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The Effectiveness of The Mental Thinking Stimulation Model in Developing Probing Thinking in Statistics and Reducing Mental Wandering Among Female Students in The Psychology Department at Najran University

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Abstract

The purpose of the study was to determine whether or not female students at Najran University's Department of Psychology, College of Education, could increase probing thinking skills and lessen mental wandering when taught statistics using the model of stimulating mental thinking. In order to accomplish this, the study employed a one-group, quasi-experimental design. A statistics unit was created using a mental thinking model, and worksheets and a teacher's guide were created specifically for the female students. The Mind Wandering Scale and the Probing Reasoning Test in Statistics made up the study instruments. Pre- and post-tests using research instruments were administered to forty female students from Najran University's College of Education's fourth-level psychology department. The statistical probing thought exam revealed a decline in mental wandering and an increase in the level of female pupils in the research group. The average scores of female students in the pre- and post-application for probing thinking in statistics showed a statistically significant difference, and the post-application resulted in less mental wandering. A list of suggestions and ideas were made in light of the study's findings.

Keywords: *Model of Stimulating Mental Thinking, Probing Thinking, Mental Wandering, Statistics*

INTRODUCTION

The twenty-first century is witnessing rapid developments in various fields of science, which have influenced and continue to influence various aspects of life. Therefore, we must develop educational systems, including educational philosophy, educational programs, curricula, and methods and strategies that develop capabilities and contribute to the development of the creative and innovative human mind. To be able to deal with developments and changes imposed by the developments of the times.

Mathematics curricula represent the most important basic pillars of scientific and technological progress that occurs in various fields and sectors. Because of its important and vital role that contributes to solving the problems of the individual and society to the extent that makes us claim that it is not possible to follow the movement of diverse and rapid scientific changes that the world is experiencing without familiarity with the minimum concepts and mathematical skills in all its branches (Al-Shalhoub, 2019).

Statistics is the most widely used branch of mathematics in all scientific fields, as it includes many educational experiences that aim to deal with different types of data in multiple forms (Al-Jazzar, 2019). Statistics appears in all aspects of social and natural life, and its importance increases day after day as life's problems become more complex, as it is an applied science that provides an accurate description for the study of a phenomenon. Knowing the causes of this phenomenon and the factors affecting it. Predicting its future behavior and directing it properly (Radwan, 2017)

The National Council of Teachers of Mathematics [NCTM], 2002) emphasized the importance of teaching statistics through educational programs and teaching practices. It helps students understand statistics, its applications, and how to use it. To produce a generation capable of facing the changes of the times.

The model of stimulating mental thinking is one of the models that achieve enjoyable learning that leads to passion, makes the learner more interactive, and learning is better and faster. As it presents knowledge in an

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integrated and interconnected manner, it works to absorb new data and apply it outside the classroom, which makes learning meaningful. (Venville & Oliver, 2015) establishes the model for mental thinking stimulation as one that facilitates the early stages of abstract and formal thinking (preparation and discussion - cognitive conflict or contradiction - thinking about thinking - bridging).

Al-Tunisi (2020) defined it as a model based on Piaget's cognitive constructivism and Vygotsky's social constructivist theory and aims to accelerate the student's cognitive development and develop his ability to construct knowledge on his own. Through a set of organized procedures performed with the help and guidance of the teacher through its four steps, which are (cognitive conflict -preparation and discussion - thinking about thinking - bridging).

PRINCIPLES OF THE MENTAL STIMULATION MODEL

The model (stimulating mental thinking) is based on a number of main principles that must be taken into account in any educational task or activity presented to students to stimulate cognitive development and stimulate their thinking. By linking these principles to the stages and steps of the model for stimulating mental thinking, Metwally (2016) and Khattab and Abdullah (2019) mentioned them as follows: positive environment - effective participation by students - cooperation between students - diversity of learning styles.

The Importance of The Model of Stimulating Mental Thinking

The importance of the model of stimulating mental thinking, as defined by Adey & Shayer (2002), Imran (2016), and Salam (2018), is that it works to raise the level of thinking among students through innovative activities that contribute to raising the level of cognitive development. Providing the opportunity for organized classroom discussions in a way that makes the student an effective, active and participating element in the teaching, learning and thinking process, which works to increase the learner's achievement. Linking the ideas that students come up with to their daily lives, which increases their willingness to participate in educational activities actively and effectively.

Stages of the Mental Thinking Stimulation Model

Salam (2018), Finau & al (2018), Khattab & Abdullah (2019), and Al-Tunisi (2020) confirm that the model of stimulating mental thinking goes through four successive stages:

The First Stage: Preparation and Discussion (Sensory Preparation)

It is an introductory stage to ensure initial understanding of the topic of the lesson or the task presented. It is the first step in cognitive acceleration interventions, as it includes preparing students for the new topic. The researcher believes that this stage appears through: presenting the problem by the teacher to the students - dividing the students into groups to make the discussion useful. Ensuring the clarity of basic concepts and ideas among students. - The students within each group discuss with each other and share information and knowledge. - The teacher guides the students during discussions and directs individual and group questions to them.

The second stage: cognitive conflict (cognitive conflict):

There is a discrepancy and conflict between two interpretations of the same idea, one of which is novel and the other embedded in the cognitive structure. In light of this, a state of imbalance occurs in the student's cognitive mental structure in order to reach a high level of thinking. This is done by presenting a mathematical problem that the student cannot solve with traditional methods of thinking, given his previous experiences. This in turn leads to a state of cognitive conflict as a result of the new idea not being compatible with his previous experiences. This helps the student move to an advanced stage of mental development that helps him find ideas to solve this cognitive conflict. The researcher believes that this stage appears through: the teacher presenting surprises while solving an activity that contains experiences that conflict with their previous information. The teacher uses confusing activities for the student that create a state of amazement and surprise. To increase the student's activity to solve the problem of conflict and contradiction of knowledge, until he reaches the maximum level of thinking possible. Encouraging the student to restore balance again in his cognitive structure

in a way that helps him adapt to new evidence and push the student to work enthusiastically to solve the problem of the cognitive conflict that he faced.

The Third Stage: Thinking About Thinking

The student's thinking about his thinking, in which the student is able to understand the meaning of what he says and does. He becomes aware of his inferences, realizes and reflects on the processes and stages of his thinking that he goes through, and the difficulties he faces. This stage, according to the researcher, is achieved by getting the student to consider the factors that led him to approach the situation in a particular way and help him understand the implications of his actions and words. The teacher allows students to talk to each other about how they solved the problem and what thinking activities they engaged in on their own. This is done through the questions that the teacher asks him, including: Why did you do this? Why did you think of this solution? How did you think about this solution? How and why did you do this? Such questions are a strategy for developing thinking about thinking. The teacher trains students in planning skills by setting plans and goals, identifying learning sources, and monitoring skills, through the student's awareness of learning strategies and his ability to employ alternative strategies to correct his understanding and performance errors.

The Fourth Stage: Bridging

This stage is considered the procedural stage in the (stimulating mental thinking) model, through which the concepts and principles that students have learned are applied in a realistic context. Bridging means linking the experiences the student has learned in the classroom to his practical life and other academic subjects. The thinking strategies, ideas, and experiences that students have learned are used in new experiences and situations to solve life problems related to the experiences gained. The researcher believes that this stage appears through: the teacher linking the students' acquired experiences with their life experiences, to make what they have learned relevant to their real lives. This is done by building intellectual bridges between the educational activities, tasks, and problems that the student studied in the classroom and real, practical, daily life, with the aim of moving from the theoretical framework of knowledge to its applied field.

From the above it is clear that the model (stimulating mental thinking) consists of four interconnected stages. It is (cognitive conflict - preparation and discussion - thinking about thinking - bridging) provided that all four stages are present and in a logical balance so that mental thinking is stimulated in a correct way. At each stage, a group of different techniques can be used that the teacher can use in the classroom, which makes the learner more interactive in the educational process.

Many studies and research have confirmed the effectiveness of using the model (stimulating mental thinking) in teaching mathematics in increasing achievement, increasing thinking, motivation, self-organization, and creative solution to mathematical problems, such as the studies of Al-Janabi (2019), Abiola (2012), Al-Tunisi (2020), and Marjan (2018).

On the other hand, probing thinking is one of the types of thinking that requires many complex mental processes such as attention, perception, and organization. It also requires recalling previous experiences and linking them to new experiences. It is included in the learner's cognitive structure, stored and retrieved when needed, or transferred when processing new experiences (Al-Aziz, 2013).

Razouki and Muhammad (2018) define probing thinking as: "An advanced mental process that is employed in various fields and enables the learner to benefit from the academic content, to develop his knowledge, experiences, and ideas. To become able to generate new ideas that are subjected to analysis and trial in order to improve performance" (p. 193). .

While Ali (2021) defined it as: "A pattern of thinking that requires practicing higher and sophisticated mental processes such as attention, perception, organization, recalling experiences stored in the cognitive structure, linking them to new experiences, encoding and integrating them, and then recalling them at the appropriate time with a strong desire to search for solutions and reach results." New and not previously known" (p. 185).

The Importance of Clear Thinking

Ahmed (2022), Ali (2021) and Al-Hanan (2016) emphasized the importance of probing thinking in the educational process in moving the learning process from the superficial level to the in-depth level and freeing the learner from negativity and his dependence on the teacher's indoctrination. And enable him to participate positively and effectively, and his ability to plan well to reach any goal, and perform higher mental operations. By practicing higher mental processes, analysis, perception, and integrating experiences together in a way that enhances most of the mental, emotional, and social aspects of the learner. Thus, the learner overcomes the difficulties of learning mathematics. By integrating new mathematics information and knowledge with previous knowledge, and comparing them, to reach results that contribute to better achievement of educational goals and learning outcomes.

Characteristics of Probing Thinking

Ahmed (2022), Ali (2021), Abdel Nazeer (2019), and Al-Kanani and Al-Shammari (2018) mention that one of the most important characteristics of probing thinking is that it gives the learner the opportunity to organize his thoughts and experiences. Making judgments based on sound scientific foundations and not rushing into it. While practicing probing thinking, the learner analyses, synthesizes, organizes, classifies, links, and perceives relationships, and all of this leads to creativity. The most important stage in probing thinking is to make learning meaningful by integrating new information with previous information into the learner's cognitive structure.

Probing Thinking Skills

Abdel Nazeer (2019) and Al-Ayasrah (2011) agreed that probing thinking skills are as follows:

First: The skill of understanding concepts: It is a mental process aimed at stimulating learners mentally and expanding the space of their conceptual system, by processing the information they have available, which includes enumeration, remembering, classifying into groups, naming, and tabulation.

Second: The skill of interpreting information: This means understanding the meanings of things by describing and clarifying concepts and linking them to each other. It includes: identifying the main relationships between things (observation), discovering new relationships, and arriving at inferences.

Third: The skill of applying principles: This means enabling the student to extract his experiences into specific principles to assimilate and store them in preparation for use in new situations. It includes formulating hypotheses, prediction, generalization, and discovering unfamiliar phenomena.

Many studies, such as those of Al-Hanan (2016), Qandil (2018), and Abdel-Nazir (2019), have emphasized the importance of the learner's possession of probing thinking skills to enhance his ability to search for knowledge, generate new ideas, and express them easily. Its results confirmed that probing thinking improves students' achievement and development of thinking and makes students more enthusiastic and motivated to learn and more responsible.

The problem of mental wandering is also one of the problems facing students in the educational process, as it is considered an obstacle to learning, and it also negatively affects academic achievement and learning outcomes among learners. Modern technology and information developments lead to students' distraction, which increases the possibility of mental wandering. In addition, they feel negative emotions during the learning process, such as boredom and anger, which makes the learning process very difficult. (Lee, et, 2022)

Qasim et al. (2022) define mental wandering as: a type of internal guidance to think while performing a task due to some internal and external stimuli, and this type of guidance may be related to the task or unrelated (p. 724).

Younis (2022) defined it as "a process that automatically shifts an individual's attention from important topics in the lesson to internal or external personal, social, or life vocabulary that has no relation to the topic of the lesson presented." (p.77)

Eid (2022) defined it as: "A condition in which the individual loses the ability to control directing his attention towards the task he is performing and diverts from it to other thoughts, and these thoughts may be related to the task or not" (p. 21).

Al-Fail (2021) believes that reducing mental wandering is of great importance because it reduces the level of desire to learn. It reduces the student's learning efficiency and lowers the degree of enthusiasm and effective participation in the classroom. Reducing the extent of psychological and cognitive integration into the learning environment.

Both (Abdel Fattah and Abdel Halim, 2021; Gericke et al, 2022) indicate that there are two aspects to students' mental wandering, the first of which is negative. It is temporary and can be modified, and the other is positive and helps increase the development of students' creative thinking skills.

TYPES OF MENTAL WANDERING

Both (Al-Hanan, 2021 and Al-Feel (2021); Eid, 2022; Al-Qahtani and Al-Harthi, 2022; Al-Maraghi, 2020) believe that the types of mental wandering are: (task-related wandering, task-unrelated wandering). While (Hussein, 2021; Abdel Fattah and Abdel Halim, 2021) believe that there are two types of ideas: (ideas not related to the task, and ideas that interfere with the task). (Seli et al., 2019) indicated that there are two types of mental wandering: intentional mental wandering and unintentional mental wandering.

Reasons for Mental Wandering

Eid (2022), Al-Fail (2018), Muhammad (2020), and Al-Maraghi (2020) state that the causes of mental wandering are (specific mental capacity - tasks that require continuous attention - mood - negative thinking about the future - negative predictions - positive predictions - deep predictions). From the above, it is clear that probing thinking can be developed and mental wandering can be reduced by stimulating the learner's mental thinking. Moreover, making him able to practice thinking in a way that includes producing diverse and new ideas that were not previously known, to solve the problems he faces and move him from passivity and indoctrination to activity, building knowledge, flexibility and enjoyment. Collaboration, as it depends on the learner's full immersion of body and mind; to obtain effective participation and a positive, comfortable and stimulating environment.

Problem of Research

The problem of the current research emerged from the need to use modern teaching models, to achieve institutional quality and quality education. Through the researcher's work teaching in the psychology program, she noticed that teaching methods are still traditional methods and that there is a lack of use of teaching methods that stimulate thinking. In addition to the increase in the number of female students in one section, I also noticed a weakness in the understanding and comprehension of statistics among female students and a decline in their achievement in it. The researcher was informed of the vision, mission, and goals of the psychology, which is centered on graduating distinguished competencies in the field of educational and psychological sciences. By preparing female students who have the ability to research and investigate educational and psychological sciences, who have the skill to prepare and apply psychological and educational standards, analyze their results, and employ them in providing psychological and educational consultations to institutions and individuals in society. This is achieved by preparing students with deep thinking that relies on higher-order thinking processes for statistical operations. They can move easily between the real world, and apply statistical processes and procedures with ease and understanding. The researcher also noted that some of the female students in this course were graduates of the literary department, and others were graduates of the scientific department, so there was a difference in their level of comprehension. This requires the use of models that take into account this difference between students, and achieve the principle of taking into account their individual differences, and this is what the current research seeks to achieve, as the research problem crystallized in answering the following main question:

How well does the approach of stimulating mental thinking work to help female students in the psychology department at Najran University develop probing thinking in statistics and lessen mental wandering?

The Following Sub-Questions Emerge From This Question

1- What is the effectiveness of using the model (stimulating mental thinking) in teaching statistics on developing probing thinking for female students in the Department of Psychology?

2- What is the effectiveness of using the model (stimulating mental thinking) in teaching statistics in reducing mental wandering for female students in the Department of Psychology?

RESEARCH IMPORTANCE

The Importance of The Research Lies in The Following

1- Achieving the objectives of the Psychology Program, in graduating distinguished competencies in the field of educational and psychological sciences by preparing female students who have the ability to research and investigate the educational and psychological sciences. They have skill in preparing and applying psychological and educational standards, analyzing their results, and employing them in providing psychological and educational consultations to institutions and individuals in society.

2- Providing a teacher's guide to explain how to use the model (stimulating mental thinking), in teaching statistics to female students in the Department of Psychology.

3- An attempt to determine the effectiveness of the model (stimulating mental thinking) in teaching statistics on developing probing thinking among female students of the Department of Psychology, by presenting a test to measure probing thinking in the course prepared for this purpose.

4- An attempt to determine the effectiveness of the model (stimulating mental thinking) in teaching statistics in reducing mental wandering for female students in the Department of Psychology, by presenting a scale test prepared for this purpose.

AIMS OF RESEARCH

The Aim of The Research Is to Find Out the Following

1- The effectiveness of using the model (stimulating mental thinking) in teaching statistics on developing probing thinking for female students in the Department of Psychology.

2- The effectiveness of using the model (stimulating mental thinking) in teaching statistics on reducing mental wandering for female students in the Department of Psychology.

RESEARCH HYPOTHESES

The Research Sought to Verify the Validity of The Following Two Hypotheses

1- The average scores of the research group's female students in the pre- and post-application of the probing thinking test show a statistically significant difference, favoring the post-application at the 0.01 level.

2- The average scores of the female research group students in the pre- and post-application of the mental wandering scale show a statistically significant difference, favoring the post-application at the 0.01 level.

Search Limits

The Current Search Will Be Limited To

Human limits: a random sample of fourth-level female students in the Department of Psychology.

Spatial boundaries: Najran University.

Time: Application of the research in the academic year (2022/2023).

Action search terms:

The Search Terms Included the Following Operational Definitions

1- Effectiveness: According to the current research, effectiveness is the difference in the performance of female fourth-level students at the College of Education's Department of Psychology (research group). The difference between the average scores of female students in the pre- and post-application of both the probing thinking test and the mental wandering scale, measured by the effect size equation, suggests that after applying the (stimulating mental thinking) model for teaching statistics, probing thinking was developed and mental wandering was reduced.

2- Model (stimulating mental thinking): Learning is created in which statistical experiences and activities are created that suit the learners' multiple styles and intelligences, by providing an enjoyable and encouraging educational environment for learning statistics through four successive stages: preparation - presentation - exercise - performance.

3- Thinking: A mental activity specific to statistics that is based on a set of statistical situations and problems, which excite and motivate fourth-level female students in the Department of Psychology to reach a solution. To those situations and problems using the following skills (describing data - organizing and summarizing data - representing data - Analyzing and interpreting data), and this is indicated by the score that students obtain when applying the statistical reasoning test prepared for this purpose.

4- Mental wandering: a process of automatic shift of focus for female psychology students at the fourth level and loss of control over directing their attention. Which leads to distracting their thinking from the statistical task, and it may or may not be related to the task. Moreover, the score that the student obtains on the mental wandering scale prepared for this purpose measure it.

METHOD AND PROCEDURES

A) Methodology:

The current research used a one-group quasi-experimental design; To measure the effectiveness of using the Adey & Shayer model (stimulating mental thinking) in teaching the psychological and applied statistics course on probing thinking. And reducing mental wandering among fourth-level female students in the Department of Psychology, and applying the probing thinking test and the mental wandering scale on the research sample before and after Teaching the course.

b) Research variables:

- Independent variable: The method of teaching the principles of psychological and educational statistics course using the (stimulating mental thinking) model.
- Dependent variable: probing thinking - mental wandering.

c) Search procedures:

First, prepare a probing thinking test:

A probing thinking test was prepared for fourth-level female students in the Department of Psychology, following the following steps:

1- Determine the goal of the test: The goal of the probing thinking test is to measure the following probing thinking skills: (the skill of conceptual comprehension - the skill of interpreting information - the skill of applying principles) among fourth-level female students in the Department of Psychology.

2- Preparing the initial image of the test: By reviewing some previous studies and research that dealt with constructing a probing thinking test. Such as the study of Al-Hanan (2016); Abdul Nazeer's study (2019); In the study of Ahmed (2022), the initial form of the test was prepared, which consisted of (36) questions, 12 questions for each main skill, and 4 questions for each sub-skill, and the questions were formulated in the form of multiple choice questions.

3- Test instructions: The test instructions aimed to help students answer the test items with ease. Care was taken that the instructions should be short and direct - clarifying the purpose of the test - a brief description of the test - indicating the necessity of answering each test question.

4- Test grading method: One point was assigned for each correct answer to each question of the probing thinking test, thus the total score for the test became (36) points.

5- Exploratory application of the test: The test was applied to the exploratory sample, which consisted of (30) female students in the fourth level in the Department of Psychology, in order to calculate the validity of its statements, the stability of the test, and the time to answer it.

A - Content validity: To ensure the validity of the test, it was presented to a group of arbitrators in order to review it in terms of: the extent to which each word belongs to the skill it measures, and the soundness and clarity of the linguistic and scientific formulation of the vocabulary. Amendments were made in light of the opinions of the arbitrators, and the probing thinking test became in its final form. .

B - Reliability of the test: The reliability of the test was calculated using the "Alpha Reliability Equation", Cronbach's equation, through the scores of the female students in the survey sample. It was found that the reliability coefficient of the test was (0.91), which indicates that the test has high reliability.

C) Test time: The time to answer the test items was calculated by monitoring the answer time of each female student in the survey sample separately, and taking the average time to answer the test items, and the time required was (50) minutes.

D- The final form of the probing thinking test: In light of calculating the validity, reliability, and response time, the final form of the probing thinking test was reached, and it is in its final form as it includes (36) questions that measure the three probing thinking skills.

Second: Preparing a mental wandering scale:

The mental wandering scale was prepared for fourth-level female students in the Department of Psychology, following the following steps:

1- Determining the scale's purpose: The purpose of the scale is to gauge mental straying among female fourth-level students in the psychology department of the College of Education at Najran University.

2- Creating the original scale image: A review of earlier research and studies that addressed the development of the mental wandering scale was conducted in order to create the initial scale image, which included thirty elements.

3- Test instructions: The scale's instructions aimed to help students answer the scale's items with ease. Care was taken that the instructions should be short and direct - clarifying the purpose of the scale, a brief description of it, and indicating the necessity of answering each of the scale's items.

4- Scale correction method: A three-way Likert scale was used

5- Psychometric properties of the scale:

A - The validity of the study tool: The researcher verified the validity of the scale by presenting the scale in its initial form to a group of arbitrators in the Psychology Department, to judge the extent of its suitability. For application by expressing an opinion on: the suitability of the phrase to the level of the students, the clarity of the wording of the vocabulary, and the addition, deletion, or Any item was modified. The amendments indicated by the arbitrators were made and the scale became composed of (30) items.

B- Exploratory application of the scale:

The scale was applied to the aforementioned exploratory group, in order to calculate the validity of its items, the stability of the scale, and the response time.

- The validity of the scale statements: The validity of the scale statements was calculated by finding the correlation coefficient between the score of each statement and the total score of the female students in the survey sample. The correlation coefficients for the scale statements fell in the closed period [0.46, 0.90], and therefore all correlation coefficients are positive, which indicates the validity of the scale items.
- Reliability of the scale: The reliability of the scale was calculated using the "Alpha Reliability Equation", Cronbach's equation. Through the scores of the female students in the survey group, it was found that the reliability coefficient of the scale = 0.88, which indicates that the test has high reliability.
- Scale time: The response time on the scale was calculated by monitoring the response time of each female student in the survey group individually, and taking the average response time on the scale items, plus (5) minutes to explain the instructions, and the necessary time was (25) minutes.

The final form of the scale: After calculating the validity, reliability, and response time of the scale, the final form of the scale was reached, which consisted of (30) items.

Third: Preparing worksheets and a teacher's guide for teaching fourth-level female students, College of Education, Department of Psychology, using the Adey & Shayer model (stimulating mental thinking):

A teacher's guide and worksheets have been prepared for fourth-level female students of the Department of Psychology, which are used during the Adey & Shayer model (stimulating mental thinking) according to the following steps:

1- Determining the general objectives of teaching: The objectives were defined as follows:

- Developing probing thinking for fourth-level female students at the College of Education, Department of Psychology, College of Education, Najran University.

Reducing mental wandering for fourth-level female students, Department of Psychology.

2- Determining the special objectives of teaching: The special objectives of teaching were formulated in a form that specifies the final behavior for teach the subjects to be acquired by the students of the research group, and described in a precise, procedural manner distributed over the lessons in the teacher's guide.

Determine the content: The content was determined so that it achieves the desired behavioral goals that were previously determined. Determine the teaching methods used: The following teaching methods have been identified: cooperative learning - problem solving - brainstorming - discussion and dialogue.

- Preparing the student's worksheets: The student's worksheets were prepared, one worksheet for each lesson, and the paper is divided into three parts: the first part is devoted to learning activities, the second part is devoted to the student's evaluation of his solutions, and the third part is devoted to linking the lesson to real-life experiences.

Preparing a teacher's guide for teaching using the (stimulating mental thinking) model: The teacher's guide was prepared for teaching using the (stimulating mental thinking) model. The guide included the following: an introduction to the guide, the basic principles of the (stimulating mental thinking) model, stages, and a list of lessons included in the applied psychological statistics course, And how to teach each lesson using the (stimulating mental thinking) model. Each lesson included the following: lesson title, procedural objectives of

the lesson, teaching aids, lesson plan according to the stages of the (stimulating mental thinking) model, and lesson evaluation.

3- The final copy of the teacher's guide and worksheets:

After completing the preparation of the teacher's guide and worksheets, they were presented to a group of arbitrators. in order to ensure the appropriateness of the behavioral objectives for each lesson, the link between the objectives and the content, the appropriateness of the model (stimulating mental thinking) in each lesson, the appropriateness of the techniques used in each lesson, and the appropriateness of the activities. And the exercises included in the worksheets for the level of female students, the suitability of the evaluation methods used.

The amendments made by the judges were made regarding the deletion of some exercises due to their abundance or difficulty. After making previous amendments to the teacher's guide and worksheets, they became applicable to female students (research group).

Fourth: Applying the research experience:

The procedures for implementing the experiment began for the second semester of the university year (2022/2023), where the probing thinking test and the mental wandering scale were applied beforehand to the female students of the research group. Which consisted of (40) female students from the fourth level in the Department of Psychology at the College of Education, Najran University, and then teaching Applied psychological statistics course using the (stimulating mental thinking) model, then re-applying the probing thinking test and the mental wandering scale post-hoc to the female students of the research group.

Fifth: Research Results and Discussion

1- Testing the first research hypothesis, which claims that: (The average scores of the research group's female students in the pre- and post-application of the probing thinking test differ statistically significantly at the level of 0.01 in favor of the post-application). Moreover, to verify its validity, the significance of the difference between the average scores of the research group was calculated. In the pre- and post-applications of the probing thinking test, using the "t" test for the associated groups aired-sample test using the SPSS program, and to answer the first research question, the effect size was calculated using Cohen's d equation for the associated groups with the following equation $d = T/\sqrt{n}$

Table (1): The significance of the difference between the scores of the female students of the research group in the pre- and post-application of the probing thinking test

Statement / Application	Number of female students	Average	Standard deviation	T	T Indication	D Connotation
Pre	40	9.2	1.99	12.35	0.01	big
Post		22.2	4.38			

From Table (1) we see that:

- The research group's average scores on the probing thinking test before and after the application differed, with a statistically significant difference in favor of the post-application at the 0.01 level. As a result, the first study hypothesis is accepted since the level of the female research group students who studied using the model (stimulating mental thought) probing thinking increased. Compared to the before application, in the after application..

The size of the effect of the independent variable (stimulating mental thinking) on the dependent variable (probing thinking) is large.

This indicates the effectiveness of using the model (stimulating mental thinking) in developing probing thinking among the female students of the research group, and thus the first research question has been answered.

This result is consistent with the findings of Al-Janabi's study (2019) in terms of the effectiveness of using the model (stimulating mental thinking) in teaching on developing probing thinking.

The researcher believes that the previous result is due to the higher focus of the stages of the model (stimulating mental thinking) attracting the students' interest and giving them positive feelings for learning statistics. Making the students the focus of the educational process, and in addition to the diversity of learning methods according to the learning styles of each of them, so there was harmony among the students. Learning became meaningful and led to an increase in their level of achievement in the course and put them in the optimal state for learning, which gives them room to invest the largest number of senses in learning and the student becomes able to read, write, compare data, describe and determine the statistical graph presented to her.

Building lessons according to the principles of the model (stimulating mental thinking) on a variety of learning methods allowed the students to choose their favorite activity to acquire and learn knowledge. This made the student active in analyzing and describing data by cooperating with her colleagues to solve papers that include linking knowledge and facts with practical life. .

2- Testing the second research hypothesis, which claims that: (The average scores of the research group's female students in the pre- and post-application of the mental wandering scale differ statistically significantly at the level of 0.01 in favor of the post-application). Moreover, to verify the validity of the second hypothesis of the research, the significance of the difference was calculated. Between the average scores of the research group in the pre- and post-applications of the mental wandering scale, a "t" test was used for the paired-sample groups using the SPSS program, and to answer the second research question, the effect size was calculated using Cohen's d equation for the following related groups $d = T / \sqrt{n}$

Table (2): The significance of the difference between the scores of the female students of the research group in the pre- and post-application of the mental wandering scale

Table (2): The significance of the difference between the scores of the female students of the research group in the pre- and post-application of the mental wandering scale

Statement / Application	Number of female students	Average	Standard deviation	T	T Indication	D Connotation
Pre	40	33.88	10.81	5.56	0.05	big
Post		15.33	27.0			

From Table (2) we see that:

- There is a statistically significant difference ($p < 0.05$) in the research group's average scores in the pre- and post-applications of the mental wandering scale test, favoring the post-application. As a result, the second research hypothesis is accepted, since the female research group students who used the model for post-application mental stimulation showed a decrease in mental wandering. In the tribal application, it is discussed.
- Mental wandering is the dependent variable, and the independent variable, the mental thinking stimulation model, has a significant impact on it.

This indicates the effectiveness of using the model of stimulating mental thinking in reducing mental wandering among the female students of the research group, and thus the second research question has been answered.

The researcher believes that the previous result is due to the fact that the teaching procedures (stimulating mental thinking) model focused on the students' positivity by providing the opportunity for discussion and dialogue, proposing solutions, discussing them, and correcting their errors, which helped in carrying out the thinking processes. The learner will be more interactive and learning will be better and faster, as the model

provides information in an integrated and coherent manner, and works to absorb new data and apply it outside the classroom, which makes learning meaningful.

RESEARCH RECOMMENDATIONS

In light of the results of the current research, the following recommendations can be made:

1- Using the model (stimulating mental thinking) to teach statistics to female college students because of its effectiveness in developing probing thinking and reducing their mental wandering.

2- Training faculty members at the College of Education to use the model (stimulating mental thinking) in teaching, through holding specialized training courses.

3- Urging faculty members to use the model (stimulating mental thinking) and employing its stages during lectures.

4- The necessity of including the model (stimulating mental thinking) in teaching courses at different educational levels. To achieve enjoyable learning that leads to passion

Suggested research:

In light of the research results, the following research can be proposed:

1- Conduct a study similar to the current study for different branches of mathematics and for all different educational stages.

2- Study the effect of using the model (stimulating mental thinking) in developing dependent variables such as achievement, statistical sense, attitude, and creative and critical statistical thinking.

3- A comparative study between the effect of the model (stimulating mental thinking) in teaching and some other modern models on increasing achievement, thinking of all kinds, and other variables.

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