). When an individual responds to a test item, an interaction occurs between the ability of this individual and the difficulty of this item through this interaction. The psychological aspect is clear in this model as it depends on two basic axioms:

1- Increases the probability of answering correctly to a test item by increasing the ability of the respondent individual.
2. An individual is more likely to answer correctly to an easy vocabulary than to answer correctly to a difficult vocabulary (Allam,2005: 69).

Hypothesis of the one-parameter Rasch model
1- One-dimensional: The existence of one latent attribute or ability that forms the basis of all items , the item must be one-dimensional that measures only one attribute. This means that the test items are homogeneous and all measure the same trait (Andrich, 1995, 11).
2-Linearity of measurement: means that there is a constant rate of measurement gradient, over the wide range of the continuous of the attribute under measurement, which is represented by one unit of measurement, then the estimate of the difference between any two successive measurements on this gradient is fixed at any level of the attribute.
3- The difficulty parameter is the only parameter affecting the performance of the examiner as the vocabulary differs among them only in terms of the level of difficulty .
4- All vocabulary has a marker equal to the correct one, and this means the Reliability of the marker for all vocabulary, where it is assumed that the curves of the singularity property (instead of 2008,:29).
5. Estimating the difficulty of the singular does not depend on the difficulty of other test-forming vocabulary, nor on the ability of the individuals who respond to it(Kim&Hong, 2004:18).
6- Absence of guessing effect, meaning that the examiner cannot guess in the correct answer, as the bottom asymptote in the curves of the characteristic of the singular equals zero (Tantawi,2000: 65) .

Rasch came up with the mathematical picture of this model, which is as follows

$$(Pi = 1, 2, \ldots, n) \ldots \ldots \ldots \ldots \ldots . (1) \quad pi(\theta) = \frac{e(\theta - bi)}{1 + e(\theta - bi)}$$

The previous equation represents the general mathematical picture of the model, where it symbolizes:

Massof, Robert W. 2011,10)), (Brown, 2010: 13)

(i)   :vertebrae equal to (1,2,3........,n)

$Pi(\theta)$:to a symbol to the likelihood that an individual with the ability to correctly (θ) answer the item (i).

(bi): Item difficulty parameter (i).

(n) : Number of test items.

(e): is the natural logarithmic base which is equal to 2.718

: (θ) Capability of the Individual (1990:195, (Mislevy.

The graphical representation of a mathematical formula for the Rasch model for two items can be illustrated in Figure(9).
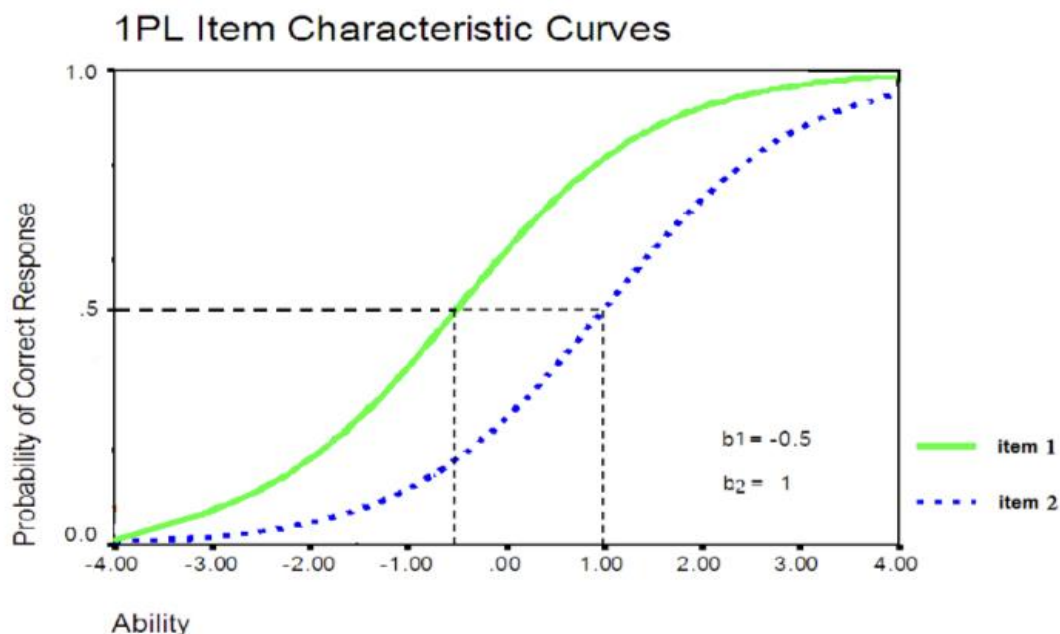
1PL Item Characteristic Curves

Fig.(1) *curve properties of two items of the Rasch model*

It is clear from figure (9) that the characteristics of the two items are parallel and differ only in the displacement of the curve from the two coordinate axes, which stems from a disparity in the treatment of difficulty, the Reliability of the coefficient of discrimination, and the absence of a guessing coefficient, as item (2) seems more difficult than item (1). The application of the mathematical formula of the Rasch model requires that all test items be equally distinguished, that is, that all the characteristic curves of the test items be parallel (isoclinical) as shown in Figure (9) and differ from each other at their point of convergence to the horizontal axis which represents the connected ability or latent feature. This means that the items differ only in their difficulty, which is the only parameter in the Rasch model (Allam, 2005: 70).

Previous studies that dealt with the one parameter Rasch model
1. Verguts & Boeck Study (2000 ,Verguts & Boeck)

Objective : This study aimed to diagnose learning during the IQ test solution using the Rasch model.Sample : The sample of this study consisted of (137) male and female students from the Department of Psychology.

Research tool: An intelligence test consisting of (40) items distributed over three groups of items Test elements consisting of (geometric shapes: circles, squares, triangles and lines, some of them white and others black) The number of items in each type is either 13 or 14 respectively.

Statistical means: Statistical programs (3.07 Winsteps version) and(SPSS) were used Results : * The test items fit the Rasch model.* The first set of items the examiners did not learn from. * The second set of items half of the examiners were able to learn and the other half were not able to with learning.* The third set of items enables everyone to learn.

(Verguts and Boeck, 2000:151-162)
2. Rannels Study (2012
Study Title:Evaluation of an achievement English Vocabulary Test Using Rasch Analysis
Evaluating achievement test items in English using the Rasch model

Objective of the study: Evaluate the validity of the test provided using the Rasch model

Study sample: It consisted of (294) participants from various disciplines except for the English language specialization of second-year students aged between (20, 21) years from Hiroshima City University in Japan.Study tool: It consisted of 83 multiple choice questions, most of which included matching an object in a picture with a word, and the sentences in the test were taken from the subjects.Statistical means:The program (3.64.2 Win steps) was used in analyzing the test items . The results of the study: * The statistical analyses carried out by the Rasch model showed that the test was arranged from the most difficult to the easiest items,*There are a number of items that were presented to the students that were not effective and gave patterns of response that were inappropriate and not indicative of the extent to which students acquired the words included in the test, * There are a sufficient number of items on a high degree of difficulty and that this test partially measures knowledge (151 - 171: RUNNEL,S2012).

Chapter (3)

Research Methodology and Procedures

In order to achieve the objectives of the current research, the researcher adopted the analytical descriptive research approach to achieve the objectives of his research, because this approach is the most appropriate for the current study, and the descriptive approach is one of the forms of scientific analysis and systematic interpretation, to describe a specific phenomenon or problem.

Second: research community

The current research community of students from the University of Baghdad represented the morning study and the level of initial studies (Bachelor)for the academic year (2021-2022), and the total number of the research community reached (60071) male and female students distributed according to the gender variable by (24213) students representing (40%) of the total research community, and (35858) female students representing (60%) of the total research community, distributed according to the variable of specialization and by (35701) students studying in scientific disciplines and representing (59%) of the total research community, and what are the (24370) male and female students representing (41%) of the total research community.

Third: The research sample: Two samples were selected from the study population:

First: The sample of clarity of instructions and understanding of items reached (50) students and its purpose is to know the clarity of instructions and items among the sample members.

Second: The sample of statistical analysis (the sample of grading) amounted to (400) students and its purpose is to analyze the data derived from the responses of its members to the test items , and will be discussed in detail during the procedures followed.

Fourth: Search tool

In the current research, the researcher used the Jane Cirillo test, a tool to measure general mental ability (general intelligence), which was prepared according to Spearman's theory of The two factors issued by the (Alpha House of Books) Foundation, which was published in 2008.

Test Description

It is a tool designed to measure the mental ability (general intelligence) of individuals

from the age of 16 years and above, prepared by Dr. Jane Cirillo, and it contains three components: formal, numerical and verbal, and thus the concept of intelligence that this test aims to measure is close to the concept that Spearman has previously called the general factor "g", "This concept includes the perception of relationships and belongings, and the test consists of (50) items of the type of multiple choice with four alternatives for each item , one valid alternative. Thus, the test is evaluated by assigning a score of one to the correct answer and zero to the wrong answer, that is, the two-division test is in the grade (1-0) (Dichotomous Responses Items). The highest score that can be obtained is (50) and the lowest score that can be obtained is (0), the recommended response time for the test is (43) minutes.

Fourth : Test Preparation

The process of preparing the test was based on a set of procedures to be followed, so the researcher did the following:

1-Translation of the mental ability test (translation validity): test translation

The researcher translated the test from English into Arabic with the help of a specialized translator1, then the researcher hired another translator to perform the reverse translation2, that is, the translation of the test from Arabic into English, and then the researcher presented the original version of the test with the translated English version to a third expert to 3 match it, and he found that they are equivalent 0 and then presented the test in Arabic translation to a specialist in Arabic, to ensure the integrity of his Arabic language4, and he expressed the validity of the instructions and items of the test, thus the researcher confirmed the validity of the test instructions and items for logical and statistical applications. The researcher also prepared the test by providing sufficient copies of it and separate answer papers. which facilitates the completion of the application process.

2- Test Instructions

The researcher prepared instructions that include how to answer the test so that the student can understand them easily and easily, taking into account the accuracy and speed of reading the test instructions, and a solution example was given that shows the way to answer the items of each test, and the student was asked to put a tick ($\checkmark$) in the box that represents the correct answer among the four alternatives in the separate answer sheet.

3. Answer sheet

The researcher prepared a separate answer sheet about the test to be answered by the students instead of answering the test booklet itself as it is a newspaper that is adopted in many tests as well as less costly and less effort in correction.

4- **Correction key:** A key has been prepared to correct the test type (punched key), and the correct answer has been determined on the basis of the original test.

Descriptive validity of the test items and their suitability for the Iraqi environment

In order to verify the validity of the items of the (Jane Cirillo) test of mental ability in their apparent form and their suitability to the Iraqi environment, the researcher presented the instructions of the test and its items in its initial form, which are (50) items , and each item has (4) alternatives to a group of experts and specialists in measurement, evaluation and general psychology to express their views in the items and instructions, as the total number of experts

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[1]- Prof. Ali Aref Fadil /Faculty of Languages, University of Baghdad
[2]- Dr. Huda Abd Ali Hattab, Faculty of Education, Ibn Rushd ;
[3]- Dr. Shahba Muhammad Shihab, Faculty of Arts, University of Baghdad;
[4]- Dr. Ali Husayn Farhan - Third Ra 'safah Education Centre ;

reached (12). In light of this procedure and the discussions held with the researcher and the supervisor's view of the opinions of the experts, it became clear that all the items had the approval of the experts except for some items that were reformulated according to the experts opinion.

Experience clarity of instructions and items
For the purpose of knowing the clarity of each item of the test, the clarity of the instructions and how to answer, the researcher experimented with the instructions and the test items exploratorly by applying them to a random group of students numbering (50) male and female students, for the second and fourth grades of the Faculty of Languages by (25) male and female students, and the Faculty of Education Ibn Rushd for the first and fourth grades, by (25) male and female students.

Statistical analysis of test items
1- Sample of statistical analysis (gradient sample)
The current study sample consisted of university students and for four grades, which was chosen in a stratified, random style, of equal style, where (400) male and female students were selected by(200) male and(200) female, and this number is considered appropriate as the minimum sample size is not less than (100) individuals according to the one parameter model Rasch model and table (1) between that.

Table (1) *Sample statistical analysis by faculty, grade and gender*

Faculty	Classrooms												Total			Percentage
	First grade.			2nd grade			3rd grade			4th Grade						
	Y	A	Mug	Y	A	Mug	Y	A	Mug	Y	A	Mug	Y	A	Mug	
Faculty of Education Ibn Ru Rushd	14	13	27	10	7	17	3	4	7	1	1	2	28	25	53	13%
Literature	9	11	20	6	7	13	5	5	10	3	2	5	23	25	48	12%
Languages	13	14	27	5	6	11	5	3	8	2	3	5	25	26	51	13 %
Fine Art	8	12	20	7	5	12	5	4	9	2	3	5	22	24	46	11%
Administration And the economy.	14	16	30	7	6	13	3	2	5	1	1	2	25	25	50	12%
Engineering Agriculture	9	10	19	9	9	18	5	5	10	3	2	5	26	26	52	13 %
Medicine	7	10	17	8	9	17	5	4	9	4	2	6	24	25	49	12 %
Engineering	11	9	20	9	8	17	5	5	10	2	2	4	27	24	57	14%
Total	85	95	180	61	57	118	36	32	68	18	16	34	200	200	400	100%

V Assumption (Rasch)
First: Investigated of Unidimensionality
This assumption has been verified as follows
1- Factor Analysis : A one factor with a root of more than one integer with a value of (11.714), and a meaning explained by limits (23.428%) of the total variance, and based on the method of the minimum limits of Gtman, as this method considers that the factor or the underlying root that can be explained is equal to or more than one integer (Abdul Khalek, 1983:

Factor	Latent Root	Interpreted variance%	Frequency of the Ascendant Complex
1	11.714	23.428	23.428
2	2.064	4.129	27.557
3	1.577	3.154	30.711
4	1.427	2.854	33.565
5	1.314	2.629	36.194
6	1.287	2.574	38.768
7	1.242	2.484	41.253
8	1.156	2.311	43.564
9	1.114	2.227	45.791
10	1.104	2.208	47.999
11	1.058	2.116	50.115
12	1.021	2.042	52.157
13	1.018	2.035	54.192

It is clear from Table(2) that there are (13) factors whose roots lie above one. The explanatory variation of the first factor is (23%), while the explanatory variation of the second factor is (4.129), that is, the ratio of the first factor to the second factor is (5.67), and thus a one-dimensional condition is achieved, as the one-dimensional condition is achieved if the first factor explains 20% of the total variation and the ratio of the first factor to the second factor (Zakry, 2009: 35).

From the above, it is clear that all the items are saturated with the first factor, which indicates the achievement of a one-dimensional hypothesis, and it is clear from Table (3) the extent of saturation of the test items with the general factor based on the saturation ratio of the test (0.30) and above according to the Gilford standard.Guilfor (Latif,2007: 156).

Table 3 *Saturation of test items by general factor*

Item No.	Saturation	Item No.	Saturation	Item No.	Saturation	Item No.	Saturation	Item No.	Saturation
1	504	11	507	21	.562	31	356	41	.484
2	494	12	442	22	421.	32	476.	42	336
3	.547	13	373.	23	597	33	538	43	.484
4	424	14	485	24	(407)	34	490|	44	560
5	532	15	- 437.	25	538	35	412.	45	449.
6	.427	16	**557	26	470	36	539	46	378.
7	495	17	592	27	361.	37	558|	47	607.
8	**557	18	502	28	456	38	535	48	442
9	382.	19	A 417.	29	538	39	441	49	476.
10	A 404.	20	569	30	487	40	347	50	548

2- Kattells Scree Test Ramp

The chart of the SPSS Analytics Kettlebar (Scree Plot) can be obtained by directing the SPSS to be visible. Using this form, the decision is reached about the number of factors depending on the point at which the latent root curve changes rapidly from a curve that is roughly perpendicular to the x-axis to a horizontal curve, as shown in Figure (2).
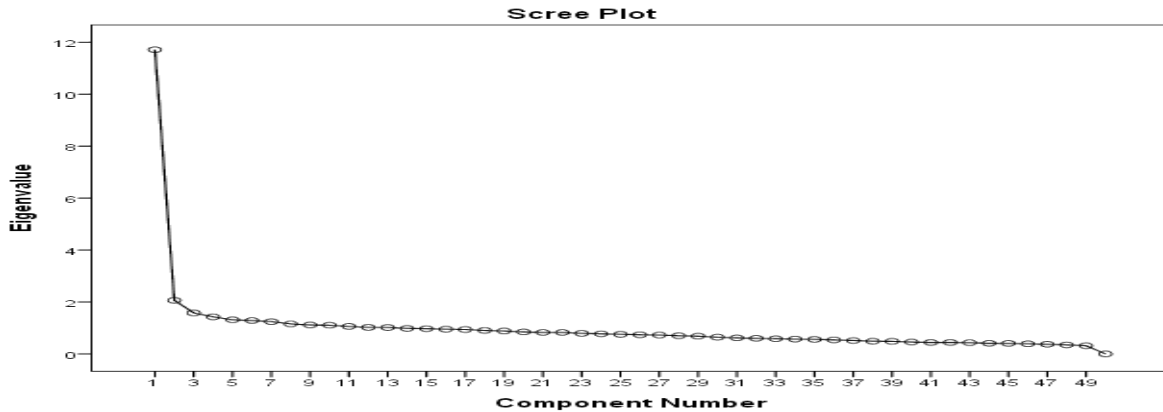
Figure (2): *Graphical representation of the underlying eigenvalue of the constituent factors of the test*

Second: Topical independence of the test

This assumption shows that it is the ability of the examiner and the characteristics of the item that affect performance or response, and by achieving this borrowing, the probability of obtaining any sequence of marks for a set of items is simply the result of multiplying the probabilities for all these items . Researchers have only relied on the results of the factor analysis to prove the independence of the position because the factor analysis produced one main factor (Bobo et al., 2019: 658-659).

Third: Assuming the curved characteristics of the item

In order to verify this assumption, the curve of the item characteristics was extracted for each of the test items (50) items , as the results showed the availability of the direct relationship between the ability and the probability of the correct answer for all items and the low parameter of discrimination that approached zero and parallel curves where the only difference is due to the difficulty parameter and the curve of the test characteristics was found as shown in the figure (3).
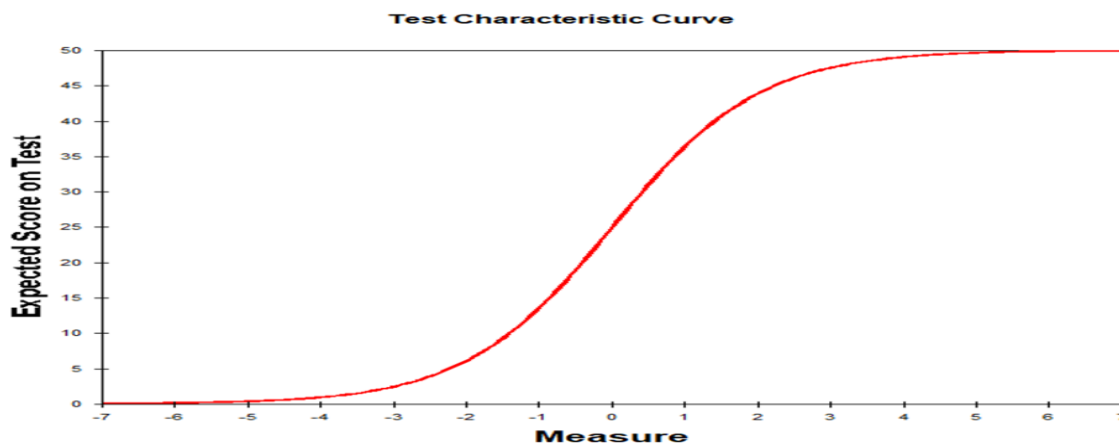
Figure(3) *shows the availability of the characteristic of the curve of the test properties according to the Rasch model. The greater the capacity, the greater the probability of the correct response.*

Fourth: Theassumption of freedom from speed in performance (Speededness)

All students were able to complete the test within the specified time to answer, and the failure of students to answer the test items was due to the ability factor.

Statistical analysis according to the " Rasch " model (estimation of the parameters of the model):

The parameters of the model were estimated the difficulty of the items and the abilities of the examiners using the computerized program (Win (Steps). This program was used to calculate the parameters of the model for the test, by analyzing the responses of the members of the sample of (400) students to the (50) test items to estimate the teachers of the difficulty of the items and the ability of individuals.

1.Estimation of item difficulty indexs

Item difficulty coefficients have been calculated in logit for each item , and logit is a unit of measurement for both item difficulty and individual ability, and it is defined as the natural logarithm of the individual's probability of success on the items , and it is the zero point (0) gradient from its difficulty (Kazim, 325:1988). Table (4) includes the gradient of the items of the (Jane Cerrillo) test of mental ability in university students as a whole ranked according to their difficulty in the logit unit in addition to the standard error estimated in the logit unit.

Table (4) *Grading the difficulties of the Jane Cerrillo test items*

Item No.logit difficulty estimationLogit Standard Error			Item No.	logit difficulty estimation	Logit Standard Error
Q1	0.05	0.1	Q26	0.03	0.1
Q2	-.03	0.1	Q27	0.27	0.1
Q3	0.05	0.1	Q28	0.19	0.1
Q4	-.03	0.1	Q29	0.14	0.1
Q5	0.14	0.1	Q30	0.05	0.1
Q6	-0.04	0.1	Q31	0.1	0.1
Q7	0.21	0.1	Q32	-0.47	0.11
Q8	-0.14	0.1	Q33	0. 15.	0.1
Q9	0.39	0.1	Q34	-0.89	0.11
Q10	0.17	0.1	Q35	-0.4	0.1
Q11	0.27	0.1	Q36	0.55	0.11
Q12	0.03	0.1	Q37	0.22	0.1
Q13	0.07	0.1	Q38	0.27	0.1
Q14	-0.02	0.1	Q39	0.14	0.1
Q15	-0.37	0.1	Q40	0.02	0.1
Q16	0.11	0.1	Q41	0.22	0.1
Q17	-0.01	0.1	Q42	0.02	0.1
Q18	0.03	0.1	Q43	-0.02	0.1
Q19	-0.33	0.1	Q44	-0.14	0.1
Q20	0.17	0.1	Q45	-0.01	0.1
Q21	0.05	0.1	Q46	-0.55	0.11
Q22	-0.16	0.1	Q47	0.47	0.1
Q23	0	0.1	Q48	0.23	0.1
Q24	0.05	0.1	Q49	0.05	0.1
Q25	0.12	0.1	Q50	0.47	0.1

It is clear from the previous table (4) that the total test items suitable for the measurement bases (50) items   cover the extent of difficulty appropriately, ranging from (-0.89to 0.55) Logit,and it is noted that there is an appropriate number of items covering different

levels over the continuum of difficulty. The standard errors of the difficulty estimates ranged between (0.1 to 0.11) Logit, and these standard error values – these – are relatively small, indicating the accuracy and Reliability of the estimates of the difficulties of the items , as the coefficient of the items reached (0.84).

2- Estimating the capabilities of individuals

The capabilities of individuals were calculated in logit for each individual, where Itzkovich et al. (2002, itzkovich & al) indicated that logit is the natural logarithm for a probability of success taken from the percentages of test takers who have undergone the requirements of each of the test items in making the transition from one of the less difficult items to the more difficult items in order to achieve measurement independence (2002: 397 „itzkovich& al).

The relationship between each potential total score on the test was found in the final forms, and the corresponding ability in logit, and Table (5) shows the corresponding ability estimates for each potential total score on the (Jane Cerrillo) test of the mental ability of university students estimated in logit unit.

Table (5)

Raw Score	Power in logit	Standard error	Raw Score	Power in logit	Standard error
0	5.15	1.83	26	0.08	0.29
1	3.93	1.01	27	0.16	0.29
2	3.21	0.72	28	0.25	0.29
3	2.78	0.6	29	0.33	0.29
4	-2.47	0.52	30	0.41	0.29
5	2.22	0.47	31	0.5	0.29
6	2.02	0.44	32	0.59	0.3
7	1.84	0.41	33	0.67	0.3
8	-1.68	0.39	34	0.77	0.31
9	1.54	0.37	35	0.86	0.31
10	- 1.41	0.36	36	0.96	0.32
11	- - 1.28	0.34	37	1.06	0.32
12	- 1.17	0.33	38	1.17	0.33
13	1.06	0.32	39	1.28	0.34
14	0.96	0.32	40	1.41	0.36
15	0.86	0.31	41	1.54	0.37
16	- 0.76.	0.31	42	1.68	0.39
17	0.67	0.3	43	1.84	0.41
18	0.58	0.3	44	2.02	0.44
19	-0.5	0.29	45	2.22	0.47
20	0.41	0.29	46	2.47	0.52
21	-0.33	0.29	47	2.78	0.6
22	0.24	0.29	48	3.21	0.72
23	-0.16	0.29	49	3.92	1.01
24	0.08	0.29	50	5.14	1.83
25	0	0.29			

It is clear from Table (5) that the corresponding ability estimates for each potential crude total score on the total test range from (-5.15 to 50.5) Logit,and the standard error values came in relatively low ratios, where the standard error ranged from (0.15 to 1.83), and these limits are the maximum limits of ability that can be estimated using the current (Jane Cerillo) measure of mental capacity in university students as a whole or any sub-meter withdrawn from it.

Standard characteristics of the test
First: Test validity

Validity according to the Rasch model is the validity of the gradient of the items in

its definition of the variable under measurement, as well as the validity of the gradient of the abilities of individuals on the continuum of this variable. (Al-Sharqawi et al., 1996: 366), and what the Rasch model provides of monometricity, achieves the validity of the gradient of the items in the measurement of the variable under measurement, as well as the validity of the gradient of the abilities of individuals on the continuum of the variable, which is based on the validity of their responses to the items (Kazim,2000: 331).

The unidimensionality is achieved by matching both individuals and items to the model according to the Winsteps suitability criteria used in the analysis, which indicate the extent to which the remaining items reflect the continuum of the variable being measured. It also shows the consistency of each individual's response pattern with the responses of most individuals, or with what is expected of it, and thus shows the consistency of the individual's ability gradient with that of the rest of the individuals on the continuum of the variable being measured(Abu Jarad, 2008 :574).

Second: Test Reliability
The concept of Reliability in light of the Rasch model is defined as the achievement of the remaining objective demands in measurement, that is: When the measurement tool created using this model is used, it is achieved:

• Measurement independence from the test used
Measurement independence from the group of individuals taking the test. That is, the measurement independence and emancipation provided by the Rasch model provides the opportunity for measurement Reliability so that the measurement does not vary (not bad for the ability of the individual or the difficulty of the item) according to the sample of gradient to which the test was applied or according to the group of items withdrawn from the original scale of gradient (Saliha, 2017 :179).

In the current study, the Reliability of the individual's ability will be calculated, and the Reliability of the difficulty of the items will be calculated separately using the 2011 Winsteps program . The Winsteps program calculates the values of the upper limits (Model Reliability), the values of the minimum limits of real Reliability (Real Reliability), and the Reliability coefficient is between these two values. The program is ultimately given two values of Reliability , one of which relates to the Reliability of the individuals' ability assessment, and the other to the   Reliability of the assessment of the difficulty of the items .

The persistence factor for estimating the capacity of individuals (0.59) and the difficulty index for items (0.84) and table (12)illustrate this.

Table (6) *Summary of test data analysis results*

Items number	Number of personnel	Average estimate		Estimation reliability factor	
		For difficulty. Vertebrae	For power. Individuals	For difficulty. Vertebrae	For power. Individuals
50	400	0	0.03	0.84	0.59

Gradient of logit units to gradient of (MNF) percentage units:
The researcher relied on the centigrade (MNF) unit, where estimates were converted to the centigrade (Mnf) unit to eliminate fractures and negative signals. Because the percentage gradient is the most familiar in most fields of measurement, as well as its use by the most studies that were based on the Rasch model in the construction of their tests, as the estimates of both the difficulty of the items and the capabilities of individuals can be transferred from

the logit unit to the MNF unit .

This gradient leads to the average difficulty of item (50) in the MNF unit, and the difficulty and capacity parameter in the field is [0, 100], (Kazem, 1988a: 101), and Hammad (2010) adds that this percentage gradient facilitates dealing with numbers that express ability and difficulty. (Hammad,2010: 186) . Tables (7, 8) show the estimates of difficulty and ability for the final form of the test estimated in logit and MNF units (Mnf).

Table (7) *Difficulty of the items estimated in the final version of the logistic unit and the MNF unit for testing*

Item No.	logit difficulty estimation	Logit Standard Error	MNF Difficulty Estimate	Standard error, MNF
Q1	0.05	0.1	50.25	0.5
Q2	-.03	0.1	49.85	0.5
Q3	0.05	0.1	50.25	0.5
Q4	-.03	0.1	49.85	0.5
Q5	0.14	0.1	50.7	0.5
Q6	-0.04	0.1	49.8	0.5
Q7	0.21	0.1	51.05	0.5
Q8	-0.14	0.1	49.3	0.5
Q9	0.39	0.1	51.95	0.5
Q10	0.17	0.1	49.15%	0.5
Q11	0.27	0.1	51.35	0.5
Q12	0.03	0.1	50.15	0.5
Q13	0.07	0.1	50.35	0.5
Q14	-0.02	0.1	49.9	0.5
Q15	-0.37	0.1	48.15	0.5
Q16	0.11	0.1	50.55	0.5
Q17	-0.01	0.1	Forty-nine, ninety-nine.	0.5
Q18	0.03	0.1	50.15	0.5
Q19	-0.33	0.1	48.35	0.5
Q20	0.17	0.1	50.85%	0.5
Q21	0.05	0.1	49.75	0.5
Q22	-0.16	0.1	49.2	0.5
Q23	0	0.1	50	0.5
Q24	0.05	0.1	50.25	0.5
Q25	0.12	0.1	50.6	0.5
Q26	0.03	0.1	50.15	0.5
Q27	0.27	0.1	48.65	0.5
Q28	0.19	0.1	50.95	0.5
Q29	0.14	0.1	50.7	0.5
Q30	0.05	0.1	49.75	0.5
Q31	0.1	0.1	50.5	0.5
Q32	-0.47	0.11	47.65	0.55
Q33	0. 15.	0.1	49.25	0.5
Q34	-0.89	0.11	45.55%	0.55
Q35	-0.4	0.1	48	0.5
Q36	0.55	0.11	52.75	0.55
Q37	0.22	0.1	51.1	0.5
Q38	0.27	0.1	51.35	0.5
Q39	0.14	0.1	50.7	0.5
Q40	0.02	0.1	50.1	0.5
Q41	0.22	0.1	51.1	0.5
Q42	0.02	0.1	50.1	0.5
Q43	-0.02	0.1	49.9	0.5
Q44	-0.14	0.1	49.3	0.5
Q45	-0.01	0.1	Forty-nine, ninety-nine.	0.5
Q46	-0.55	0.11	47.25	0.55
Q47	0.47	0.1	52.35	0.5
Q48	0.23	0.1	48.85	0.5
Q49	0.05	0.1	50.25	0.5
Q50	0.47	0.1	52.35	0.5

Table (8)_Estimation of capacity for each grade of crude estimated in logit unit and munaf unit for final test_

Single score	Power in logit	Standard error	MNF power (Eng.)	MNF error.
0	5.15	1.83	24.25	9.15
1	3.93	1.01	30.35	5.05
2	3.21	0.72	33.95	3.6
3	2.78	0.6	36.1	3
4	-2.47	0.52	37.65	2.6
5	2.22	0.47	38.9	2.35
6	2.02	0.44	39.9	2.2
7	1.84	0.41	40.8	2.05
8	-1.68	0.39	41.6	1.95
9	1.54	0.37	42.3	1.85
10	- 1.41	0.36	42.95	1.8
11	- - 1.28	0.34	43.6	1.7
12	- 1.17	0.33	44.15%.	1.65
13	1.06	0.32	44.7	1.6
14	0.96	0.32	45.2	1.6
15	0.86	0.31	45.7	1.55
16	- 0.76.	0.31	46.2	1.55
17	0.67	0.3	46.65	1.5
18	0.58	0.3	47.1	1.5
19	-0.5	0.29	47.5	1.45
20	0.41	0.29	47.95	1.45
21	-0.33	0.29	48.35	1.45
22	0.24	0.29	48.8	1.45
23	-0.16	0.29	49.2	1.45
24	0.08	0.29	49-6	1.45
25	0	0.29	50	1.45
26	0.08	0.29	50.4	1.45
27	0.16	0.29	50.8	1.45
28	0.25	0.29	51.25	1.45
29	0.33	0.29	51.65	1.45
30	0.41	0.29	52.05	1.45
31	0.5	0.29	52.5	1.45
32	0.59	0.3	52.95%	1.5
33	0.67	0.3	53.35%	1.5
34	0.77	0.31	53.85	1.55
35	0.86	0.31	Oh! Good to see you.	1.55
36	0.96	0.32	54.8	1.6
37	1.06	0.32	55.3	1.6
38	1.17	0.33	55.85	1.65
39	1.28	0.34	56.4	1.7
40	1.41	0.36	57.05	1.8
41	1.54	0.37	57.7	1.85
42	1.68	0.39	58.4	1.95
43	1.84	0.41	59.2	2.05
44	2.02	0.44	60.1	2.2
45	2.22	0.47	61.1	2.35
46	2.47	0.52	62.35	2.6
47	2.78	0.6	63.9	3
48	3.21	0.72	66.05	3.6
49	3.92	1.01	69.6	5.05
50	5.14	1.83	75.7	9.15

Statistical means: The researcher used the following statistical means

       1- Win steps software to analyze the items of the test of mental ability (Jane Cirillo) and their progression according to the Rasch model.

2- Statistical Portfolio for Social Sciences (spss) to extract

Exploratory Factor Analysis, Principle Compnent, with Varimax reanalysis, to verify unidimensionality.

3-T-testing of one sample.

4-Interactively analyze the binary variation to identify statistically significant differences in the mental ability test.

Chapter Four: Presentation And Interpretation Of Results

The first objective : Preparing the mental ability test for university students according to The item response theory (IRT)

       This goal was achieved in the third chapter of the research procedures, as the test was prepared and its items were included using the one parameter Rasch model.

The second objective: To identify the level of mental capacity of university students

       To identify this goal, the researcher applied a mental ability test to the application sample of (400) male and female students, and the research results indicated that the arithmetic average of the sample scores as a whole amounted to (1400.25) and a standard deviation of (5.70410) with a cut-off score of (37), where the calculated T-value was (41.584) and was greater than the tabular T-value of (3.291) at the significance of the level (0.001) and the degree of freedom (399). This means that the application sample as a whole has a decrease in mental ability, and Table (9) shows that.

Table(9) Mean, standard deviation and T-value of the research sample as a whole

VariableCategoryQuantity	Accounting average	Standard Deviation	Cut off score	T value		Significance (0.001)
				Calculated	tabular	
Sample as a whole 400	1400.25	5.704	37	41.584	3.291	Significant in favor the cut off

Third Objective: Identify the level of mental capacity of university students according to gender and grade variables

       The results of the research indicated that the arithmetic mean of the sample scores as a whole amounted to (1400.25) and a standard deviation of (5.7041), and that the arithmetic mean of the scores of the research sample (males and females) on the test amounted to (25.165, 25.115)respectively, with a standard deviation of (6.04021, 5.36205, respectively, and that the arithmetic mean of the scores of the research sample according to the first, second, third and fourth grades) on the test amounted to (24.0300, 25.2600, 25.8100, 25.4600) respectively, and with a standard deviation of (4.710, 5.743, 6.500, 5.646) respectively, and upon knowing the significance of the difference between the arithmetic mean and the cut off score of (37) score , the results were as shown in Table (10).

Table (10) *The mean, standard deviation and T-value of the research sample on the mental ability test*

Variable	Category	Quantity	Accounting average	Standard Deviation	Cut off score	T value		Significance (0.001)
						Calculated	tabular	
GENDER	Males	200	25.115	6.040	37	27.833	3.390	Significant , cutting (Maths.)
	Females	200	25.165	5.362	37	13.342	3.390	In favor of the cut off s
Grade	First	100	25.4600	4.710	37	24.501	3.416	In favor of the cut off
	Second	100	25.8100	5.743	37	20.592	3.416	In favor of the cut off s
	Third	100	25.2600	- Uh... 6,500.	37	18.061	3.416	In favor of the cut off s
	Fourth	100	24.0300	5.646	37	22.996	3.416	In favor of the cut off s

Table (10) shows the following:

As   for the mental ability of the research sample according to the gender variable, the calculated T-value for males was (27.833) greater than the tabular T-value of (3.390) at the significance of the level (0.001) and the degree of freedom (199). The significance was in favor of the degree of cut, which means that the male research sample has a low level of mental ability.The T-value for females of (13.342) is greater than the T-value of (3.390) at the significance of the level (0.001) and the degree of freedom (199). This means that the female research sample has a low level of mental ability.As for the mental capacity of the research sample according to the grade variable, the calculated T-value for the first grade of (24.501) was greater than the tabular T-value of (3.416) at the significance of the level (0.001) and the degree of freedom (99). This means that the research sample from the first grade has a decrease in the level of mental capacity.As for the T-value of the second grade (20.592), it is greater than the T-value of (3.416) at the significance of the level (0.001) and the degree of freedom (99). This means that the research sample from the second row has a decrease in the level of

mental ability.The T-value for the third grade of (18.061) is greater than the T-value of (3.416) at the significance of the level at the significance of the level (0.001) and the degree of freedom (99). This means that the research sample from the third grade has a decrease in the level of mental ability.The T-value for the fourth grade of (22.996) is greater than the T-value of (3.416) at the significance of the level at the significance of the level(0.001) and the degree of freedom (99). This means that the research sample from the fourth grade has a decrease in the level of mental ability.

Fourth Objective: To identify the significance of the differences in mental capacity among university students according to the variables of gender and grade.

The   researcher took the responses of the application sample of (400) male and female students on the mental ability test, and after processing the data statistically, and to achieve this goal, the researcher extracted the averages of the sample members' scores on the test according to the gender variables (males and females), and the grade (first, second,third, and fourth), and to confirm these differences, the researcher used the binary variance analysis test interactively,

Table (11) *and the results were as shown in Table (11).*

Source of variance	Sum of squares	Degrees of freedom	Mean squares	Percentage C	Significance (0.001)
GENDER	.250	1	.250	.008	(Nonsignificant)
Grade	179.780	3	59.929	1.848	(Nonsignificant)
Gender*Grade	88.930	3	29.643	914.	(Nonsignificant)
Error	12713.200	392	32.432		
Total	12982.160	399			

The results of the binary variance analysis showed the following data

a) Sex : The calculated value of the C-ratio was shown.008) is smaller than the value of the tabular percentages (11.50) at the level of significance (0.001) and two degrees of freedom (392, 1), which indicates that there are no statistically significant differences according to the gender variable.

B) Grade: It was found that the value of the calculated percentage (1.848) is smaller than the value of the tabular percentage (5.86) at the level of significance (0.001) and two degrees of freedom (3, 392), which indicates that there are no statistically significant differences according to the grade variable.

C) Sex * Grade : The calculated value of the percentages was found (.914) for the interaction between (gender* grade) is smaller than the value of the tabular percentages (5.86) at the significance level (0.001) and two degrees of freedom (3, 392), which indicates that there are no statistically significant differences according to the interaction between gender and grade.

Conclusions

1- The test achieved a high degree of Reliability when it was graduated using the Rasch model.
3- All items fell within a statistical value suitable for the Rasch model, and therefore the current measurement tool was prepared according to the Rasch model characterized by the objectivity of measurement.
5- The university students as a whole have low mental capacity.
7. Mental capacity is not affected by the gender variable, i.e. there is no difference between males and females in the level of ability.
8. The row variable does not affect the level of mental ability in the sample, i.e. there is no difference between the four rows in the level of mental ability.

Recommendations: In light of the findings of the researcher, the following is recommended
1- Using the Rasch model in the preparation and development of tests and psychological and educational measurement tools for the accuracy and objectivity it achieves, because of the characteristics of this model that can be used to raise the efficiency of measurement tools and improve their quality to be more flexible to achieve the objectivity of measurement.

2-Adopting this test as a test to judge the extent to which university students in Iraqi universities possess mental capacity and benefit from it in scientific research, as it is a tool for

researchers who aim to study mental abilities.

Suggestions: In light of the current study, the researcher proposes the following:

1- conducting a study aimed at comparing the traditional theory and The item response theory (IRT) in the statistical analysis of the items of the (Jane Cirillo) test.

2- Conducting a study aimed at comparing the models of The item response theory (IRT)to the two-teacher-teacher test in the preparation of the (Jane Cerrillo) test of mental ability in order to find out which models are more accurate.

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