Research Article

Physical problem-solving skills of students of the second vocational grade and their relationship to mental capacity

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Abstract

The aim of the current research is to reveal the skills of solving physical problems among students of the fifth vocational grade and their relationship to their mental capacity, the research sample consisting of 200 male and female students of the second grade of vocational education has been selected at the state industrial schools in the district of Mosul Governorate.

A physical problem-solving skills test was built into 23 items divided into five physical problem-solving skills, a ready-to-measure measure of mental capacity was selected and the psychometric properties of the two tools were verified, the research tools applied to the specified sample at the end of the first course of the 2020/2021 academic year, and under the supervision of the researchers.

After analysing the results, it became clear that there was a high and positive correlation between physical problem solving skills and mental capacity in the second vocational students, and that gender had an impact on the level of physical problem solving skills and mental capacity scores and for the benefit of females.

In the light of the results of the research, a number of recommendations and suggestions were made.

Keywords: problems-solving skills, mental capacity, vocational education

Introduction

Physics is one of the pillars of the natural sciences and is the basis of many other sciences concerned with the study, analysis interpretation and investment of natural phenomena, Physics has a significant impact on scientific and technological progress. Because of the importance of this science, States have been interested in teaching it within their school curricula, because physics includes abstract concepts, laws, theories, mathematical relationships, physical problems, and deductive questions, the flowing, extensive and complex information causes exhaustion and stress to the mind, this has made it difficult for students to understand this subject, especially since some teachers still use traditional teaching methods, this has adversely affected students' academic achievement.

Therefore efforts must be redoubled to improve students' attainment, develop their skills to solve the physical problem, facilitate the difficulties encountered in solving the problem, and take into account the varying mental capacity of students to reduce the effort on the mind and the ease with which information is communicated to learners, which in turn may be reflected positively in students' performance to better solve physical problems.

Research Problem

By examining the highest number of studies on the problem of students' low attainment in physics and their lack of motivation towards the subject, including the study (Al-Bawi, 1987), the study (Al-Emadi, 2001), the study (Al-Tahan, 2003) and the study (Hamash, 2004), there is a decline in students' attainment in physics, among other reasons: Their cognitive storage weaknesses, significant weaknesses in physical problem-solving skills, low motivation for learning in physics, and in a study (Belikov, 1989) it was stated that although students had theoretical information about physics, they could not solve physical problems as the student did not know where to start with the solution and what law was appropriate to the problem (Belikov, 1989. 10)

According to the researchers, students' ability to solve problems was and still is substandard because they faced few real problems (relevant to their daily lives) during their studies, as the teacher's focus was not on providing them with problem-solving skills but direct applications of laws.

Mental capacity is one of the factors affecting an individual's ability to learn, and any exhaustion of mental capacity or overloading it is one of the important factors that cause difficulties in learning, as it results in an increase in the load on the mental capacity of learners, and this in turn causes a failure to solve the problems facing learners on the contrary, storing information in memory and retrieval when needed contributes to the learner benefiting from the largest number of stored information and investing it in the educational process.

From the experience of researchers in teaching physics, and through the exchange of views with parents and colleagues from physics teachers, it was found that there is a clear weakness in the students' achievement of physics in general and the skills of solving physical problems in particular, especially since they are taught in English symbols and terms.

Most of the teachers agreed that physics is one of the important subjects that students study in the fifth vocational stage because it contains information, relationships and laws that are closely related to our daily lives, as well as explaining most natural phenomena.

And based on what studies have shown, including Higgins, 2006, that some structural variables of the same problem are among the factors that limit the individual's ability to solve the problem. And mental capacity is an influential factor in how to deal with knowledge and information, where there is a type of cognitive capacity in which individuals differ clearly, and Lim (2006) indicates that any exhaustion of mental capacity or overloading it is the common factor among the factors that cause the difficulties that learners face during their studies, in terms of how information is stored in memory, how stored information is transmitted, and how to retrieve it to be used again in learning and problem solving, and thus increasing the load on the mental capacity of the learner results in a decrease in performance and failure to solve problems.

The physical problem represents a scientific problem that the student is required to solve, but all the studies that have dealt with the solution of the physical problem did not pay much attention to the role of each of the students' mental capacity and the structural variables of the problem itself.

Therefore, the researcher believes that it is necessary to search for the relationship of the student's skills to solve the physical problem with his mental capacity, especially since - within the limits of the researcher's knowledge - there are no similar studies.

Therefore, the problem of the current research is limited to the following question:

What is the relationship between the skills of solving physical problems among students of the fifth vocational with their mental capacity?

Research Importance

The content of physics curricula is one of the curricula content that is developing tremendously, and this development is reflected in the students' ability to understand the world around them, by providing answers to essential questions regarding students' understanding of what is around them. (Maqadisi, 2002:5).

Problems form an important part of physics, and solving them is one of the important mental stimuli in studying the subject, as it helps students improve their mental abilities and develop their ability to solve problems, which is one of the important goals that the school curricula aspire to (Al-Ani, 1996: 19), Also, solving physical problems is one of the most important topics that preoccupied researchers in the field of physics teaching and those interested in it and its teaching methods, and the development of physical problem solving skills occupies an important aspect in modern trends in physics teaching, which is one of the main objectives of the British Nuffield Physics Project and it is a mental activity the high level that requires the learner to have high thinking skills (Al-Sayed, 1997: 95).

Therefore, the teacher should teach his students how to solve problems, not solve them for them, because solving physical problems does not lead to learning whose effect can be transferred to new learning, and students may not be able to solve new problems themselves (Scandura, 1978:9).

Perhaps the students' ability to solve the physical problem varies according to the amount of mental capacity they have, because the mental capacity represents the maximum number of cognitive units or mental schemes that are

processed through memory at one time while performing a specific performance or solving a problem, the mental capacity of the learner is related to his ability to remember information and process it at the same time to come up with responses related to a particular educational situation, if he is given certain experiences and he does not have in the long-term memory related previous experiences, then the mental processing of the presented experiences is difficult to derive real responses to them (Afanah and Youssef, 2009, 24), so he is unable to receive external stimuli and obtain a set of information that be able to process and preserve it (Gray, 2002, P; 33)

If the mental capacity of the learner limits his ability to learn and solve problems, then it thus reflects the extent of his ability to process information and interact with educational situations, which results in an increase in the load on his mental capacity, which leads to a decrease in performance and failure to solve problems, and expanded theories Cognitive reason to search for everything related to the means and strategies that worked to overcome quantitative limitations such as the strategy of gathering, focus, attention and mental schemes (Turkington, 2004, 123).

In order to increase and activate the mental capacity of the learner, the teacher should urge the learner to organize his experiences according to a certain characteristic that helps him remember information through cognitive organizations stored in memory from real experiences, and thus the possibility of identifying new experiences as a result of this interaction becomes part of the stored hierarchical structure. (Qatami and Qatami, 1998: 171)

The importance of the research is:

The importance of revealing the level of problem-solving skills among students of vocational education, as they are among the objectives of teaching physics.

The importance of revealing the extent of the mental capacity of students.

- The importance of revealing the relationship of physical problem solving skills to the student's mental capacity.

-The results of the current research may draw the attention of those in charge of the educational process to build and design the content of physics curricula when physical problems are included in the textbook quantitatively and qualitatively.

-Directing the attention of physics teachers to take into account the mental capacity of the student as an influential factor in how he deals with knowledge and information.

-It is the first research to the knowledge of the researcher that deals with physical problem solving skills and their relationship to mental capacity.

The researcher hopes that the results of this research will shed new lights on the teaching-learning process, and open new areas for researchers to research and investigate the causes and factors behind the difficulties in learning physics, especially physical problems.

Search aim

The current research aims to reveal the level of physical problem solving skills of second vocational students and their relationship to their mental capacity by answering the following questions:

1- What is the level of physics problem solving skills possessed by the second vocational students?

2- What is the level of mental capacity of the second vocational students?

3- What is the relationship between the skills of the level of solving physical problems and the level of mental capacity of the second vocational students.

Research Limits

The current research is limited to the following:

1- Students of the second vocational grade in the morning vocational schools in the governorate of Mosul (the center) for the academic year (2020-2021).

2- Chapters of the Physics Book for the Fifth Vocational Grade (3rd Edition) for the year 2018.

Determination of Terms

1- Problem-solving skills: defined by:

- (Al-Sayyid, 1997) as: “the set of mental processes necessary to solve problems, and it is measured by an achievement test in physics problems” (Al-Sayyid, 1997: 107).

- (Zaytoon, 2001) as: “a set of special mental abilities and processes necessary to apply problem solving correctly” (Zaytoon, 2001: 231).

2- Mental capacity: difined it

(Saraya, 1995) as “a hypothetical mental capacity within the memory that varies from one person to another, and is determined by a certain number of information and is responsible for preparing the new information to merge with the previous information in the individual’s cognitive structure, which leads to the occurrence of a new mental work” (Saraya, 1995, 14).

* The researcher agrees with the theoretical definition of (Al-Rubaie, 2012): “It represents the saved stock of potential energy that can be allocated to increase the effectiveness of the information units and mental schemes that can be dealt with or processed and interpreted, which reflects the storage capacity in taking information and eating it simultaneously while performing mission” (Al-Rubaie, 22, 2012).

It is defined procedurally as: "the total score that the students will obtain in the research sample by answering the scale that includes items related to visual number series, optical letters and picture cards, and the perception in dealing with information and mental schemas by choosing the correct alternative from among the available alternatives in the scale."

3-Vocational education: defined by the Iraqi Ministry of Education as: schools concerned with educating middle school graduates during a specific period of time of three years, during which the student is exposed to educational, training, vocational and general programs that qualify him to practice one of the agricultural, industrial or commercial professions.

As for the procedural definition: it is the industrial education that students acquire in the fifth vocational grade, and which prepares them for a specific specialization.

Theoretical background: The following is some theoretical information about the research variables:

1- Problem solving skills

Problem solving skills are “the learner’s ability to identify the data and what is required of the scientific problem and use his mathematical skills to reach possible solutions” (Afaneh, 2000: 75),

He defines it (Zaytoon, 2001) as: “a set of special mental abilities and processes necessary to apply the solution of problems correctly” (Zaytoon, 2001: 231), and defines it (Talaba, 2007) as: “the apparent or written procedures that the student implements to reach the solution.” Talaba (2007: 174),

And (Al-Hashimi and Taha, 2008) defines it as: “The high ability to perform a complex act that enables the learner to do problem solving in an elaborate manner” (Al-Hashimi and Taha, 2008: 23).

Based on the foregoing, the researcher finds that solving the problem is a mental skill that requires the student to use the learning aspects of facts, concepts, relationships and laws in formulating and testing hypotheses.

The problem is an essential part of the content of physics courses is the application of what the student has learned in new situations aimed at developing his thinking in different situations, and this requires practicing a set of skills and obtaining information that helps him to practice these skills, which are called physical problem solving skills. (Al-Radhi, 2012, p. 6 11)

Muhammad Ali (2008, p. 258-259) identified the skills needed to solve physical problems as follows:

• Formulate the problem in the student's style.
• Determining physical quantities and their symbols and units of measurement.
• Translate the question into a simplified diagram.
• Determining the data and what is required in the matter.
• Determine the law used to solve the problem.
• Determine the intermediate laws needed to solve the problem.
• Compensation in laws, mathematical operations and finding a solution.
• Validate the solution.
• Determine the physical meaning of the final product of the problem.

Classification of physical problems:

Physical problems are classified into two types:

• Stereotypical problems: these are familiar stereotypical problems with a specific end that require direct application to the law, thus not developing students' thinking skills.

• Atypical problems: those open-ended research problems that do not view physics problems as the application of routine mathematical processes for final output; But it focuses on the development of students' skills to solve physics problems and the physical meaning of this product and contributes to the development of students' thinking skills, which is the focus of recent trends in physics teaching.

Recent trends in physics teaching focus on problems that need innovation (atypical).

Therefore, physics problems should not be seen as routine mathematical operations to obtain a final result, but rather should be viewed as a process that needs training students on many strategies that develop their physical problem solving skills (Mohammed Al-Sayed Ali 2008, p. 256).

The teacher's role in developing problem-solving skills:

The teacher has an important role in developing the problem-solving skills of the learners, and it is the teacher who determines the method and strategy that suits the student's mental level, and matches the skills to be developed, Arefej and Suleiman (2010: 190) have indicated a set of instructions that the teacher should follow to develop students' ability to solve problems. These instructions are:

1- Helping them to have a spirit of thinking, meditation and patience.

2- Encourage them to reformulate the problem in their own language.

3- Urges them to bring up information and ideas that help them solve the problem.

4- It helps them to draw the problem and clarify it in figures, or create a model that clarifies it.

5- It helps them to try more than one solution to reach the desired solution.

6- It helps them by hinting or referring to the most prominent relationships and theories that the problem is related to, and choosing what suits them.

Through the previous presentation, we conclude that problem-solving skills help the learner to think and research in an organized scientific manner that helps him find the relationship between the data and the desired, and thus find the appropriate solution to the problem he faces, as this problem represents a state of mental imbalance, and the teacher has a role to play Significant in transferring the learner to a state of mental stability by using appropriate educational props.

2- The concept of mental capacity: It is a factor that participates in the process of processing information and operating it within memory, which is mental capacity, as it builds the internal representation of the stimulus that is learned, so its efficiency decreases when it is loaded with a large amount of information that exceeds its capacity. (Al-Dardir and Jaber, 2005, 150) In order to activate the mental capacity of the student, the short-term memory must be linked with sensory experiences of various types, so that the student finds characteristics and symmetry of those experiences in the long-term memory and then outputs them to the short-term memory to become ready to interact with sensory experiences, and from here the student must be provoked with sequential experiences, so that he can deal with it on real foundations and give meaning to him, which leads to an increase in the mental capacity of the student through the acquisition of more comprehensive and organized concepts. (Afaneh and Youssef, 2009, 25)

Al-Rimawi stated that the human capacity does not exceed 7 cognitive units of information, and this determines the reality of individual differences, as the immediate and direct memory has a very small capacity, while the short-term memory has a greater capacity, but it is very limited, and finally the long-term memory has a relatively unlimited capacity. . (Al-Rimawi et al., 2008, 275)

Sternberg also pointed out that working memory is part of long-term memory, as it carries with it information retrieved from long-term memory and processed to be stored in a temporary special area, and it also includes short-term memory that receives information from sensory memory. (Al-Atoom, 2005, 130)

There is also a positive correlation between the working memory capacity of the student and at any level of encryption, and the role of the strategy used in the processing level and memory capacity should not be overlooked (Randall, 1992, p:99), and (pascual-Leone, 1970) shows that there is a relationship between Mental capacity and cognitive methods, as it is the maximum number of active mental schemas that the examinee classifies in his memory while performing (solving) the task (the problem), and therefore it is responsible for putting information for a specific time and performing some operations using this information. (Pascual-Leone, 1970, 306)

Mental capacity is also one of the important concepts in the cognitive field, as it is concerned with processing information, preserving it, and the possibility of retrieving it and employing it in future and immediate solutions,

mental capacity represents a hypothetical mental area in which a fusion is formed between the incoming information and that stored in the long-term memory, and thus the matter is done reciprocally (Saray, 2007: 205).

And amplitude is not something abstract or absolutely fixed for different individuals at different ages under different circumstances, and that there are multiple factors that affect mental capacity, such as the quality of coding, emotional factors and meaning, Miller used the term Chunk to describe the basic unit for organizing knowledge or information (1998: 359–361, zayat). Mental capacity is one of the main factors in information processing, as it constitutes the maximum number of cognitive units and mental schemas that an individual can deal with at one time during the processing process, therefore, the increase in the amount of information will lead to an increase in the burden on mental capacity, but its efficiency can be increased by adopting the organization of information and compiling it in the form of meaningful information, which reduces the cognitive load and thus facilitates the learning process (Al-Mazrou, 2005: 17).

Case (1974) sees that mental capacity is a structure known as the field of executive processing, which is equivalent to mental work, and is divided into two parts: the operational space that processes modern schemes, and the short-term storage space that remains active to retrieve information again when needed and he calls it (Case) in executive processing site.

As Just & Carpenter (1992) pointed out in their constructivist theory of mental capacity, it is the maximum amount of the activation process inherent in working memory, which varies among individuals in storage capacity, and therefore is responsible for the qualitative and quantitative differences in all forms of thinking and problem solving among university students, while for younger ages, working memory plays the most prominent role in storing intermediate and final products to be differentiated in the form of lexical, visual and structural representations of words and sentences for working memory. (Just & Carpnter, 1992, 124-149) According to this, cognitive theories have sought to search for means and strategies that work to overcome the limitations of processing capacity, such as the strategy of aggregation, repetition, focus of attention, mental schemas, and brevity (Otoum et.al, 2011: 192). The Habib 2015 study conducted on high school students in Iraq concluded that the correlation between learned helplessness and mental capacity is not statistically significant (Habib 2015).

❖ **Previous studies:** Some studies related to the research variables will be reviewed

- **Suleiman's study (2014):** It aimed to know the relationship of mental capacity with self-concept and decision-making among middle school students.

- **Emretson study**: (Emretson, 1995) the study aimed to know the relationship between mental capacity, working memory, and performance strategies on problem-solving tasks.

Research Methodology and Procedures

The procedures for selecting the research sample, preparing and applying tools, and determining the statistical methods used in data analysis will be presented as follows:

First: Choosing the research method

The descriptive relational approach (the type of correlational studies) was adopted, as the approach is appropriate to the nature of the research objectives

Second: Define the research community

The current research community has been identified with all the second vocational students in the vocational high schools affiliated to the Nineveh Education Directorate/Vocational Education Department, in the Nineveh Governorate Center for the academic year (2020-2021) AD.

Third: Research Sample

The research sample was randomly selected from the research community with an average of (50-150) male or female students from each school, as shown in Table (1).

Table (1) The research sample distributed by schools

Nineveh General	**Schools**	**total**

Directorate of Education/ Vocational Education Department	School name	number of male students	number of female students	
	Umm al-Rabeein mixed vocational high school	20	15	35
	Mosul Industrial high school	25	0	25
	Nineveh vocational high school	15	0	15
	Al-Intisar Vocational high school for Girls	0	35	35
	Al Jazeera vocational high school	20	0	20
	Sumer evening vocational high school	20	0	20
		100	50	150

Fourth: Research tools: The physical problem solving skills test was built, and the mental capacity scale was built according to the following steps.

1 - Physical problem solving skills test: One of the requirements of the current research is to build a test to measure the physical problem solving skills of the students in the research sample.

The test of physical problem solving skills was built according to the steps:

A - Identify five basic skills.

B- Determining the number of test items for each skill, as shown in Table (2).

Table (2) Table of specifications for the physical problem solving skills test

Skill	The number of test items	percentage %
Determine the data and what is required	5	21.73
drawing skill	4	17.39
Standardization of units of measurement	4	17.39
Write the user's law	5	21.73
Answer the questions and make sure that the solution is correct	5	21.73
Total	23	100

C- Formulating the test items of the type of essay questions.

D- Confirming the validity of the test by submitting it to a committee of experts.

E - The exploratory application on (40) students from the research community:

To calculate the coefficients of distinction and difficulty for the test items, all of which were within the accepted coefficients

- Calculating the stability of the test using the alpha-Cronbach equation, and the stability value reached (817.0), and this value is considered acceptable.

Thus, it became valid for application in its final form, and it consists of (23) items, with a total score ranging between (0-100) and a hypothetical average of (50).

Mental capacity scale: After reviewing the literature and previous studies related to mental capacity, the mental capacity scale prepared by (Al-Rubaie, 2011) was chosen because it is modern and suitable for the Iraqi environment.

The scale with the procedural definition was presented to a group of experts specialized in the field of teaching methods of physics, educational psychology, measurement and evaluation to ensure its validity for application and suitability of students and taking into account the age difference as well as the appropriateness of the items in the final formula, all experts agreed on the validity of the scale, with a slight modification to the items linguistically.

The scale consists of (30), and the total score of the scale ranges between (0 - 75) and an arithmetic mean (37.5).
The scale was applied to a pilot random sample, consisting of (40) male and female students from vocational schools in the Mosul Center for:
Make sure the items are clear.
- Calculating the stability of the scale using the alpha-Cronbach equation equal to (0.817)
Thus, the scale is ready for application.

❖ **Application of the final test and standards:**

In order to preserve the integrity of the descriptive design, and to reach its results, the researcher performed the following procedures:
1- The researcher chose all vocational schools in Mosul (the center) as shown in Table (1)
2- The two tests (physical problem solving skills and mental capacity scale) were applied after agreement with the administration and teachers of the subject and under the supervision of the researchers, with all the necessary tools to implement the two tests (such as pens, a ball, a stopwatch, a display screen DATA SHOW)), a computer laptop-type (msi)
3- After the tests were completed for each school separately, the papers were collected and corrected, and the total score for each student was calculated, and arranged according to schools.
4- The researcher arranged the lists of students' grades according to gender, provided that each student has two grades on the (physical problem solving skills test, mental capacity scale) and the grades of students who did not complete all tests were excluded and that the final sample listed in Table (1) represents all students who passed both tests.

❖ **Statistical means:** The researcher used the statistical methods (alpha Cronbach's equation, item difficulty calculation equation, item discrimination equation, Pearson correlation coefficient equation).

Presentation and interpretation of results

Since the current research aims to reveal the physical problem solving skills of the second vocational students and their relationship to their mental capacity.
The obtained results will be presented and interpreted according to the research questions, as follows:
1- Regarding the first question, which states ((What is the level of physics problem solving skills possessed by the students of the second vocational)?
Through the results presented in Table (3), it appears that the arithmetic mean of the scores of the research sample students on the proposed skills test to solve the physical problem is equal to (50.71) and with a standard deviation of (10.81), and that the arithmetic mean of the scores of the research sample students on the test of solving the skills of the physical problem is equal to (65.86).) with a standard deviation of (19.68), and that the arithmetic mean of the scores of the students of the research sample as a whole on the test of physical problem solving skills is equal to (54.50) and with a standard deviation of (15.04).

Table (3) the arithmetic averages of the sample scores on the problem-solving skills test

The sample	number	arithmetic mean	standard deviation
female students	50	65.86	19.68
male students	150	50.71	10.81
students	200	54.5	15.04

By comparing the results, we find that the sample of female students has higher physical problem solving skills than the male sample, and that the level of achievement of male and female students is higher than the hypothetical level of the test of (50).
This is due to the fact that the students have a good level of skills necessary to solve the physical problem and for the benefit of females
2- To answer the second question, which states ((What is the level of mental capacity of the second vocational students))

From the data presented in Table (4), it appears that the arithmetic mean of the research sample's scores on the mental capacity scale is equal to (53.79) and with a standard deviation of (9.25), and that the arithmetic mean of the research sample's scores on the mental capacity scale is equal to (55.08) and with a standard deviation (11.49) And the arithmetic mean of the scores of the students of the research sample as a whole on the mental capacity scale is (54.115) and with a standard deviation of (9.86).

Table (4) sample data on mental capacity test

The sample	Number	Arithmetic mean	Standard deviation
female students	50	55.08	11.49
male students	150	53.79	9.25
students	200	54.12	9.86

By comparing the results, we find that the sample of female students has a higher mental capacity than the male sample and a lower level of dispersal, and that the level of mental capacity of male and female students is higher than the hypothetical level of the scale, which is (37.5).

This is due to the fact that the students have a good level of mental capacity and in favor of the females because of their ability to prepare and store well.

3- To answer the third question, which states ((What is the relationship between the level of physical problem solving skills and the level of mental capacity among students of the second vocational)), and by using the equation of the Pearson correlation coefficient, the correlation coefficient was calculated between the results of the students on the test of physical problem solving skills and their results on the capacity test mental as in Table (5).

Table (5) Correlation coefficients between the problem-solving skills test and mental capacity

The sample	The value of the correlation coefficient of problem-solving skills and mental capacity	relationship type
female students	**0.894[1**]**	**very high and positive**
male students	**0.789[2**]**	**high and positive**
students	**0.760[3**]**	**high and positive**

From Table (5), it is clear that the relationship of the physical problem solving skills of the second vocational students with their mental capacity is high and positive, in favor of females.

The researchers attribute this result to the fact that students, in general, males and females, have approximately the same level of mental capacity and skills necessary to solve physical problems, because their main goal is to excel and to pass the school stage successfully, but there are some individual differences between them and in favor of females.

Conclusions: In light of the results of the research, it was concluded that there is a high and positive relationship between the skills of solving physical problems and mental capacity among the students of the second vocational, and the relationship is very high and positive in favor of the students, and it was concluded that mental capacity has an important role in the skills of solving physical problems, and that gender has an impact on the level of degrees of mental capacity and in favor of females.

[1**] Correlation is significant at the 0.01 level

[2**] Correlation is significant at the 0.01 level

[3**] Correlation is significant at the 0.01 level

Recommendations: Based on the results and conclusions that have been reached, the researchers recommend the following:

1- Focusing on the problem of physical problem solving skills for student's at all academic levels, especially second-year vocational students in the Vocational Education Department.

2- Taking into account individual differences for students in the rise and fall of mental capacity has a great role in storing information and recalling it when solving problems.

3- Directing the attention of physics teachers to take into account the mental capacity of the student as an influential factor in how he deals with knowledge and information.

4- The training courses prepared by the Department of Preparation and Training in the Ministry of Education for physics teachers include strategies that develop skills for solving physical problems.

Suggestions: To complement this research, the researchers suggest the following:

1- Conducting similar studies to the current study to reveal the relationship of physical problem solving skills in different academic levels and other variables.

2- Studying the relationship between mental capacity and some teaching strategies and the ability to solve physical problems in the different stages of education.

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