

Effectiveness of Strategy of Activating Previous Knowledge in The Tendency Towards The Subject of Physics of Second Intermediate Students

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Abstract

This research aimed to identify the effectiveness of a strategy of activating previous knowledge in the tendency towards the subject of physics of second intermediate grade students, to verify the aim of the research, the researchers used experimental design with two equivalent groups (experimentation and control), as the research sample included (69) students, (33) students for the experimental group and (36) students for the control group, the research instrument was a scale of students' tendency towards the subject of physics prepared by the researchers consisting of (25) items, after verification of its validity and reliability was applied at the end of the experiment, SPSS was used to calculate the means , Standard deviation, percentages, t-test value , Pearson correlation coefficient, Cronbach's alpha coefficient, and the effect size calculation equation (η^2) . Results showed a statistical significant difference between the two groups mean scores and the control group's mean scores in favor of the experimentation group .In light of the results the researchers came out with some conclusions, recommendations and proposals.

Keywords : Activating ; Knowledge ; Previous ; Tendency

Chapter One

Introducing the Research

The Problem of the Research

Physics is an applied science upon which the advancement of nations depends and progresses because it has a role in discovering and interpreting phenomena that occur in nature and keeping pace with scientific and technological development related to this science and its direct relationship with all other sciences, that its teaching cannot be only the transfer of knowledge to the learner, but it is building mentally, skillfully, and sentimental, as well as teaching him how to think in a scientific and logical way about what is around him and applies what he learns in his daily life and is able to develop his scientific and mental capabilities, all these are done through developing his tendencies towards the subject of physics and the love of learning it first, and because the major of the methods used in education depends on memorization and indoctrination, which gives a kind of monotony and boredom, in addition to the nature of the content of physics subject to the learner's possession of mental skills that range between inference and problem solving and knowing the reasons for the occurrence of natural phenomena previously observed in daily life or learning for some concepts in his past years of study, which at that time only exceeded memorizing those concepts or understanding them at other times, as well as the need to link that knowledge with what he will learn in the content of physics, this matter needs to increase his tendency towards learning the subject to raise the level of attention and focus It has an increased achievement in it, and it is worth noting that the transformations that occurred in the secondary education systems recently, such as the courses system and the distribution of curricula in it, made a large time difference between the learner's study of science in the first course for the first intermediate grade after the physics and chemistry subjects were merged into one book with facts of two units of chemistry and one unit of physics, and his study of science / physics in the second course for the second intermediate class, meaning that the time difference between his studies of the subject in the first and second intermediate grades is full year, this calls teachers of physics to develop their knowledge is teaching strategies and methods used inactivating the previous knowledge of learners and linked them to the current situation by increasing their desire to learn the material and their tendency towards it.

Upon, the research problem can be summarized in the following question:

What is the effectiveness of the strategy of activating previous knowledge in the tendency towards physics among second intermediate students?

Importance Of The Research

Importance of the research: The researchers summarize the importance of the research in the following:

- 1- The necessity of paying attention to what the learner possesses from previous information or noticing some phenomena in his daily life and linking them with what he will learn in the current school stage (second intermediate class).
- 2- The research may contribute to informing the researchers of the daily plan that was prepared for the academic subject.
- 3- The possibility of adopting the strategy in increasing the tendency of learners to learn physics as it has a role in their lives.
- 4- The possibility of providing physics teachers with a scale of the tendency towards matter.
- 5- The results of the research can be used to develop the educational process in Iraq and keep pace with the global development and direct the attention of specialists in the field of education to the importance of strategies that are concerned with previous knowledge in raising the level of cognitive, emotional and skill learners.

The aim of the research

The research aims to identify the effectiveness of a strategy inactivating previous knowledge in the tendency towards the subject of physics among intermediate school students

The hypothec of the research

There is no difference at the significance level (0.05) between the scores mean of the experimental group using the strategy and the scores mean of the control group using the usual method of scale of tendency towards physics.

Limitation Of The Research

The current research is limited in :

- 1- Students of the second intermediate class in the governmental day school (Makkah Al-Mukarramah)
- 2- The academic subjects (unit 1- movement and its laws and force, unit 2- work, power and energy, unit 3- wave motion, sound and light) from the book of science - the second part / physics for the second intermediate class, 2017.
- 3- The second course of the academic year 2018-2019.

Defining the Terms:

First: Effectiveness: defined by (Shehata and Al-Najjar, 2003) as measuring the size of the effect of a factor or independent factors on one or some dependent factors. (Shehata and Al-Najjar: 230,2003)

Second: The strategy: defined by (Al-Afoon and Al-Fatlawi, 2011) "as the plan that the teacher prepares to achieve the aims of the study, so every mental or behavioral cognitive process that has a purpose or aim in achieving its aims is included." (Al-Afoun, Al-Fatlawi: 2011, 95)

The researchers define it procedurally: an organized and integrated plan of procedures prepared by the researchers and applied within the lesson to achieve the aims of teaching science / physics to develop the tendency of intermediate-class second-class students (research sample) towards the subject.

Third: Activatingpast knowledge strategy

Defined by (Amani, 2007): These are steps aimed at stimulating thought processes before studying the subject, in its aftermath, and after it, this strategy is one of the methods used to develop the learner's cognitive storage that aims to deepen understanding and solve problems." (Amani, 2007: 35)

Fourth: Tendency:

It defined by (Melhem, 2000) as a drive that directs the learner's response selectively.

(Melhem, 2000: 367)

It defined by (Zaitoun, 2004) as what the learner prefers from things and activities, and what they do as well as desirable activities and activities to them, during which they feel a great amount of love and relief." (Zaitoun, 2004: 115)

It defined by (Abu Allam, 2011) as a desire of the learner to participate in a specific activity.

(Abu Allam, 2011: 472)

As for procedural, the researchers defined it as: the students 'desire to learn physics and their interest in it, and it is inferred by the total degree that they obtain by answering the items of the scale of tendency towards physics.

Chapter Two

Theoretical Framework And Related Studies

Theoretical Framework

First: metacognition theory and a strategy to revitalize previous knowledge

The emergence of metacognition: Scientists have begun to move towards the generation of new ideas that rely on cognitive psychology, and as a result of these developments the concept of metacognition and its strategies emerged based on the work of some researchers such as (Flavell) who developed some ideas to understand the epistemological processes of learners that have proven effective in The different academic and educational fields, as

metacognition is manifested as one of the most important theories through which we can control thinking as we control our actions (Al-Ruwaity, 2009: 11), and the individual develops a tendency towards seeking and persevering to obtain the information he needs, the education has become questionable on its core role in the preparation of an individual who has not only knowledge but beyond knowledge. (Obaid 2009: 6)

The new roles that the information revolution imposes on the teacher develops awareness among students of their thinking, and awareness of thinking means the ability to know what you know and what you do not know, and this process is called multiple names including: understanding, knowledge of knowledge, memory of memory, learning to learn, self-education Learning activities , other knowledge processes that are examples of complex mental activity that has been termed as thinking, or metacognition which is a component of cognitive theory in contemporary psychological sciences, and this concept has found interest in theoretical and practical levels, and Flavel suggests that most psychological processes such as: knowledge, motivation, emotion, and motor skills, are within the processes of metacognition. (Al-Adl and Abdul-Wahab, 2003: 188)

Metacognitive Patterns of Knowledge: There is general agreement among cognitive psychologists that metacognition is divided into two more general patterns, namely:

First: Knowledge of metacognition: It is represented in the following:

- 1- Declarative knowledge: awareness of the skills and steps that are required to accomplish the task to be performed, and at the same time, this knowledge answers the question of what (what)? I.e. knowledge of things, and this knowledge appears when he has The individual is a simple target, from which he aims to access quick information.
- 2- Procedural Knowledge: It is that knowledge related to the differentiated and sequential procedures that follow to accomplish a task, and at the same time, it answers the question of "How", for example, how did you attend school?
- 3- Conditional Knowledge: In this type of knowledge, the question is answered (When, Why), that is: when adopting a specific strategy and not others to work on accomplishing a task.

Second: Metacognition skills: represented by the following

- 1- Planning: According to this procedure, strategies are chosen in order to achieve the aims to be achieved, as both the conditional and conditional knowledge are related to the planning element, as the learner has to know specific procedures that are related to an important study tool, and at the same time, he must choose the most appropriate of these procedures at a time What, and at some point in the implementation stages (Abu Jado and Nawfel, 2007: 350-351), while practicing this skill, the learner can ask himself a number of questions including:

What is the aim do I want to achieve?

What do I need to know to treating the situation?

What is my plan to deal with the situation?

- Do I have an alternative plan that I resort to?

Do I write every important idea that comes to mind?

(Abu Rayash, 2007: 38)

- 2- Monitoring: means the level of progress toward the aim, with a view to reviewing the plans, and working to correct the path the learner is moving (Abu Jado and Nawfel, 2007: p. 351). It also indicates the learner's ability to monitor and guide success in the task, such as investigating that Absorption did not happen, so the learner will learn strategies to reform his learning and continue it, and verify its conformity with the answer, which was obtained for the estimated answer, and that monitoring includes:

- Walk toward the desired target.

- Save the sequence of steps and their sequence.

-Know the obstacles and difficulties.

-How to face difficulties.

- Move to the next steps.

- 3- Evaluation: At this stage, the extent to which the desired aim is achieved is verified, and the learner asks himself, such as: Have you got the information necessary to solve the problem? Do you understand what I read? Also, the evaluation process is a continuous process that begins at the beginning, during and at the end of mental processes (Abu Jado and Nawfel, 2007: 352). Among the questions that the learner can ask themselves are:

- How was my performance?

- Did you achieve the aim?

-Do I need to go back to work review?

-Can I check the correctness of my steps?

-Do I balance my current level with my previous level?

(Abu Rayash, 2007: 41)

Metacognition Strategies: There are several strategies in teaching metacognition, all of which increase thinking skills and the ability to understand concepts, and the reason for their diversity is that the greater the diversity in the

use of teaching strategies with students, the greater the opportunity to use the appropriate strategy with The educational situation or educational mission, and these strategies include:

1. Concept maps.
2. Role-playing.
3. Thinking loudly.
4. Talk about thinking.
5. Relationships of the question to the answer.
6. Brainstorming.
7. Interactive teaching.
8. Make illustrations.
9. Problem maps (v).
10. Activating previous knowledge.

(Zayer, et al., 2013: 234)

Strategy of activating previous knowledge

The learner uses his previous knowledge to link it with the new knowledge, which leads to the integration and understanding of the subject completely, as well as aims to activating thinking processes before studying the subject , during and after it . It is one of the methods used to develop previous knowledge and deepen understanding (Amani, 2007: 35), The researchers relied on this strategy on the important role of previous knowledge in acquiring information to build an organized strategy that works in sequential steps that help direct the required thinking process and organize ideas, and also helps to recall information in an organized way, and increase awareness of mental processes, and increases the focus in the task required of the learner, and activating his mental plans related to the topic, and the role of this strategy also comes from that it gives a role to metacognitive processes that are concerned with training the learner in organizing himself and planning what he will do and assess himself, so the learner here sets his aim of reading by asking a number of questions to himself, then he recalls his previous knowledge about the topic, then reads the topic, and assesses his understanding of it by the extent of his success in answering his questions. (Al-Waqfi, 1999: 117)

Advantages of using a strategy of activating past knowledge: This strategy serves several purposes, including:

- Remind students in their previous knowledge of the topic.
- Explain the purpose of the information contained in a lesson on the subject.
- Contributes to monitoring and evaluating understanding.
- It provides an opportunity to broaden the scope of topic ideas.
- It makes the learner the core of the educational process and emphasizes the principle of self-learning.
- Activating the previous knowledge of the learners and raising their curiosity.
- It helps learners to appreciate and organize what they learn.
- Familiarize the learner with thinking before, during, and after reading.
- Help to learn difficult topics.

(Attia, 2010: 175)

The main steps of the strategy to activating previous knowledge

It consists of major steps in teaching as :

First: Introduction: The teacher writes the topic title on the whiteboard and provides a summary about the topic.

Second: A table for each student that includes three fields:

- 1- What is your previous knowledge on the subject?
- 2- What information do you want to know?
- 3- What did you learn?

Third: Students discuss their previous information on the topic: give them enough time to remember and discuss what they know and whether their previous information has anything to do with the current topic? To be written on the whiteboard.

Fourth: Discussing what they want to know: This is done through the questions that the teacher asks, which help students direct their ideas towards the objectives of the topic and introduce it.

Fifth: Explaining the topic: After students have determined what they know about the topic and what they want to know, they are required to study the topic in light of what has been profoundly defined and relate to what they know and what the new topic contains in order to achieve what they want to learn.

Sixth: Students consulted with what they learned: the possibility of applying subject information in their lives, in addition to asking additional questions related to the topic.

(Al-Ghamdi, 2010: 42)

Second: The Tendency

Most educational and psychological specialists emphasize the importance of forming the scientific tendencies of learners and developing them, as it is one of the main aims in teaching science, and because it raises interest and scientific tendency for them, therefore leads to their effective participation in the teaching process, which leads to an increase in their speed in learning and retaining the learning material they have for a long time. And the learner is able to memorize subjects that are associated with little or much with his tendency or satisfy his needs, because it gives him an impetus to learn and works to preserve the learned experiences, so teachers in general and science teachers in particular are responsible on discovering the pleasures and its development by directing them to the types of activities that satisfy their tendencies (Al-Wakeel and Hussein, 2001: 46). The tendency is an important pillar of the personality of learners, which has taken a large part of the tendency of educators and specialists, as it was described as the response of the learner accompanying his attention and expressing cases of love, hate or desire towards a certain thing or interest in a side, which is a psychological aim that focuses attention on the specific subject and appears through the test and the attitudes of the learner, there are several types of tendencies which are as follows: -

- 1- The tendency that an individual expresses verbally, where the individual expresses his tendency or alienation from an activity or work that he says he loves or tends to.
- 2 - The apparent tendency, which is evident from an individual's taking a job.
- 3- The tendency measured by referendums, which refers to a number of referendums that revolve around some aspects of the activity in which there is some similarity between them.
- 4- The tested tendency, which is the objective measured tendency, in order to distinguish between them and the lists that depend on personal or self-assessments.

(Fawzi, 2001: 175)

The beginning of the formation of tendencies in the learner can be revealed by achieving the following behavioral manifestations:

- 1- The learner's passion for exploring scientific issues and his interest in scientific news.
- 2- Free expansion in scientific readings.
- 3- Learner participation in scientific fields.
- 4- He joined scientific activity societies in the school or others.
- 5- Practicing hobbies.
- 6- His attempt to collect tools that could be used to conduct some experiments in his home.
- 7- His tendency to stay in the school laboratory for a longer time .
- 8- His participation in the scientific activities available in the school.

(Atallah, 2001: 193)

Related Studies :

First: Study (Amr, 2006)

The study aimed to know the effect of the strategy of activating the previous knowledge on reading comprehension among a sample of students with learning difficulties from the fourth grade level. The study sample consisted of (60) male and female students, as the experimental approach with partial control was used, the study tool was an achievement test to measure absorption readers, the results indicated the effectiveness of the strategy in improving comprehension reading among students with learning difficulties, and not observing the effect of student on assimilation. (Amr, 2006: 113)

Second: Study of (Al-Butti&Saad, 2010)

This study aimed at using constructive education and knowing its impact on the achievement of second-students mean and their tendency towards physics, the sample consisted of (47) students, the researchers prepared an achievement test of (40) items and a scale of tendency, the results indicated the superiority of the group that was studied according to the method of education constructivist on the group that studied the usual method in achievement variable and the tendency variable. (Al-Butti and Saad, 2010: 92)

Benefiting from previous studies: Previous studies have benefited the researchers in the following aspects:

- 1- Formulating objectives, selecting the sample and experimental design appropriate for the current study.
- 2- Making use of its tools in building the tools of this study.
- 3- Statistical methods used in group equivalence and results analysis.

Chapter Three

Methodology & Procedures

First: Experimental Design

The researchers chose the experimental design with two equivalents (experimental and control), the experiment group is the one whose students are studied according to the independent variable (the strategy of activating the

previous knowledge), the control group is the one whose students studied in the usual method , the dependent variable is the tendency towards physics, and the researchers have prepared a scale for this purpose .

Second: The research Community

The research community consists of all intermediate second-grade students in government day and secondary schools in the Qadisiyah Governorate Center for the academic year (2018-2019), represented in (82) schools, according to the statistics obtained by the researchers from the Planning Division / General Directorate of Education in Al-Qadisiyah.

Research sample

The two researchers chose the intermediate school of Makkah Al-Mukarrama contained four classes of second intermediate grade. Class (B) was randomly chosen to represent experimental group which has a number of students (41) students, and class (A) to represent the control group contained (42) students, thus the total of the research sample will be (83) students . Initially, after the students who failed, were excluded, as they numbered (14) students (8) of them are in the experimental group and (6) of them are in the control group , keeping them in their classrooms in order to preserve the school system and continue their education, as they have experiences on the subjects studied during the duration of the experiment, which may have an effect on the results, thus the sample of the research became (69) students, (33) students in experimental and (36) students in the control group.

Three - Equivalence of the two Research groups

1- *Age calculated in months*: The researchers calculated the ages of the students of the two groups by months, so the age mean of the experimental group students was (165.46) months with a standard deviation (4.75), and the age mean of the control group students (165.62) months with a standard deviation (4.82), when using (t-test) for two independent samples to know the difference between the ages of students of the two groups, the results showed that there were no statistical significant differences between the two research groups in this variable, as the calculated value of t was (0.12) which is smaller than the tabled (2) with a degree of freedom (67) at the level of significance (0.05), therefore the two research groups are equivalent in chronological age.

2- *Intelligence test scores*: The researchers applied the test (Al-Nabhan, 2018) consisting of (40) items due to its suitability for the level of the sample individuals, as well as it is codified on the Iraqi environment (Al-Nabhan, 2018: 149), it consists of four sections (verbal, mathematical, Logical, visual) and this is what distinguishes it from the rest of the tests. It can also be applied to large numbers at the same time. After examining the students ' answers, the scores mean for students of the experimentation group reached (23,63) degrees with a standard deviation (4,2), and the scores mean for students of the control group (24,41) degrees with a standard deviation (4,17), when calculating t-test refers that there are no differences at the level (0.05) as it was (0.77) smaller than the tabled value of (2) in degree of freedom (67) , this shows the equality of the two groups in the IQ test.

3- *The tendency towards physics*: The two researchers applied the tendency that was prepared for the purpose of equivalence only on 2/18/2019. After correcting the answers, the mean score for students of the experimental group reached (47,85) degrees with a standard deviation (10,46), and the mean score for students of the control group (45,64) degrees of standard deviation (11,31), and when calculating the t-test for two independent samples, it became clear that there were no differences at the significance level (0.05), as the calculated value (0.84) was smaller than the tabular value of (2) and a degree of freedom (67) This indicates that the two groups are equal.

The effect of experimental procedures

In order to protect the experiment from some factors that may have an impact on the dependent variable, the researchers tried to limit the impact of these factors on the course of the experiment and were represented by the following:

1- *Research Confidentiality*: The researchers did not inform the students about the nature of the task they are performing.

2- *Academic subject*: The two groups studied the same academic and representative subject (Unit 1- Movement And its laws and power, unit 2 - work, power and energy, unit 3 - wave motion, sound and light) from the second part of the science / physics book for the second intermediate grade, 2017).

3- *The teacher*: The teacher studied himself by teaching the two groups, because allocating a teacher to each group may lead to the interaction of this factor with the independent variable due to the difference in personality traits or the scientific level.

4- *Lesson distribution*: The two groups studied five lessons per week according to the weekly ration distribution schedule, as well as ensuring that the ration times for the two groups are close, so that there is no variation in the activity of the teacher and students of the two groups.

5- *Time Duration*: The time duration of the experiment was the same for the two research groups, which is eight weeks.

6- Classroom Environment: Each of the two groups was studied in one place, which is the school classroom.

Fifth / Research Requirements

1- Study subject: Before starting the experiment, the study subject that was taught in the second course of the academic year (2018-2019) was determined and the vocabulary of the curriculum was distributed to the prescribed weekly classes.

2- Formulating behavioral objectives: (127) behavioral objectives were formulated according to (Bloom) cognitive, as they were divided between three levels (remembering, understanding, and applying) were presented to a number of arbitrators specialized in teaching methods, and they were modified in the light of their observations and proposals, they were done adoption of an agreement percentage not less than 80% of the arbitrators' opinions, accordingly no objectives were deleted from it and the number remained the same, and thus the agreed behavioral objectives became distributed throughout the entire academic subject.

3- Setting daily lesson plans: (40) teaching plans were prepared for each group, which included plans for the experimentation group using the strategy, while the teaching plans for the control group included the usual method, and to ensure the validity of the teaching plans, a sample of each of them was presented to a number of specialists in Physics and its teaching methods have been modified in light of their opinions to take their final form.

Sixth / The Research Tool

Scale of Tendency Toward Physics

The scale was prepared consisting of (25) items with three alternatives to answer the items of the scale, which are (large, medium, and few), they were given grades (3, 2, 1), respectively, then the highest degree is (75) and less score is (25), and to make sumre of its apparent validity and the reliability of its items, the arbitrators' observations were taken and an agreement rate of (80%) was taken, then the scale was applied to aexploratorysample consisting of (50) students to verify the scale's validity, clear instructions, and calculating the mean response time for the scale. It reaches (20) minutes of vinegar the calculation of the response time of the first five students and the last five, and to verify the validity of its construction by finding the internal consistency of its items, correlation coefficients were calculated between the grades of each of its items and the total score for it using the Pearson correlation coefficient, as the correlation coefficients between each item and the total degree of scale (0.38-0.71) so all items are acceptable, and the test has an internal consistency, achieving the validity of the construction.

After check the answers of the students of the exploratorygroup and arranging them in descending order, higher (27%) of the grades were taken to represent the higher group and lower (27%) of the grades to represent the lower group to perform the statistical analysis of the grades and extract the following:

1- Discrimination of scale items: To calculate the discrimination of the tendencyitems, t-test was used for two independent samples to find the differences between the grades mean of students of the upper and lower groups, the results showed that the differences were significant for all items , thus all the items are distinctive.

2- The reliability of the scale: The reliability of the scale of the tendency towards physics was calculated using Cronbach's alpha, and the coefficient of reliability was (0.87). (Peers: 2006,29)

Seventh : Applying The Experiment

After the equivalence of the two research groups and the identification of behavioral objectives, the experiment was conducted on Tuesday, 2/19/2019, by teaching the students of both groups. The experiment ended on Sunday 28/4/2019, after that the tendency scale was applied on Monday 29/4/2019.

Eighth / Statistical Means

SPSS was used to calculate the percentage, mean , standard deviation, t-test for two independent samples, Pearson coefficient, Cronbach's alpha and the effect size equation (η^2).

Chapter Four

View and Discussing Results

This chapter includes the results of this research, analysis, discussion, interpretation, conclusions, recommendations, and proposals that were developed in light of their results as follows:

First: View the results

To verify the research hypothesis, the scores mean of students of the experimental group (54.5) and a standard deviation of (10), the scores mean of students of the control group (46.5) and a standard deviation of (11.8) were calculated, by using the t-test for two independent samples, it became clear that the difference between them statistically significance at the level (0.05), since the calculated value of t was (3.03) and it is greater than the value of the tabular t (2) with a degree of freedom (67), the null hypothesis was rejected and the alternative was accepted, which means the preference of students of the experimental group who studied using the strategy on control group students who have studied the usual method in the tendency toward physics, as shown in the following table :

The value of t -test of the difference between the scores mean for the experimental and control groups in the scale of the tendency towards physics

Group	N	Mean	Std. Deviation	t-test		Sig. Level
				value	tabled	
Experimental	33	54.5	10	3.03	2	0.05
Control	36	46.5	11.8			

Also, the effect size (η^2) of the strategy was calculated (0.12) which is an mean value according to a criterion (Christopher, 2006) (0.01 small, 0.06 medium, 0.14 large).

(Christopher, 2006: 403)

Second / Interpretation of the Result

The researchers showed that the strategic steps have a role in stimulating the student's mind and giving him freedom to review his previous information and motivate him to participate in the lesson and make him in a state of interaction with his colleagues to find out what he wants to learn from the material and evaluate his personal information and this interaction and harmony while explaining the topic increases the student's desire to learn his love for the subject, focus his attention, and increase his tendency towards it by linking his information with new information to organize his knowledge structure.

Third: Conclusions

Upon the research result, the researchers concluded effectiveness of the strategy in the students' tendency towards physics.

Fourth: Recommendations

The researchers recommend that physics teachers should be defined and trained on strategy by engaging them in training courses for their apparent impact on the tendency towards material.

Fifth: Proposals

The researchers suggest conducting a number of studies and scientific research using the strategy with other dependent variables such as problem solving, critical thinking and others and with other stages and subjects.

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