

## **The Factorial structure of the scale of mind habits productive by students of the College of Education for Pure Sciences / Ibn Al-Haytham**

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### **Abstract:**

The current study aimed at the nature of the global structure of the scale of productive habits of mind built by (Al-Saadawi 2016) on the Egyptian environment. The scale consists of 30 behavioral positions for university students distributed among three sub-components: (Self-organization consists of 10 behavioral positions, critical thinking and 12 behavioral positions, Creative thinking consists of 8 behavioral situations), the three-response scale (I always do this behavior, I do this behavior sometimes, never do this behavior), applied the scale to a sample consisting of 554 students using the statistical spss program in the global analysis in a way of rotating the Pharmac component, I came up with The results of that measure consists of (3) basic components of the saturated paragraphs measure paragraph 30, and thus match the specimen theoretical scale producing habits of mind and data derived from the students of the Faculty of Education Sciences Pure / Ibn al-Haytham analysis using global exploration.

### **Research problem**

The research problem is to answer the following questions:

- 1- Is there a correspondence between the theoretical model of the measure of the habits of reason produced and the data derived from the students of the College of Education for Pure Sciences / Ibn Al-Haytham using the exploratory factor analysis?
- 2- Does the scale of mind habits produced have a high degree of internal consistency at the sub-dimension level?
- 3- Do the factors of the Habits of Mind Scale (Al-Saadawi, 2016) differ in the Iraqi environment, despite its use in many studies, but it has not been verified by its exploratory factor's honesty in the Iraqi environment?

### **research importance :**

Modern educational calls at the end of the last decade of the twentieth century and the beginning of the twenty-first century tended towards the direction of a new thought in education based on the results of studies and research in the brain and thinking, so the so-called Habits Of Mind emerged.

Cognitive researchers have begun to pay attention to educational strategies concerned with training in thinking skills, and the shift in thinking processes to mental habits

practiced by the individual in his life, and the solution of his problems, these habits have become a starting point for smart teaching strategies, which produce a smart student.

Habits of the mind should be like eating, drinking and sleeping habits, just as a person gets used to sleeping early or brushing his teeth when sleeping or eating in certain periods, he should get used to practicing thinking skills and mental cognitive strategies that help him to do his duties and achieve educational outcomes better.

Mind habits are an unconscious pattern of behavior acquired during the process of repetition, established in the mind to become the habit of the individual in solving his problems, and it is also a pattern of smart performances of the individual leading to productive actions (Costa, 2008: & Kalik,).

The American educator Horsemann likened training students to habits of the mind with the rope that weaves its strings and ultimately cannot cut, and so are habits of the mind, it is a developmental process of training that is gained by exercise and practice to eventually lead to solid cognitive production, and this analogy is evidence for educators and teachers that these habits are not Innate in humans; it comes through training and learning (Katame and Amor, 2005).

Among the most important characteristics of habits of the mind is to go beyond the stage of preserving knowledge, understanding and retrieving it for use and employing it in new situations through certain mental practices such as perseverance, listening, self-organization, metacognitive thinking, applying previous knowledge to the present, controlling recklessness, creative thinking, and others.

Intelligence is not the only unique factor for academic success or success in various affairs of life, whether scientific, practical, social, or emotional, and to ensure success, smart practices must be transformed into mental habits practiced in his life such as perseverance, flexibility, control of recklessness and questioning, and other habits of the mind That guarantees the individual success in his field and his life.

When some educational methods tended to pay attention to increasing the cognitive outcome after the learning process, and paying attention to the amount of knowledge in education, mental habits went further, as it focused on the student's behaviors in the search for knowledge, habits of the mind are smart behaviors accustomed to the individual not the product of knowledge, and not Remember, memorize, or reproduce.

Habits of the mind help the individual to organize the knowledge reservoir of the learner, manage his ideas effectively and train him to organize the assets in a new way, and look at things in an unfamiliar way to organize existing knowledge to solve problems, referred to mental habits as (intelligent behaviors) (Marzano, 1997) which are life skills that can To help learners not only in the educational institution but throughout their lives and the productive mental preparations outlined (Marzano et al.) How can we help students gain these habits? Explaining what these behaviors are

and that they improve learning and reinforce students who are low in their academic achievement may not realize that their attitude, mental habits, and frame of mind influence their learning or that they have the ability to organize themselves, their feelings, attitudes, and behaviors (Billneyer & Barton, 1998: 10)

Kattami (2007) believes that the habits of the mind are among the variables that have to do with the academic performance of students at all educational levels. Therefore, many studies in the twenty-first century have emphasized the importance of teaching, strengthening, discussing, thinking, evaluating and providing mental habits for students in order to encourage them to adhere to them. To become of themselves and their mental structure (Al-Raghibi, 2015: 58)

(Johnson, 2007) indicated that the usual learner does not have a brain like a white paper but contains a cognitive repository of experiences and experiences, when prior learning is activated the mind creates connections with the new scientific material which supports understanding and awareness of the meaning, and Anderson and Pearson have confirmed the study , 1984) The importance of correlation with previously learned material (Johnson 2007: 36)

Habits are the important part of memory, as the mind needs to examine the rule of habit, and habit is formed in our minds and consciousness, or its behaviors in the mind are activated in the nerve brain cells and move the parts that leave an experiment in the ideas that occur in our heads and the mind is a computer to the energy of the mind compared to the electricity that powers the computer This is called life force energy (Andris, 2015: 55)

The present research is the importance of exploratory factor analysis in testing the validity of assumptions about the relationships between latent variable and measured variable. This method is used to check the structural (global) validity of the measures, and each underlying variable is expressed through the set of dependent (dependent) variables Empirical factor analysis - unlike conventional exploratory factor analysis - tests the validity of a particular model that was built on the basis of a specific theory in previous studies, to verify the degree of quality of this model on the same samples or different samples, hence We can define the basic question that empirical and empirical analysis is interested in answering, which is: What is the degree of quality of the assumed model that consists of a set of latent and measured variables? (Allam, 2003: 686-689), and Eyzenk explained in 1953 in an article entitled "The Rationale of Global Analysis" that global analysis has three basic goals that are intended to be achieved and linked to these goals three views on the nature of the factors: description, proof of assumptions, Suggestions of assumptions from preliminary data (Abdel Khaleq, 1987: 100)

Despite the interest of researchers in the psychological field in the study of patterns of memory and thinking and the provision of multiple approaches, there is no study within the limits of the researcher's nature that dealt with the nature of the empirical

constructive structure of the scale of mind habits, so this study is an addition to the psychological measurement literature.

Research objective:

The current research aims to identify:

The nature of the exploratory global structure of the measure of productive habits of reason and internal consistency at the sub-dimension level.

Search limits: The current search is limited to:

Students of the College of Education for Pure Sciences / Ibn Al-Haytham / University of Baghdad for the academic year 2017-2018 morning studies and for the four stages of both sexes.

Defining terms:

Factorial structure was defined by:

2004, GadElrab -

It is the set of underlying hypothetical factors that underlie a set of test vocabulary, measures, or variables in general (377 Gadelrab, 2004 :)

Al-Nabhan 2004

It is a form of building sincerity that is reached through factor analysis and it is used to test the hypothesis about the existence of a specific link between the underlying variables through mathematical processes in analyzing the connections between these variables (test paragraphs or scale), then interpreting these connections and reducing them to a smaller number of variables They are called factors (Al Nabhan, 2004: 300)

Productive habits of mind

Marzano introduced her, 2000

Behaviors used by thinkers and organized critics of themselves, enabling individuals to control their own behaviors and processes of thinking and also help them learn what experience they may need in the future (Marzano et al., 2000: 17)

Theoretical framework and previous studies

First: factor analysis

It is the method that leads to the interpretation of the positive correlation coefficient (which has a statistical significance) to the level of generalization (Abu Hatab and Sadiq, 1991: 589)

It is considered a multivariate statistical method that is used to analyze data or correlation matrices (which are simple correlation coefficients), or variations matrices (for variables and their multiplications), and the goal is to clarify the relationships between those variables, and results in a number of new (assumed) variables called factors (Murad) , 2000: 481)

It is a type of analysis that is based on knowing the main components of the phenomena that we subject to measurement, and therefore it is the most accurate and strongest way to know the truth that is called in its name, meaning global honesty (Al-Sayyid, 2005: 3 49).

Characteristics of factor analysis:

1- The global analysis deals with large groups of data drawn from psychological tests and educational and social standards such as the use of questionnaires and case studies.

2- Global analysis is one of the flexible methods that we can use in various research designs in order to verify the validity of the assumptions.

3- Factorial analysis methods in finding complementarity between them and many other multivariate statistical methods with correlations such as multiple regression, path analysis, partial correlation, complex correlation, multidimensional scales, and variance analysis.

4- Global analysis can be used to classify individuals and objects in distinct patterns by analyzing the relationships between individuals and objects in order to arrive at clusters of similar individuals or similar things from different groups (Melhem, 2010: 219)

5- The global analysis is based on the use of correlation coefficients and reflects two important sources of variance: the variance arising from the examiners, and the variance arising from the tests used, and the variation arising from the examiners from the individual differences between them in the various measured features as reflected in the tests used for the alienation of these measures in their measurement of these characteristics On the one hand, and about measurement errors, on the other hand

6- The size of the sample and its characteristics affect the results of the global analysis. The greater the difference between individuals, the more obvious the factors will be.

7- The number of factors resulting from the global analysis is determined by the number of tests, so the number of factors increases as the number of tests increases, depending on the values of the interconnections between the variables measured in the tests and the nature of these tests and the features that measure them, and the nature of the factors varies according to the difference in the values of the interconnection factors between the tests that It measures the analyzed variables.

8- The process of interpreting the factors resulting from the global analysis is subject to the common characteristics that distinguish the tests subject to analysis on the one hand, and the nature of the field covered by these tests on the other hand, and the age range not the individual in which the global analysis is performed on the third side, and the meaning of the interpretation of the factors giving meanings to the factors Resulting from Factor Analysis (Al-Ansari 1998: 188)

Second: productive habits of the mind

Many cognitive psychologists such as Marzano (1992), Hyerle (1999) and Costa & Kallick (2008) have studied and categorized mind habits, setting the most important habits of mind that teachers should practice, and train their students Accordingly, the most important of these habits are the following:

Critical thinking: It includes research skills, clarity, openness to others, resisting recklessness, taking positions, defending them, and sensitivity to others.

□ Brainstorm: It results in seeking ideas for criticizing them and choosing the best ones.

□ Collaborative work: As the results of cooperative work are usually times the individual work, in addition to its accuracy, and its benefits in learning proficiency, and practices of dialogue and discussion skills.

□ Perseverance: Those who are distinguished adhere to the tasks and duties assigned to them until they are completed, they do not give up easily, but they present their best and persevere in their work and overcome barriers and obstacles.

□ Control recklessness: the owners of this habit are thoughtful and thoughtful before taking any action or performing a task.

□ Listening: the owners of this habit spend a great deal of time listening to and understanding other people's views, and respecting the views of others.

□ Questioning and asking problems: One of the characteristics of a successful individual is his ability to find and solve a scientific problem, or ask questions and find answers to them.

Applying past knowledge to new knowledge: This is through applying past knowledge and experiences to new learning.

□ Data collection using the senses: When the individual owns this habit, he uses all his senses to access knowledge.

Digital habits of the mind, and the transition to a new type of mental habits. The era in which we live a digital age needs digital mental habits, and the shift in digital literacy concepts from overcoming the difficulties of use of technical innovations, especially

the Internet, to possessing digital scientific research skills and digital critical thinking skills

previous studies

First: Studies related to the global structure of tests and metrics

Abdelkader and others 2007 study

(Global building of intelligence in light of Gardner's classification and its relationship to both self-efficacy, problem solving, and academic achievement for university students)

The study aimed to identify the global structure of intelligence in the light of Gardner's classification of intelligence and to determine the path of the relationship between multiple intelligences and each of (self-efficacy, problem-solving, and academic achievement), as well as studying the impact of each study, gender, academic specialization, and bilateral and triple actors among them on the degree of multiple intelligences formed. The sample consisted of (475 students), Zagazig College of Education (184 students), and (291 students). Multiple intelligences list, self-efficacy scale, problem-solving scale, and academic achievement score were shown:

- The multiple intelligences of male and female students is an underlying general factor around which the nine observing factors are organized.
- A statistically significant effect of multiple intelligences on both self-efficacy, problem solving, and academic achievement.
- There are no statistically significant differences between male and female in multiple intelligences.

(Abdul Qadir, 2007, 171-242)

- Al-Jabri Study, 1433 AH

(Global construction of a scale of the five major factors in personality using empirical factor analysis for Umm Al-Qura University students)

The study aimed to validate the appropriateness of the five-factor model to measure the five major factors in personality on Umm Al-Qura University students using empirical factor analysis, as well as present steps to employ a confirmatory factor analysis method to test the validity of the five major factors model of personality to Umm Al-Qura University students and to verify the presence of Differences due to the stage of study (Bachelor - Graduate Studies), specialization (literary - scientific) and marital status (married - unmarried) in the global structure of the personality of the university student. To achieve the goals of the study, the study sample reached 436 students. The study found a statistical fit Between the five-year model of the scale

of the five major factors in personality and data derived from students of Umm Al-Qura University, five factors were extracted using global analysis in the way of greater likelihood, and the scale of the five factors in personality enjoyed a high degree of honesty and consistency and the absence of a difference in global construction with different levels of study and specialization And marital status. (Al-Jabri, 1- 241: 1433:)

Bin Ato et al. 2017

The global structure of the emotional intelligence scale for the university student

The study aimed to reveal the global structure of the emotional intelligence scale among university students, as the implications of honesty and consistency were verified, as the study sample consisted of 250 students from Chlef University from the four academic levels, as the results showed that the emotional intelligence scale has a good psychometric efficiency, and this has shown The matter in the indicators of consistency and stability that were extracted in this study, as demonstrated in the sincerity of the construction, the discriminatory honesty, and the global analysis of the paragraphs of the scale, which allowed the exploration of seven factors that explained 56% of the total variance. (Bin Atto et al., 2017: 39-50)

Mwafaq Study 2017

The global structure of social skills testing and its relationship to some personality variables

The current research aimed to uncover the global structure of the social skills test prepared by Ronald Riggio Ronald among a sample of Algerian students, and then verify the significance and validity of its paragraphs. As well as inferred the relationship between the factors of this structure and factors Kattel personality to support the affirmative honesty. The research also aims to extract local standards suitable for testing. Finally, learn about the significance of the gender differences in social skills. The research sample consisted of 554 individuals (113 males, 441 females) from students of some Algerian universities. The results showed that the global construction of the social skills test using exploratory factor analysis includes ten factors that differ from the six components on which Reggio based his model of social skills. These factors represent new dimensions of the test: mixing and social participation skills, interactive initiation skills, conversation skills, leadership skills, feelings of emotion and emotion skills, social sensitivity skills, social observation skills, empathy and social satisfaction skills, social and emotional control skills and coping skills with Social situations.

Abdul Majeed Study 2017

The global structure of Sternberg's three-dimensional IQ test for middle school students



The research aimed at relying on the three-dimensional intelligence test of Sternberg, which emphasizes in the theoretical framework three capabilities (analytical, practical, and creative) and the sample consisted of 400 students who were randomly selected by 6 preparatory schools in Baghdad governorate, the results reached a case of matching that can Dependence on it, as the ratio between the square of Kay and the degree of freedom reached (2.011) and this is a good indicator of conformity, as is the index of good conformity GFI whose value is (0.932) and this is an acceptable index for matching, and the standard conformity index NFI has a value of (0.901) which is an acceptable index for matching (Abdul Majeed, 2017: 819-854).

Second: Studies related to productive habits of the mind

1- Study of Master 2018

The current study aimed to identify:

1. Beyond memory for distinguished high school students:
  - a . Satisfaction with memory. B . Ability . C. The strategy.
2. Mind habits produced by distinguished high school students:
  - a . Self-organizing habits. B . Critical thinking habits. C. Creative thinking habits.
3. The nature of the correlation between memory and the habits of mind produced by the research sample.
4. The extent to which habits of mind produced contribute to (beyond memory).

The study reached the following results:

1. Outstanding students enjoy beyond memory (awareness of memory).
2. Outstanding students enjoy productive habits of mind.
3. There is a statistically significant positive correlation between (beyond memory and productive habits of mind) among distinguished high school students.
4. There is a contribution to the components (productive habits of the mind), the ability to organize oneself, the ability to think critically, and the ability to think creatively (in my two components) and memory opinions (: ability, strategy).

According to the results of the study, some recommendations and proposals crystallized (Al-Sayed, 2018: 1- 168).

2- Abdul Rahim Study (2018)

Mind habits, mental motivation, academic specialization, and gender, as predictive variables for the effectiveness of positive learning among Sohag University students

The study aimed to identify the impact of each of the sixteen habits of mind and mental motivation with its dimensions on the positive learning efficiency of students of the Faculty of Education in Sohag. The study was applied to a sample of 260 students from the third year students in the College of Education for the academic year 2016-2017 the first semester of them 130 Male and female students of literary specialization and 130 male and female students from scientific majors. A measure was applied by the researcher, which was based on the Costa and Calic model (2003), the California measure of mental motivation and the measure of positive learning efficiency. The results of the research resulted in:

1- There is a relationship of different significance between the habits of the mind in its various dimensions, the motivational mind with its different dimensions and the positive learning efficiency in its different dimensions.

2- There are no statistically significant differences between males and females in each of the habits of reason and mental motivation in different dimensions. (Abdul Rahim, 2018: 1-495)

#### Search procedures

This chapter includes the procedural steps of the research as the methodology used by the researcher in the study is clarified, the method of selecting the research sample, research variables, the tool used for measurement and the statistical treatments that have been adopted, and how to verify the psychological characteristics of the scale.

#### Research Methodology

The descriptive approach was adopted in the current study, which is a method that relies on the study of reality and is concerned as an accurate description and expresses them qualitatively or quantitatively. The qualitative expression describes the phenomenon and clarifies its properties, while the quantitative expression describes the phenomenon digitally and clarifies its amount or size and the degree of its relationship to other phenomena (slaves and others, 2011: 176)

#### research community

The current research community was determined by the students of the College of Education for Pure Sciences / Ibn Al-Haytham / Baghdad University / Morning Studies for the academic year 2017-2018, as they numbered (2534) students, distributed according to the five science sections of both sexes (male and female) and the school stage, as The number of male students reached (1089) and constitutes (43%), the number of female students (1445) and constitutes (57%), and the students are distributed over the academic stages, as the number of first grade students reached (719) and constitutes (28%), and the number The second grade students (735) and constitute a percentage (29%), and the number of students in the third grade reached (655) and constitutes (26%), and the number of fourth grade students reached (425) and constitutes a ratio of (17) %).

### The research sample

The sample is part of the community. The phenomenon is studied by them through information and data about this sample, which represents an honest representation of the community, until the study results are generalized to the community (Al-Najjar, 2009: 35). To achieve the current research goal, a sample of (554) male and female students was selected. She was chosen by the stratified random method, from the College of Education / Pure Sciences for the five departments (physics, chemistry, life sciences, computers, mathematics) and from both sexes (from each stage 15 males 13 females).

The research tool: The achievement of the research objectives requires the use of a tool to measure the productive habits of the mind. After the researcher examined previous studies and literature and the measures related to productive mind habits, the researcher found a scale (Al-Saadawi, 2016), as the scale consists of 30 behavioral positions of university students distributed among three sub-components : (Self-organization consists of 10 behavioral attitudes, critical thinking and 12 behavioral attitudes, and creative thinking consists of 8 behavioral attitudes), the three-response scale (I do this behavior always, I do this behavior sometimes, I never do this behavior), and weights are taken in positive situations (3,2,1) No Wazzan (3,2,1) in the negative attitudes.

### Logical analysis of the paragraphs of the measure of produced habits of the mind

The scale was presented with its instructions to (16) experts specializing in educational and psychological sciences (Appendix 1) who were asked to examine the paragraphs and their suitability for the research sample and based on their opinions some of the paragraphs were modified and all paragraphs were accepted at a rate of 80%, as the paragraphs are valid for use and without deleting any a paragraph .

### Clarity of instructions

In order to verify the clarity of the instructions of the scale of produced habits of the mind, the scale was applied to a random sample of 40 students, it became clear to the researcher that the instructions for the scale are clear and accurate in the language of the paragraphs, as the average time taken (40 minutes)

### Statistical analysis of scale paragraphs

- The discriminatory power of paragraphs

The researcher followed the extraction of the discriminatory force of the paragraphs the following procedures:

Determining the total score for each of the 400 forms

The forms are arranged in descending order from the highest to the lowest

- The researcher approved 27% of the forms with the highest degree and 27% of the forms with the lowest degree, as this percentage gives the maximum differentiation (mehren & lehman, 198: 122)
- The number of the forms subject to statistical analysis reached (216) forms.

The discrimination equation was used to calculate the discrimination coefficients, the results showed that the paragraphs were all distinct and according to the Apple criterion, as the paragraph is good if it is greater than (0.30) and the results range between (0.34 - 0.78)

#### Validate paragraphs

The researcher subjected the scale transformation matrix to extract the internal consistency between the three factors, and the results were as shown in Table (1):

Table (1)

The internal consistency between the components of the mind habits measure produced

| a3 | a2    | a1    | Factors |
|----|-------|-------|---------|
| -  | -     | -     | a1      |
| -  | -     | 0,546 | a2      |
| -  | 0.306 | 0.459 | a3      |

From the table, we note that the coefficients of the scale factors are statistically significant at each level at (0.05) and with a degree of freedom (214). This indicates that the scale factors are consistent, homogeneous and have a degree of honesty.

The psychometric properties of the scale of habits of reason produced

Validity of the scale:

1- Verify the content:

Honestly, the content means the extent to which the test elements are represented and their suitability for the content that it measures, meaning that since the test elements are a sample of all areas covered by the content, the evidence for honesty here depends on the extent of the sample representation (the test) and its adequacy (Al-Dossary, 2001: 54), it has been verified Whoever validates the content by presenting the scale to a group of experts and arbitrators for the purpose of assessing the paragraphs and their relationship to the components of the scale in a comprehensive manner.

## 2- Honesty of the building:

The validity of the construction has been verified by the discriminatory force coefficients of the scale as well as the validity of the internal consistency of the paragraphs.

### Stability of scale:

The stability of the scale was verified by the Alpha-Cronbach equation (KR-20), and the stability factor of the scale as a whole was (0.78) and it is considered a good indicator of stability, as the evidence indicates that the values of the stability coefficients that exceed (0.70) are acceptable because the determination factor, that is, the contrast ratio The interpreter is greater than (0.50) (Parker et al., 1999: 122).

### Factor analysis:

Before performing the global analysis, it was necessary to verify first the conditions for its use, including:

- Examining the correlation matrix, as it is necessary to ensure that the correlations between the variables achieve the matrix susceptibility to analysis, including the moderate natural distribution of data. This was done using three statistical methods, namely:

Calculation of twisting and flattening coefficients

Kolmogrov-Smirnov test for moderation

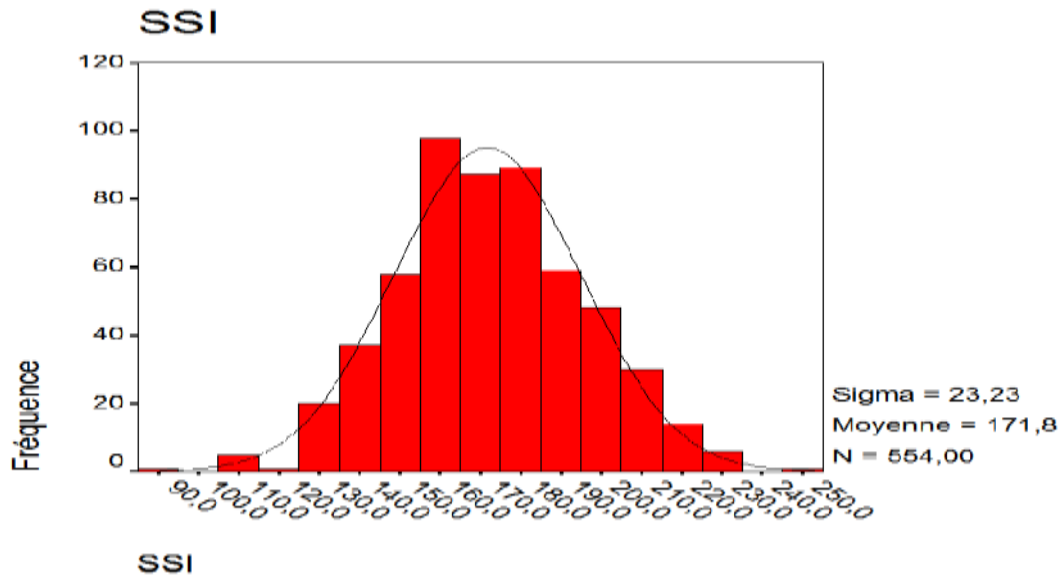
Draw the iterative curve of the research variables and Table (2) illustrates this

Table (2)

Shows descriptive statistics for the data

| Statistical values | Descriptive statistics   |
|--------------------|--------------------------|
| 171.76             | SMA                      |
| 0.073              | Coefficient of torsion   |
| 0.125              | Flatness coefficient     |
| 0.732              | Kolmogrov- Smironov test |
| 0.657              | Moral significance       |

It is clear from the above table that the torsional coefficient is equal to (0.073) which is a value that approaches zero and does not exceed (- + 3) and that the coarse coefficient is equal to (0.125) and this value approaches zero and does not exceed (+3 +3) On the other hand, the value of the Kulmogorov test indicates - Smeronov to (0.732), and since the calculated significance value of (0.657) is greater than (0.05), then experimental data follows the moderation in the distribution and the figure below shows that:



The values of the calculated correlation coefficients matrix between the responses of the sample members to the test items indicated that they are not completely correlated, which indicates the possibility of using the global analysis method. On the other hand, the value of the KMO index to detect the adequacy of the sample size was (0.849) and it exceeds the minimum acceptable for the use of factor analysis and Table (3) shows that:

Table 3

Shows the value of the KMO indicator

|          |                    |             |
|----------|--------------------|-------------|
|          | 0.849              | K.M.O       |
| 7816.617 | Values of k2       | Bartlett    |
| 553      | Degree of freedom  |             |
| 0.002    | Moral significance |             |
|          | 0.003728           | Determinant |

Exploratory Factor Analysis of the Scale of Produced Habits of Mind:

After verifying the assumptions required by factor analysis, we move to the next step, which includes subjecting the matrix to exploratory factor analysis using the method of analyzing the basic components, while noting that factors have been identified, paragraph selection and classification of factors according to several criteria:

The Kaiser criterion that accepts factors whose root value is equal to or greater than Eigen-Value over one is correct (Abdel-Khalek, 1994: 114), which is consistent with the basic components method used in the current research.

Acceptance of the worker, provided that at least 3 paragraphs be filled in.

- That the percentage of explanation for the discrepancy of the paragraphs exceeds 50% of the total discrepancy.
- Examination of the values of commonness or socialism for each paragraph, which must exceed (0.5).
- Catel's chart test is based on stopping at the horizontal inflection point, which indicates the importance of the remaining factors.

Figure (2) shows that the value-Eigen roots that can be taken and those that can be excluded according to the Cattell method, where we notice that the steep roots are very steep in the field (5) of the factors.

Also, the absolute values greater than (0.05) for the remainder were examined and it was found that they are equal to (22%), which is not more than half.

And based on what has been obtained from factors that will be interpreted according to the high ramifications or the statistically significant relationship, the interpretation of the factors is the most difficult thing that the researcher is exposed to because it depends on the interpretation of the contents of the factors i.e. paragraphs that are related to the factor and that means that there is a relationship between the paragraph and the factor (Faraj, 1980). : 119), as shown in Table (4) as follows:

Table (4)

It explains the factors extracted, their underlying roots, and the explained proportions of contrast before and after the rotation process

| Factors after recycling           |                          |                     | Factors before recycling          |                          |                     |             |
|-----------------------------------|--------------------------|---------------------|-----------------------------------|--------------------------|---------------------|-------------|
| Interpretati<br>on ratio<br>total | Interpretati<br>on ratio | Late<br>nt<br>roots | Interpretati<br>on ratio<br>total | Interpretati<br>on ratio | Late<br>nt<br>roots | Facto<br>rs |
| 7.687                             | 7.686                    |                     | 13.156                            | 13.156                   | 7.376               | 1           |
| 14.072                            | 6.385                    | 4.228               | 21.278                            | 8.121                    | 4.878               | 2           |
| 19.998                            | 5.927                    | 3.512               | 26.715                            | 5.436                    | 3.992               | 3           |
| 52.478                            | 2.537                    | 3.262               | 53.043                            | 1.906                    | 1.048               | 4           |
| 54.878                            | 2.400                    | 1.395               | 54.878                            | 1.833                    | 1.008               | 5           |
|                                   |                          | 1.320               |                                   |                          |                     |             |

After conducting the orthogonal rotation and arranging the paragraphs in descending order for each of the rotating factors, they were interpreted according to the basic conditions for their acceptance as confirmed by previous studies and research, and by reference to the following criteria:

Guilford suggested accepting the worker provided that at least three significant paragraphs are saturated with him, and that the paragraph saturation is dependent on the worker to which he belongs (0.3) or more.

- If it appears that some of the paragraphs are saturated with two factors, then they are considered to belong to the worker whose saturation is dependent on them to the extent that they belong to a worker, and they are considered to belong to the worker in which they are satisfied in the second place, provided that their content corresponds to the contents of the paragraphs belonging to the same worker, the results indicated by relying on the criteria to Acceptance of (3) factors that satisfied each worker with more than (3) items, while two factors were excluded due to the difficulty of their psychological interpretation and the non-fulfillment of the preceding conditions. As a result, acceptance of all paragraphs distributed among the three factors and table (5) shows that:

Table (5)

It illustrates the factors extracted from exploratory factor analysis using the varimax method and paragraph saturation

|   |                               |
|---|-------------------------------|
| The first factor: Self-regulation: is to control the behavior that is achieved by observing individuals their behavior, performance, and evaluation by using personal criteria and responding positively and negatively according to the .(stimuli they are exposed to Bandura, 1991: 491 |                               |
| Saturation  | Paragraph number in the scale |
| <b>0.744</b>  |                               |
| <b>0.725</b>  | <b>V2</b>                     |
| <b>0.625</b>  |                               |
| <b>0.623</b>  | <b>V7</b>                     |
| <b>0.531</b>  | <b>V9</b>                     |
| <b>0.437</b>  | <b>V25</b>                    |
| <b>0.394</b>  | <b>V13</b>                    |
| <b>0.352</b>  | <b>V17</b>                    |
| <b>0.312</b>  | <b>V20</b>                    |
| <b>0.309</b>  | <b>V21</b>                    |
|   | <b>V26</b>                    |
|   | <b>V22</b>                    |
| <b>Latent root value = 4.228</b>  |                               |
| <b>Explanation contrast ratio after rotation = 7.687</b>  |                               |

|  |                               |
|--|-------------------------------|
| The second factor: critical thinking: that it is a set of skills that an individual acquires to help him be able to objectively analyze news and knowledge, in the manner in which he becomes able to distinguish between assumptions and instructions, and between facts and opinions in a logical and clear way (Rabadi, 2008: 18) |                               |
| Saturation   | Paragraph number in the scale |
| <b>0.693</b>   |                               |
| <b>0.673</b>   | <b>V3</b>                     |
| <b>0.768</b>   | <b>V4</b>                     |
| <b>0.404</b>   | <b>V8</b>                     |
| <b>0.344</b>   | <b>V10</b>                    |



|   |              |            |
|---|--------------|------------|
|   | <b>0.504</b> | <b>V14</b> |
|   | <b>0.642</b> | <b>V16</b> |
|   | <b>0.696</b> | <b>V12</b> |
|   | <b>0.411</b> | <b>V18</b> |
|   | <b>0.558</b> | <b>V24</b> |
|   | <b>0.516</b> | <b>V23</b> |
|   | <b>0.648</b> |            |
| <b>3.512 =Latent root value =</b>                   |              |            |
| <b>Explanation contrast ratio after =rotation =</b> |              |            |
|   | <b>6.385</b> |            |

**The third factor: creative thinking: it is looking at something in a new and different way, which is known as thinking outside the box, which includes lateral thinking or the ability to perceive unclear patterns in something, and creative people have the ability to devise new ways to solve the problem (ALISON DOYLE, 2018, 2)"**

|   | Saturation   | Paragraph number in the scale |
|---|--------------|-------------------------------|
|   | <b>0.744</b> | <b>V1</b>                     |
|   | <b>0.725</b> | <b>V5</b>                     |
|   | <b>0.625</b> | <b>V6</b>                     |
|   | <b>0.632</b> | <b>V11</b>                    |
|   | <b>0.594</b> | <b>V15</b>                    |
|   | <b>0.557</b> | <b>V27</b>                    |
|   | <b>0.494</b> | <b>V28</b>                    |
|   | <b>0400</b>  | <b>V30</b>                    |
|   | <b>0.003</b> | <b>V23</b>                    |
|   | <b>0.009</b> | <b>V24</b>                    |
| <b>Latent root = 3.262</b>                            |              |                               |
| <b>Interpretation variance after rotation = 5.927</b> |              |                               |

**Conclusions:**

From the above table, it becomes clear that the paragraphs that are essentially satisfied with the first factor are the paragraphs (2.7, 9, 13, 17, 20, 21, 22, 25, 26). Thus, the factor of self-organization became composed of (10) paragraphs as it is in ( Al-Saadawi Scale, 2015) As for the second factor, it was saturated with paragraphs (3,4,8,10,12,14,16,18,19,23,24,29), so the component of critical thinking became composed of (12), and it became clear that the factor The third was saturated with paragraphs (1,5, 6, 11, 15, 27, 28, 30). As for the paragraphs (23, 24) they appeared in the third factor, but the amount of their saturation was very weak, so they were removed from this factor and they were kept in the factor The second is higher, so a measure of the habits of the productive mind can be described That consists of three

fundamental factors and each factor consists of a number of paragraphs, namely, (the first factor of self = 10 paragraphs of the organization) (second factor critical thinking = 12 paragraphs) (third factor creative thinking = 8 paragraphs).

#### Recommendations:

Providing advanced statistical programs to conduct studies on the global structure of tests and other measures.

- Motivate your students to persevere and complete the mission to the end, and not to give in to the difficulties encountered.

Teach your students to be careful in thinking and controlling their emotions, and not to perform a task or solve educational activities except after deep thinking about them.

Listen to them carefully and attentively, so that they have a model for listening and listening to others.

- Get your students accustomed to the flexibility of thinking, flexibility of opinion and persistence of one opinion, but help them change their opinions in the event of new knowledge or data on a particular topic.

#### Suggestions:

Conducting studies on confirmatory factor analysis of tests and metrics to verify the validity of the global architecture and the validity of these metrics for application and generalization in the Iraqi environment.

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