



RESEARCH ARTICLE

The Impact of Using SAM Model on the Scientific Mindfulness of 5th Grade Primary School Students

Furqan Burhan Ibrahim^{1*}, Ali Raheem Mohammed²^{1,2} University of Al-Qadisiyah, College of Education, Iraq**ARTICLE INFO**

Received: May 21, 2024

Accepted: Jun 21, 2024

Keywords

The SAM model

Scientific mindfulness

***Corresponding Author:**

edu.bio.posta114@qu.edu.iq

ABSTRACT

The study goal was to determine the effect of SAM model on the scientific mindfulness of fifth-stage primary school students. To achieve this, the following null hypothesis was formulated there is no difference of statistical significance at the level of 0.05 of significance between the mean scores of the experimental group students, who studied according to SAM model and the mean scores of the control group students who, studied according to the traditional method in the scientific mindfulness scale. The study was limited to fifth stage primary school students in public primary schools of the general directorate of Al-Muthana education for the academic year 2023-2024. The researcher adopted the partial control experimental design (experimental group and control group) with a post-test to measure the students' achievement in science and their scientific mindfulness. The study sample consisted of (60) students divided into two sections, one of which was randomly selected to represent the experimental group, which included (30) students who studied according to the SAM model. The other to represent the control group, which included (30) students who studied according to the conventional method. The two groups were equivalent in terms of age, intelligence, previous achievement (end-of-year stages in science for the previous year), and scientific mindfulness. The scale validity and reliability coefficients were verified using Cronbach's alpha, and it reached (0.918). The study most important findings were: the students of the experimental group, who studied according to SAM model outperformed the students of the control group, who studied according to the traditional method in scientific mindfulness. The researchers recommended the following: The importance of using SAM model in teaching science. Incorporating educational models and designs into teacher education programs, especially for science teachers. Conducting similar studies on samples of students from higher stages, as well as using other dependent variables such as (habits of mind, mindfulness, systemic thinking, mental motivation, visual thinking skills).

INTRODUCTION

The twenty-first century was characterized by development and discovery, and that is why it is the age of science, and we all see that. Yesterday is not like today, and when we want to achieve prosperity, we must develop the human being because he is the means of development, its tool, and its goals. After education, it is the basic foundation and driving force for this human development

and a passport to the future. On this basis, strength must be known. Basic principles, their applications, how to access them and achieve progress for society by scientific method (Hu et al., 2021), That modern education focuses on the learner's participation in educational situations, as the learner remaining a recipient of information only without the ability to interact with it leads to negative regression and the failure of effective learning to occur. Therefore, it emphasizes interest in the learner, activating his role, and arousing his motivation towards learning, and tries to distance the teacher from traditional methods and interest in methods. Which encourages the learner to think soundly and be able to solve (McNicholas, 2020). The problems he faces in his scientific and professional life especially since modern trends give preference to important procedures in teaching and learning in the educational process (König, 2023). These two processes are intertwined in nature, as they depend on each other. There is no importance for education unless there is a desire to learn on the part of the learner. The primary stage is one of the important basic stages, and represents the cornerstone for the subsequent stages. Attention must be given to this stage so that the educational system is strong, solid and solid, according to The effectiveness of teaching is measured in the level of achievement and raising the level of learners in various aspects alike.

Whether it was cognitive, skillful, or emotional. Therefore, the researchers may experiment with the SAM model and find out its effect on the scientific alertness of fifth-grade primary school students. Based on the above, the research problem can be formulated with the following question:

What is the effect of using the SAM model on the scientific alertness of fifth-grade primary school students?

The Importance of research

- The importance of teaching science to the fifth grade of primary school because it is the foundation for the subsequent educational stages and helps understanding different facts and concepts.
- This research can contribute to achieving the objectives of the science subject and improving student learning through its results study plans and prepared tests that may benefit researchers, teachers, and supervisors.
- It may contribute to enriching the library with resources in the field of science specialization in teaching methods, which will benefit students of postgraduate studies and researchers, and to the researcher's knowledge, did not find a previous study that dealt with the SAM model.
- Directing the attention of curriculum developers towards the need to adopt teaching strategies that rely on positivity The learner's activity is such as the SAM model (De Melo, 1988).
- Preparing a teacher's guide for planning the subject according to the SAM model may contribute to putting teachers on the right path to understanding and teaching the science course and even understanding the new education system as a whole.
- The research provides a tool that measures student achievement among the class's students of fifth primary school.
- Providing a modern strategy that may contribute to raising the level of students' achievement and increasing their ability to solve their future problems they may face (Pyatt, 1988).

The goal of the research

The current research aims to identify the effect of using the SAM model on Scientific Mindfulness among 5th grade primary school students.

Limits of research

The current research will focus on:

- One of the mixed primary day schools in the countryside of Al-Muthanna Governorate
- Fifth grade students.

- The first semester of the 2023-2024 academic year.
- A number of topics in the science book for the first semester prescribed by the Ministry of Education for the fifth grade of primary school for the academic year 2023-2024.

Search terms

SAM model was defined by:

It is a successive approximation model with a clear path to success, measurable and obtainable milestones to mark completion, and target moments to reach agreement and compatibility (Courtois & Spiegel, 2013).

-It is a clearly defined and manageable model, but it encourages creativity and experimentation. It continually reveals the design as it evolves, and does so in ways that all stakeholders can see and evaluate. It helps all team members communicate with each other some, contribution and collaboration In short, it seems to meet all the criteria (Allen & Sites, 2012).

- The researchers define the SAM model procedurally: it is a simplified method to reduce cost and space, allowing multiple steps to be carried out at the same time. This allows students and teachers to perform multiple tasks at the same time and in the same place.

Scientific Mindfulness was defined by:

- A flexible field of mental ability that is characterized by objectivity and is not linked to the individual's point of view It allows for a good and open view of all the mental and sensory experiences of the individual without making special judgments (Grossman, 2019).

- It is the learner's ability to have immediate awareness of academic experiences without issuing judgment and acceptance of oneself as it is, organizing momentary attention, orientation towards the present, and sensory awareness of what is happening changes in the environment around him and managing his feelings in an organized manner (Jonsen et al., 2010).

-The two researchers define scientific alertness procedurally as: a set of processes and skills that help the student confront scientific problems, and it means voluntary concentration and conscious attention to the events and facts that occur around him.

A theoretical framework and previous studies

That includes a theoretical framework that explains the research variable and what is related to it, as well as previous studies related to the research

The current one as follows:

The theoretical framework:

SAM model

Designing and producing high-quality instruction is no easy task. There are many factors that interact with each other to determine success. An approach that works with one group of authors and developers may fail dramatically with another group teaching similar skills (Sites & Green, 2014). Here begins an unusual step among models of instructional design. With a limited amount of analysis at this stage and with vital information certainly lacking, students are encouraged to use their ideas and guess what might be a good solution and present it to teachers after little time or thought. In fact, the students usually generate the first future design in a brainstorming, which begins the lesson meeting within the lesson as a smart start with the students (De Melo, 1988).

The SAM model is a more flexible approach (Hu et al., 2021): It focuses on speed, flexibility, and collaboration in order to design the lesson topic more effectively and efficiently. Furthermore, SAM focuses on pupil experiences, engagement, and motivation throughout the entire design and

development process (as content organization, information presentation, and incoming testing) (Allen & Sites, 2012).

The SAM model is also defined as a successive approximation method for the appropriate attention model. Everyone knows the phenomena that are summarized by attention: focus, selection, selection, and intensification. Problems quickly arise in terms of what needs to be explained and how to explain it. We can include issues of lack of sufficient focus and repetition words and thoughts many times, and decreased concentration (Mason, 2023).

The simplest SAM model consists of three parts: preparation, iterative design, and iterative development. The key word here is iterative, which is the basis of this model and indicates that each step aims to repeat and its review (Courtois & Spiegel, 2013).

Stages of the SAM model

(Successful). preparation and planning stage

The preparation phase is the period to gather basic information, even before trying to design the first solution we are eager to get into as quickly as possible. The background helps in setting the goal, identifying special problems, and ruling out options. It prepares for the intense design activities to follow by narrowing the focus (Ali, Acquah, & Esia-Donkoh, 2021). This is a time to actively explore the performance issue in broad terms—a context within the organization's needs, goals, and outcome expectations (Llop & Manresa, 2004) The preparation phase begins with gathering all the necessary information and context for the topic. The content and scope of this phase will vary greatly depending on the topic. The distinctive feature of the end of the first phase of this model is the SMART START, which encourages brainstorming, drawing, prototyping, and the involvement of as many students as possible during the course Lesson topic design (DiOrio, Dobos, Janzou, Nelson, & Lundstrom, 2015).

Basic information that will be collected includes:

Start with a quick analysis of the situation, need, and goals. Who are the students and what needs to change in their performance? What can they do now? Are we sure they can't do what we want already? What, if anything, is unsatisfactory about current educational strategies? Where do students go to get help? How will we know if this new model is successful? What is the time required for completion Lesson topic (Hu et al., 2021).

(Approximation) Iterative design phase

In the second iterative design phase, the goal is to design and prototype the material so that it can be evaluated by the teacher. It allows for more comprehensive review and testing All design, prototyping and evaluation processes are done iteratively in small steps. Prototyping is a vital part of the design phase (Poonounin & Chano, 2023). A prototype can serve as a means of communication between students by making conceptual ideas visible, rather than just an idea. Several prototypes are developed with each evaluation (Iskandar, Koto, Yulanto, & Marlan, 2022; Wolverton & Hollier, 2022).

List and organize clear objectives, mention the behavioral objectives for each, mention the ways in which students' performance can be evaluated, choose appropriate educational methods, and who is the main decision maker? Draw some examples of designs that seem appropriate to the topic and are reasonably expected to be achieved Objectives (Sites & Green, 2014).

Iterative development phase (Model)

Iterations are useful to the design process as they allow students to have an ongoing means of evaluating decisions and making corrections within the constraints of the topic. In the final iterative development phase, the final prototype is fully developed and implemented. Once used, it can be evaluated and brought back during the development and implementation phases, if necessary

Prototyping Focus on creating prototypes of activities learner rather than the content of the presentation (DiOrio et al., 2015; Iskandar et al., 2022).

Scientific Mindfulness

Vigilance is also described as a distinct inferential activity, noticing new and different things and seeing the familiar in the new and the new in the familiar itself (Langer, 1989)

The origin of vigilance goes back to the military fields, that is, before entering into a battle or the like, that is, the necessity of knowing everything that is happening around us in matters related to guarding and surveillance, and alertness is a personal trait that requires great abilities of awareness and perception, and the alert person is a person who is aware and present with all his senses, his mind, and himself with the present universe. He does not live in distraction, frustration, or escape, but rather he is in a state of alert awareness and feeling and in a mode of reception. And receive all the signals and actions received from the external environment, accurately, when and where takes place (Jonsen et al., 2010).

The attentive personality, in modern psychology, is a personality characterized by the ability to continuously focus and continuous, and the ability to maintain focused attention for long periods of time, and tries during this time is revealing the events and situations going on around it (Matthews, 2000)

Defined the vigilant personality as the personality that possesses a high degree of attention, as it monitors everything around it, and it also possesses a strong will, and this is what makes it feel capable of confronting various life events, and realizing (Arnout, 2019) the breadth of danger if others direct it towards it.

If someone has an alert personality, nothing passes in front of him unless he spots it and focuses his attention on it. He is one of those, he has strong senses of hearing and sight, and is able to understand symbolic messages that others exchange. Somehow, with all its hints, mysteries, and hidden meanings (Arnout, 2019)

There are six traits or qualities that are considered a gateway to knowing the attentive personality, and the higher the percentage of these traits The more clearly the alert personality is formed.

1-The independence: The alert personality has strong independence. The person with this personality has no need someone helps, he makes the decision himself without needing anyone.

2-Caution: They are cautious in dealing with others. They prefer to know people in depth before dealing with them or trust them.

3- Self-defense: These people do not hesitate to defend themselves under pressure or during In case of attack from others.

4- Sensitivity to criticism: They take criticism from others seriously and respond without feeling fear or Results.

5- Perception and awareness: They are excellent listeners and possess mental acuity in analyzing and evaluating speech several levels of communication.

6- Sincerity: They look at sincerity with great importance and they work diligently to extract it from others, and they always ask for it from others and it is, therefore their condition for building an intimate relationship or a strong friendship.(Arnout, 2019)

POPULATION AND SAMPLE OF RESEARCH

What is meant by the study population is all the elements of the problem or phenomenon and its components that are a limitation research. The current research population included all fifth-grade primary school students in government primary schools affiliated with the General Directorate of AL-MUTHANA Education for the academic year (2023 -2024), their numbers are (2458) in (40) schools at the districts of the governorate.

As for the research sample, it is a model that includes a part or aspect of the units of the original society intended for research, as it is representative of it and bears its common characteristics. This part or model spares the researcher from studying all the vocabulary and units of the original society, especially in the event that it is impossible or difficult to study all that Units. Jawad Al-Imah Mixed School was chosen randomly from among the primary schools in the research community. The researcher visited the school administration according to the task facilitation book issued by the General Directorate of Al-muthanna Education, as the school included two divisions for the fifth grade of primary school, namely (A. B). The number of students in each class ranges from (30) students, and the research sample was determined by random assignment to represent Division (B), the experimental group taught using the SAM model, and Division (A) to represent the control group, which is taught in the usual way. Therefore, the research sample became composed of (60) Student according to The following table:

Table (1) Distribution table of students in the research sample

S	The group	Division	Number of students
1	Experimental	C	30
2	Control group	A	30
TOTAL			60

Research tool

To achieve the research goal, the researchers prepared a scientific alertness scale to determine the effect of using it The SAM model for fifth-grade primary school students.

Scale Validity

Honesty is one of the characteristics that must be available in a research tool. The tool is honest if it achieves the goal for which it was prepared. An honest tool is one that can measure what it was designed to measure (Cohen, Manion, & Morrison, 2017) and in order to verify the validity of the scale, the validity was extracted in two ways.

The validity of the construct was extracted in two ways, the first is internal consistency validity and the second is through:

Factorial validity:

1- validity (Internal consistency): It is the extent to which we can determine that the scale measures a particular characteristic (Anastasia, 1997, 151), and the importance lies in the validity of the construct the scale has the ability to measure the inherent characteristic of an individual by collecting quantitative information.

2-Confirmatory Factor Analysis: (Confirmatory Factor Analysis) for the Scientific Vigilance Scale (Harrington, 2009).

Factorial validity is one of the important indicators of construct validity, as the extent of saturation of the scale (scientific alertness) with each of its component aspects is measured, and the correlation matrix method was used the internal differences between the eight dimensions of scientific alertness (Brown, 2015).

In order to verify the validity of the theoretical model adopted in the research, evaluate its degree of validity, and ensure its conformity with the data extracted from the sample, the confirmatory factor analysis method was used. So, the following is required:

A - The presence of a theoretical framework that explains the phenomenon, its concepts, variables and factors.

B-There is a precise definition of the factors that make up it, which have names inherent in the phenomenon.

C- The presence of a set of indicators (the positions or items that make up each factor, which must be saturated with it without the other factors, when we have a measure prepared according to a model given that the goal of factor analysis will be to verify the extent of conformity of the model that was derived from a specific theory and to a set of data (Alzamili & Mohammed, 2019), and since it is a measure of alertness the scientific method was prepared and derived from theory of Langer's, 1992.

Which showed that scientific alertness has eight components, which the researcher built according to the theory: That is, the theoretical basis that was adopted helps the researcher determine the way in which the variables are saturated with the factors, which are: the student's ability to have immediate awareness of academic experiences, accept himself as he is, organize momentary attention and focus on the present, manage negative automatic feelings, thoughts, and emotions, accept constructive criticism, and automatic change. Behavior through openness to new ideas, modern theories, and different opinions, scientific curiosity, making wise decisions at the appropriate time, and adherence to ethical standards in academic performance and scientific activity, as stated in the model. Confirmatory factor analysis was conducted according to next steps:

A- Type of factor model, including the number of factors: There are types of confirmatory analysis, as there is a single, dual, or even multi-stage factor model, and since the measure of scientific alertness consists of among eight main areas: The ability of the student, through immediate awareness of academic experiences, to accept himself as Regulating momentary attention and orientation towards the present, managing negative automatic feelings, thoughts and emotions and accepting constructive criticism, automatic behavior change by being open to new ideas, modern theories and different opinions, scientific curiosity, making wise decisions at the appropriate time, commitment ethical standards in academic performance and scientific activity. Each area consists of four paragraphs It saturates on it, so the model was single-stage.

B- Determining measurement errors: They represent the rest of the variance that the worker was unable to explain for each an indicator of the measured indicators.

There are some important indicators that must be achieved to accept or reject the model, which is called the quality of fit. When there is high acceptance of these indicators, the measure will then be accurate. Conversely, it will be weak, and therefore that model can be rejected (Brown, 2015). And procedures the next step, using the AMOS-26 program, includes checking the goodness-of-fit indicators for the self-scale digital:

The ratio between the values of (X^2) and the degrees of freedom (Chi Square df.). This indicator is considered one of the most important indicators of good matching between the covariance matrix of the sample and the covariance matrix of the hypothesized model. It is based on the ratio between the values of (x^3) and the degrees of freedom (df.), and in contrast to what is known in traditional statistics about the statistical significance of differences, as statistical significance is determined using the Chi-square in the context of structural equation modeling, it indicates that the variance matrix of the hypothesized model differs from the variance matrix of the sample. As for the non-statistically significant Chi-square value, it indicates that there are no fundamental differences between the variance matrix of the hypothesized model and the variance matrix of the sample,

meaning that the hypothesized model matches the sample. The greater the value of the Chi-square, the fit of the model gets worse, and therefore the Chi-square is an indicator of poor fit and not good fit. If the value of this indicator is less than (5) it indicates the acceptance of the model (Mustapha & Bolaji, 2015). It has been shown the calculated value reached (4.4), which means it is a good value.

Root indicator Mean Square Error of Approximation (RMSEA)

2-This indicator is based on the assumption that the models are not completely identical in reality, but rather close to it, and therefore they are approximate models. Thus, it measures the level of lack of conformity. In other words, it focuses on the discrepancy and covariance between the variance and covariance matrix of the assumed model and the variance and covariance matrix of the population. The value of (RMSEA) for the current model was (0.037), which means that the value is good and indicates matching, as values less than (0.05) indicate good matching. (Alzamilia & Mohammedb, 2020; Yin, Shi, & Fairchild, 2023).

Comparative Conformity Index CFI

This indicator ranges in value from (1-0), and the higher its value and the closer it is to (1), the more it will indicate the acceptable match of the model with the sample data. Its value calculated here was (0.811), which means that its value is high and therefore its quality, and based on the above indicators, the researcher has verified and confirmed the quality of the model used in adopting the Scientific Vigilance Scale in extracting the results and in assuming congruence between the covariance matrix of the 32 items of the scale that were included in the analysis and the assumed matrix of the model (Lai & Green, 2016).

Table (2) summarizes the above indicators. Figure (1) shows the theoretical structure of the vigilance scale scientific research as shown in the (AMOS) programme.

Table (2) Confirmatory factor analysis indicators for the scientific alertness scale

No.	Chi square: df. (x2)	Value	Cutting grade value
1	Root means square error index	4.4	(accepted value)
2	Approximate RMSEA	0.037	Younger than 5
3	Comparative conformity index CFI	0.811	Every time you approach 1

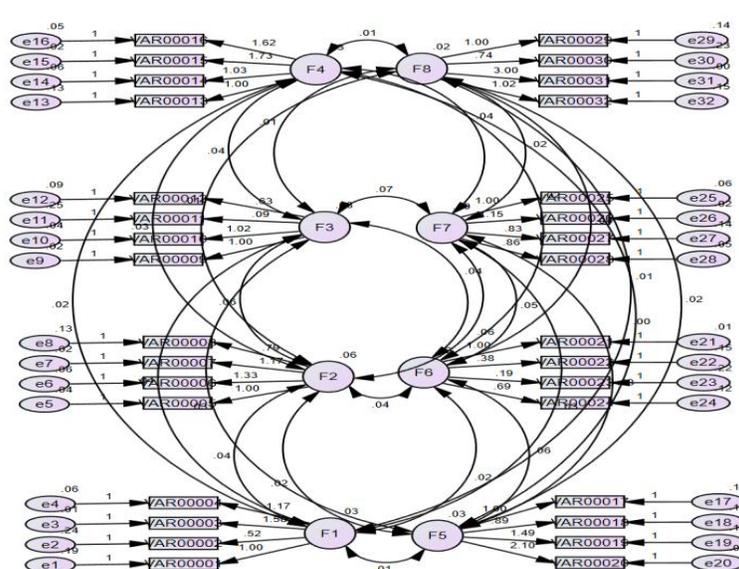


Figure (1) confirmatory analysis of the scientific vigilance scale.

The figure above shows the confirmatory factor analysis of the academic alertness scale, where F1 symbolizes the student's ability to have immediate awareness of academic experiences, F2 accepts himself as he is, F3 regulates momentary attention and orientation towards the present, F4 manages automatic negative feelings, thoughts and emotions and accepts constructive criticism, and F5 spontaneously changes behavior about The path of openness to new ideas, modern theories, and different opinions, F6, scientific curiosity, F7, making wise decisions at the right time, F8, and adherence to standards ethics in academic performance and scientific activity.

Reliability of Scale

Reliability is one of the indicators of the accuracy of the scale and the consistency of its items in measuring what is intended to be measured. It indicates stability in the sense that if individuals are tested on a certain scale, their scores will be the same if they are re-applied The same standard applies to them under the same circumstances (Alzamili & Mohammed, 2020; Raykov & Shrout, 2002). Reliability was calculated.

-Cronbach's reliability coefficient method for internal consistency:

The reliability coefficient was calculated in this way by applying the Cronbach equation for internal consistency. All of the respondents' questionnaires, amounting to (200) were subjected to statistical analysis, and then the Cronbach alpha equation was used. The alpha reliability coefficient for the scale reached (0.918). The scale is considered internally consistent because this equation reflects the consistency of the paragraphs. The scale is internal (Eisinga, Grotenhuis, & Pelzer, 2013).

Statistical indicators for the scientific awareness scale

Scientific literature has shown that one of the statistical indicators that should characterize any measure is to recognize the nature of the moderate distribution, which can be identified by means of some indicators the statistics that show us the nature of the measure, Table (3) and Figure (2) illustrate this.

Table (3) Statistical indicators of the scientific alertness scale.

No.	Indicator	Value
1	Hypothetical mean	48
2	Mean	38.7
3	Median	36
4	Mode	34
5	Standard deviation	6.75
6	Skewness (torsion)	0.458
7	Kurtosis	0.235
8	Minimum	32
9	Maximum	61

When observing the values of the aforementioned statistical indicators of the scientific alertness scale, we find that these indicators are consistent with most indicators of scientific standards, as the scale scores and their frequencies are relatively close to a moderate distribution, which allows for the creation of parametric inferential statistics with the aim of generalizing the results of applying this scale. This is illustrated graphically in Figure (2) below.

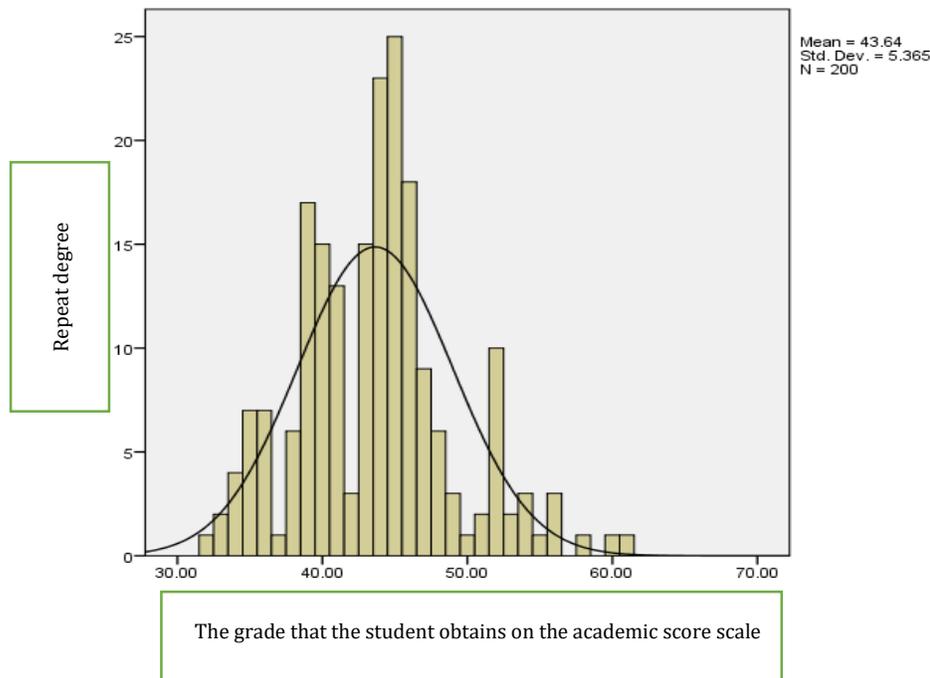


Figure (2) Moderate distribution of the sample of statistical analysis of the scientific alertness scale.

RESULTS

The superiority of the students of the experimental group who studied according to the SAM model over the students of the control group who studied according to the usual method in scientific alertness (t) 5.675, Sig. 0.000 can be explained by the fact that the SAM model SAM is characterized by many features that the regular method lacks, and these features include:

- 1 - Using the SAM model helped students make the most of their mental abilities through the various activities provided by the model in an attempt to develop some dimensions of scientific alertness, such as perseverance, and collecting data through senses and linking current information to the previous knowledge.
- 2-Teaching according to this model works to develop many different mental skills that helped students develop their thinking and thinking about thinking (Alzamili and Mohammed 2019).
- 3-Teaching according to the SAM model provided the opportunity for students to express their opinions and discuss with others, thus making the science lesson lively, active, and interactive. This made them enjoy scientific work in an atmosphere of democracy and freedom, and this is what drives them to persevere and complete their subject and understand it in an enjoyable way, as a group of studies indicated. The nature of dialogue in science classes plays an important role in the ability of learners to practice thinking skills .
- 4-Preparing the SAM model by having the students work in groups is a good opportunity to develop scientific curiosity and make wise decisions. It also provides them with the opportunity to learn from their colleagues who have a good scientific level, as well as to activate the majority of the senses and then use them in the learning process and give them scientific alertness.
- 5-Teaching according to the SAM model provided an atmosphere of excitement, motivation, curiosity, and love of reconnaissance.

CONCLUSION

There are a number of conclusions reached by the researcher, and this was based on the results, which are:

1-Teaching according to the SAM model helped the students of the experimental group excel the students of the control group in achieving science subject.

2-Teaching according to the SAM model helped the students of the experimental group excel students of the control group in scientific awareness.

3-Teaching according to the SAM model reduces the size of the gap between the learner and the academic content, while the usual method helps to create a large gap or gap between the students and the academic content, as the learners consider the content to be something essential that cannot be bypassed, and that their failure to study means they will fail.

4-Teaching according to the SAM model provided the opportunity for low-achieving learners last year to raise and modify their academic level, as working in groups gave them the opportunity students learn from their classmates who have a good academic level.

5-Teaching according to the SAM model gave students the freedom to express their observations, opinions, and suggestions various questions and positive contribution within the class.

Recommendations

In light of the findings, a number of recommendations were formulated they are:

1-The necessity of including educational models and designs in science teaching and programs for preparing science teachers and science subject teachers by including them in the teaching methods subject as one of the academic curricula of future teachers.

2- The necessity of using the SAM model and including it in educational curricula and courses working on training teachers.

3-Adopting the SAM model by teachers and those who train them, especially in the field of science, in order to improve the scientific level of their students and their scientific alertness, as achievement and scientific alertness have become important general goals in teaching science, through continuing education seminars held by education for its staff to Continuously developing education and keeping pace with the great and continuous development in all areas the most important fields are education, which is the basis for the development of countries.

Proposals

The both researchers suggest conducting the following studies:

1- A study using educational models and designs and knowing their effectiveness in increasing academic achievement and awareness and compare its results with the results of current research.

2- Studies on the effect of using the SAM model on achievement and academic alertness at this phase of middle school, high school, and other academic subjects.

3-A comparative study of the SAM model and its impact on achievement and academic alertness in urban schools' rural schools, government schools, and private schools.

4-A study to determine the effect of the SAM model as an independent variable with other dependent variables in science such as (habits of mind, mindfulness, systems thinking, mental motivation, visual thinking skills).

REFERENCES

- Ali, C. A., Acquah, S., & Esia-Donkoh, K. (2021). A Comparative Study of SAM and ADDIE Models in Simulating STEM Instruction. *African Educational Research Journal*, 9(4), 852-859.
- Allen, M., & Sites, R. (2012). *Leaving ADDIE for SAM: An agile model for developing the best learning experiences*: Association for Talent Development.
- Alzamili, R. A. J., & Mohammed, F. H. (2019). Organizational Commitment to Preparatory Stage Teachers. *psihologija*, 52(5).
- Alzamili, R. A. J., & Mohammed, F. H. (2020). Ethical Leadership and its Relationship to the Occupational Competency of University Staff. *psihologija*, 52(6).
- Alzamilia, R. A. J., & Mohammedb, F. H. (2020). Evaluation of Educational Supervisors of Primary School Teachers in Relation to Effective Teaching Skills. *Evaluation*, 13(6).
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research*: Guilford publications.
- Cohen, L., Manion, L., & Morrison, K. (2017). Validity and reliability *Research methods in education* (pp. 245-284): Routledge.
- Courtois, C. A., & Spiegel, J. (2013). *Sexual abuse of males: The SAM model of theory and practice*: Routledge.
- De Melo, J. (1988). SAM-based models: an introduction. *Journal of policy modeling*, 10(3), 321-325.
- DiOrio, N., Dobos, A., Janzou, S., Nelson, A., & Lundstrom, B. (2015). Technoeconomic modeling of battery energy storage in SAM: National Renewable Energy Lab.(NREL), Golden, CO (United States).
- Eisinga, R., Grotenhuis, M. t., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International journal of public health*, 58, 637-642.
- Grossman, P. (2019). On the porosity of subject and object in 'mindfulness' scientific study: Challenges to 'scientific' construction, operationalization and measurement of mindfulness. *Current opinion in psychology*, 28, 102-107.
- Harrington, D. (2009). *Confirmatory factor analysis*: Oxford university press.
- Hu, R., Zou, L., Hu, G., Nunez, D., Mui, T., & Fei, T. (2021). SAM theory manual: Argonne National Lab.(ANL), Argonne, IL (United States).
- Iskandar, H., Koto, I., Yulanto, D., & Marlan, M. (2022). *Instructional Design of Successive Approximations Model (SAM) for Project-Based Learning Media Development*. Paper presented at the Proceedings of the 4th International Conference on Innovation in Education, Science and Culture, ICIESC 2022, 11 October 2022, Medan, Indonesia.
- Jonsen, K., Aycan, Z., Berdrow, I., Boyacigiller, N. A., Yoko Brannen, M., Davison, S. C., . . . Lazarova, M. (2010). Scientific mindfulness: A foundation for future themes in international business *The past, present and future of international business & management* (pp. 43-69): Emerald Group Publishing Limited.
- König, A. (2023). Teaching Classics as an applied subject. *Journal of Classics Teaching*, 1-9.
- Lai, K., & Green, S. B. (2016). The problem with having two watches: Assessment of fit when RMSEA and CFI disagree. *Multivariate behavioral research*, 51(2-3), 220-239.
- Langer, E. J. (1989). Minding matters: The consequences of mindlessness–mindfulness *Advances in experimental social psychology* (Vol. 22, pp. 137-173): Elsevier.
- Llop, M., & Manresa, A. (2004). Income distribution in a regional economy: a SAM model. *Journal of policy modeling*, 26(6), 689-702.
- Mason, S. (2023). Dimensions of Emotional Fit. *The Philosophical Quarterly*, pqa112.
- Matthews, G. (2000). The Cognitive Science of. *Handbook of cognition and emotion*, 171.
- McNicholas, C. (2020). *The role of information in postgraduates' decision-making cycle*.
- Mustapha, B., & Bolaji, B. Y. (2015). Measuring lecturers commitment scales: A second order confirmatory factor analysis (CFA). *International Journal of Education and Research*, 3(3), 505-516.

- Poonounin, R., & Chano, J. (2023). *The Instructional Management by Using Task-based Learning with Video on YouTube to Enhance English Listening and Speaking Skills of Grade 11th Students*. Mahasarakham University.
- Pyatt, G. (1988). A SAM approach to modeling. *Journal of policy modeling*, 10(3), 327-352.
- Raykov, T., & Shrout, P. E. (2002). Reliability of scales with general structure: Point and interval estimation using a structural equation modeling approach. *Structural equation modeling*, 9(2), 195-212.
- Sites, R., & Green, A. (2014). *Leaving ADDIE for SAM field guide: Guidelines and templates for developing the best learning experiences*: Association for Talent Development.
- Wolverton, C., & Hollier, B. G. (2022). Guidelines for Incorporating Active Learning into the Design of Online Management Courses Utilizing the Successive Approximation Model (SAM). *International Journal of Education and Development using Information and Communication Technology*, 18(1), 264-274.
- Yin, Y., Shi, D., & Fairchild, A. J. (2023). The effect of model size on the root mean square error of approximation (RMSEA): The nonnormal case. *Structural Equation Modeling: A Multidisciplinary Journal*, 30(3), 378-392.