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# **The extent of physics teachers' awareness of higher-ranking thinking skills and its relationship to the preventive awareness of their students**

**ASS. Prof. Samaa Ibrahim Abdullah**

Al-Mustansiriya University, College of Basic Education

Email: [Samaibrahim1980@gmail.com](mailto:Samaibrahim1980@gmail.com)

**Salam Shakir Aajil Alzaydi**

Al-Mustansiriya University, College of Basic Education

Email: [salamshakir95@gmail.com](mailto:salamshakir95@gmail.com)

**Abstract**--The current research aimed to identify the extent to which physics teachers are aware of high-ranking thinking skills and its Relationship to the Preventive Awareness of their Students, The research sample consisted of (100) physics teachers who study in the middle school day for boys and their Students they numbered (4000) students In the schools of Shatra District Education Directorate of Dhi Qar Governorate \ Iraq, The researchers used a tool to measure the higher-ranking thinking skills of physics teachers "research sample" and test to measure preventive awareness of their students, It was presented to a group of arbitrators, and its psychometric properties were extracted, The researchers used a set of statistical methods, including the one-sample t-test, the Pearson correlation coefficient, and the Alpha Kron-Bach equation, The results showed the availability of high-ranking thinking skills among physics teachers, and the preventive awareness of their students, The research came out with a set of recommendations and suggestions.

**Keywords**---awareness, skills, thinking, high-ranking, physics, preventive.

## **Chapter One: Introduction to the Research**

Research problem

The human being is the producer of information and knowledge, especially at the present time, As the sciences multiplied in an amazing way, and in ranking for a

person to succeed and progress, he must look to this new information and learn how to obtain it, And how to treat it as well as organize it so that his thinking does not remain static so as not to constitute a burden on him and a difficulty in facing problems, whether in the educational field within the school or in other life situations.

Physics is one of the basic and applied natural sciences, and its development has effectively contributed to the formation of a clear scientific curriculum as it is one of the important study subjects related to the student's life and society, and that teaching is not just transferring knowledge only, but rather it is a mental, skill, emotional and social construction, This requires the preparation of qualified teachers, and modern trends emphasize it in the educational process, despite the efforts made by the Ministry of Higher Education to build educational cadres, but there is laxity and failure in teaching and the failure to use modern methods and thinking skills as a study (Al-Tamimi, 2011).

In recent years, many educators have emphasized the importance of teaching high-ranking thinking skills and physical information processing skills, Also, teachers tested this pattern, which is a targeted educational output, and that teachers are responsible for encouraging students to work within high levels of thinking, At all grade levels, students are taught these skills, as they enable them to interact with the real world environment, Effectively in ranking to solve daily problems, modern curricula and educational policies in many countries direct minds towards the use of these skills, It has become a goal with which both the learning and teaching processes must end (Al-Atoum et al., 2007: 219).

What the researchers felt was the increasing number of health problems that may be due to the student's lack of knowledge of proper health behavior and the prevention and prevention of diseases, It becomes more dangerous when he has no awareness of these problems and an appropriate way to confront them, Rather, it is a reason for its spread at times, due to his wrong behavior in increasing material and human losses (Al-Ahdal, 2006).

This is reflected in the student's information, skills and attitudes related to health and environmental issues and correct preventive practices, Educational institutions at all levels did not realize the necessity of accommodating the so-called preventive awareness (Al-Ahmadi, 2003: 34).

Among the researcher's frequent visits to schools and his discussion with physics teachers, he noticed the lack of focus on the concept of preventive education in the school curricula, and this is confirmed by the findings of the study (Al-Sudani, 2008: 30) in its results.

Therefore, the researcher discussed the students and felt the lack of information about many health issues and the lack of health awareness of how to deal with materials in laboratories, A questionnaire was conducted to (100) students of the fourth scientific grade in the Directorate of Education of Dhi Qar / Shatrah District, and the results resulted in the following:

- (70%) of them confirmed their lack of knowledge of preventive awareness.

- (30%) indicated that there is some environmental information about preventive awareness, which is most often acquired from the environment and the media and is not obtained by the subject teacher,

Accordingly, the research problem is defined in the following question:

**What is the degree of physics teachers' awareness of higher-ranking thinking skills and its relationship to the preventive awareness of their students? research importance :**

Those concerned with educational affairs bear a great responsibility in keeping pace with the characteristics of the scientific age and the explosion of scientific knowledge, As one of the main means of coping with these challenges is education as the pillar on which these countries were built, the basic rules for the process of progress and development (Al-Najdi and others, 1999: 7).

Teaching plays a major role in shaping students' behavior and determining the fate and future of countries. It has also become one of the main inputs to meet the requirements of comprehensive development in its social, cultural and economic dimensions. Because of this importance of education, the discussion of its issues has become an ongoing process (Al-Khalili and others, 1996: 60).

Physics is one of the important sciences that has an impact in our lives and helps simplify the nature of the complex world in which we live, as its study makes students feel and realize what is in their environment and that it satisfies their inclinations and desires for knowledge, experience and exploration. Creative helps to interpret information and reach the right decisions (Zangana, 2008: 5).

In recent years, many educators have emphasized the importance of teaching high-ranking thinking skills and physical information processing skills, Also, teachers test this pattern, which is a targeted educational output, and they are responsible for encouraging students to work within high levels of thinking, At all grade levels, they are taught these skills that enable them to interact with the real world environment, effectively in ranking to solve everyday problems, In modern curricula and educational policies in many countries, minds are directed towards the use of these skills, as they set it as a goal that must be achieved by both the learning and teaching processes (Al-Atoum et al., 2011: 219).

The teachers' possession of physical information processing skills and high-ranking thinking skills enable them to interpret information, understand and analyze ideas and concepts, By sorting, classifying, arranging and comparing, then understanding the partial and total relationships, as well as linking causes with results, and helping them to form a social, educational and psychological atmosphere that is appropriate for effective learning, And the problems of daily life that are complex usually require complex solutions, as these solutions are obtained through high-ranking thinking skills, and this helps direct the student in the right and successful direction (Khatab, 2004: 9-10).

We must also reconsider the development processes that are difficult to achieve without taking care of the student's life, through human development that is concerned with several aspects, including social, health, educational and cultural,

To form a society with diverse energies that contribute as much as he can to stability and comprehensive continuous development by providing him with the right knowledge, attitudes, skills and behaviors that enable him to build a new view that guarantees the protection of his environment, health and continuity of life (Abdul Masih, 2004: 121-122).

The goal of preventive education is to educate students and develop them in a preventive way to confront these dangers, to preserve their health, and to provide them with the ability to act according to an organized scientific manner in the face of any accidents or disasters that may arise, and to regulate the relationship between the student and his environment (Nur al-Din, 2000: 1).

In order to preserve the safety of the environment and the health of students and to prevent them from accidents or falling into the expected dangers and to develop their awareness of acting in an organized scientific manner in the face of any accidents or disasters that may arise (Abdul Salam, 2006: 363).

Paying attention to preventive awareness is an essential aspect in the life of every student in the community, as well as his success in changing many unhealthy behaviors and behaviors, and what we notice in our lives of great loss of life and health and environmental degradation indicates the low level of preventive awareness in the community this was confirmed by a study (Darwish and Tayseer, 2001: 44) and a study (Husam El-Din, 2000). Therefore, attention must be paid to developing preventive awareness, especially in the health and environmental fields.

**Through the foregoing, the importance of the research can be summarized in the following points:**

1. This research came in response to the recent trends in teaching and the scientific development taking place.
2. The use of higher ranking thinking skills can contribute to improving the teacher's acquisition of physical concepts.
3. The research provides teachers in the preparatory stage with a measure of higher-ranking thinking skills and the extent to which their students acquire preventive awareness.
4. This research is expected to shed light on preventive awareness and the importance of including physics curricula.
5. Research results, tools and steps for subject teachers for the purpose of developing its teaching.
6. The importance of the preparatory stage; As it represents an important stage in the educational stages, it prepares students for the university stage or for the business markets, as they go through a critical stage in various areas of growth.

**Research goal:**

The current research aims to know the extent to which physics teachers are aware of higher-ranking thinking skills and its relationship to the preventive awareness of their students. The goal of the research is achieved by answering the following questions:

- What is the degree of awareness of physics teachers about higher ranking thinking skills?
- What is the relationship between the awareness of physics teachers of higher-ranking thinking skills and the preventive awareness of their students?

### **Search limits**

The current research is limited to the following limits:

- 1- Secondary and preparatory day schools for boys affiliated to the Directorate of Education of Dhi Qar / Shatrah District.
- 2- The first semester of the academic year 2021/2022
- 3- a- Educationally qualified physics teachers (holding a bachelor's degree in education), who have served at least three years in teaching physics.  
b- School students of the research sample of students of the fourth scientific grade for the academic year 2021/2022.

### **Objective limits of measurement:**

- a- Awareness of physics teachers.
- b- The first six chapters of the physics book for the fourth grade of science (10th ed./2019), which are:
  - Chapter One (Main Concepts in Physics)
  - Chapter Two (Mechanical Properties of the Material)
  - Chapter Three (Static Fluids)
  - Chapter Four (Thermal Properties of Matter)
  - Chapter Five (The Light)
  - Chapter Six (Reflection and Refraction of Light)
- C- Preventive awareness is represented in the following areas:
  - cognitive domain.
  - Emotional field (scientific trends).
  - The skill area (mental skills).

### **Defining the terms:**

- ✓ **Awareness:** It was defined as “the first step in the formation of emotional aspects, including trends and values, and despite the fact that awareness falls at the lowest degree of emotional classification, it is often imbued with the cognitive aspect and means a student’s awareness of certain things in situations.” **(Shehata and Zainab, 2003: 239).**  
**Procedural definition:** "Understanding based on sensation and knowledge that helps to make decisions about a specific issue, and in the current study awareness is measured through the tool prepared by the researcher for the study".
- ✓ **Skills:** “The ability to perform with a high degree of efficiency, accuracy and speed” (Jaber et al., 1985: 45).  
**Procedural definition:** "Carrying out mental operations practiced by the teachers of the research sample and using them on purpose in processing information and data to achieve the desired goal".
- ✓ **higher ranking thinking:** "An independent thinking style that has characteristics that distinguish it from the patterns of normal thinking,

critical thinking, creative thinking, reflective thinking, and others” (Al-Atoum et al., 2011: 202).

**Procedural definition:** "A set of skills that a physics teacher uses in teaching physics to fourth-grade students, through which thinking is taught to them by including the scientific subject" .

- ✓ **preventive awareness:** "An emotional activity emanating from a student as a result of a reaction. This emotional activity is often imbued with cognitive aspects, not at the level of remembering, but at the level of awareness" (Bandari, 2002: 69).

**Procedural definition:** "Identifying the correct preventive practices through some diseases, disasters and environmental pollutants affecting health in ranking to reach a level of preventive awareness measured by the degree obtained by the fourth scientific grade students (research sample) in the scale".

## **Chapter two: Theoretical background and previous studies**

**Higher ranking thinking skills:** The cognitive trend is one of the most important trends in psychology that is devoted to understanding higher-ranking thinking, its skills, the methods and methods used in teaching and developing it, and how to deal with students according to their stages of cognitive development, It is one of the important educational dimensions of the process of learning and advanced education and falls within the higher levels of thinking (Resnick, 1987). It is clear from the foregoing that it is an independent thinking style that has characteristics that distinguish it from ordinary, critical, creative, contemplative and other types of thinking.

**Teaching higher ranking thinking:** Educators emphasize the importance of teaching high-ranking thinking skills and testing and preparing teachers for this type of thinking, as it is a targeted educational product. Educational policies and modern curricula are all geared in many countries that care about the minds of their teachers towards high-ranking thinking, and educational researchers point out that there is a group of Factors that develop this type of thinking include:

- Teacher preparation method.
- The nature of the exam and class questions.
- The nature and content of the curriculum.
- The quality of the classroom and extra-curricular activities.

( Limbach and Waugh, 2010 )

### **Models for classifying higher-ranking thinking skills:**

There are several models that have provided ratings for higher ranking thinking skills:

**Gagner's model:** In which he explained that skills begin with the formation of regular, successive ranks according to the complexity of skills, which include rules, cognitive skills, and problem solving, which may be simple or complex. He referred to the generalization that describes the relationships between concepts, which he called rules (de Bono, E.1976: 55).

**Haladina's Model:** In which he presented the complexity of thinking and learning trends by classifying thinking processes into four categories (understanding, problem solving, critical thinking, and creative thinking) that can be applied by

learning facts, concepts and procedures and applying those skills in content dimensions ( Friedman, 1992 : 43).

**Brunner's model:** includes active inquiry, inductive reasoning, discovery, and trends. He emphasized that the stages of knowledge development are not linear, and presented the curriculum as a spiral in which students refer to topics covered before and present them in a new context for learning. Brunner explained that thinking skills Higher ranking is achieved by engaging students with work and use of symbols and visual representations in physics (Bransford, J. ,1986 : 77).

**Preventive awareness:**

**Patterns of Preventive Awareness:**

It has become necessary at the present time for the educational system to protect students through the formation of trends, as knowing the causes and nature of common accidents in life is one of the effective means to resist them and reduce the material losses that result from them. It is the construction of the “safety trend” for students, which in turn represents the catalyst that emerges and is increasingly needed, which is safety information, and to achieve safety behaviors in the student. Attitudes are psychological and functional patterns (psycho-physiological) that require him to act in a certain way in a situation (Z.A. Khowaja, 2009 : 67).

In general, the goals of community preventive education are to preserve the student from:

- The intellectual influence that may occur as a result of foreign ideas and cultural invasion from within the community or as a result of openness to other societies that may differ in ideas and beliefs.
- Total dependence on the opinions of others and confinement to false ideas and adherence to them.
- Moral decay and collapse that occurs within the same family.
- Failure to resolve conflicts, frequent injustice, and increased behavior that leads to aggression.
- The difference and the wide chasm between the classes of society. (Al Jasser R, 2020 : 54)

**Elements of preventive awareness:**

In light of what has been presented, the elements of preventive awareness can be identified as follows:

- a- It is necessary to have a moderate amount of knowledge related to some of the health and environmental issues and problems we are currently experiencing, including some environmental information and concepts such as environmental pollution, desertification, viral hepatitis, and AIDS.
- b- Awareness of the effects of industrial activities on the environment and human health and awareness of the real or potential negative effects resulting from the interaction between man and his nature, with a sense of the importance of changing some of those activities and what are the possible alternatives for the activities of this interaction.
- c- Acquiring thinking skills and making appropriate decisions to solve some problems.
- d- A sense of responsibility that aims to reduce the risks that threaten human life and the environment.

- e- Developing positive trends towards the environment, such as preserving natural resources, rationalizing the use of various energy sources, encouraging environmentally friendly technology, and how to preserve human health in light of the changes taking place in the world and others.

### **Previous studies:**

Previous studies dealing with higher order thinking:

- 1- (Hussein, 2012) in Iraq, aimed to identify the level of availability of high-ranking habits of mind and thinking and their relationship to self-efficacy among students of faculties of education, The sample consisted of (400) male and female students (166) male and (234) female Random sample, The study tools were the Habits of Mind scale, the high-ranking thinking scale, and the self-efficacy scale, The results showed that a small percentage of the research sample possesses high-ranking thinking at a high degree, and that the vast majority of individuals have medium-level high-ranking thinking, while the rest of the sample members do not have this type of thinking.
- 2- (Tamimi,2010) in Iraq, aimed to Knowing "higher thinking skills and their relationship to mathematical achievement among students of teacher preparation institutes", The sample consisted of (254) male and female students who were randomly selected, The study tools were a measure of critical thinking A measure of creative thinking and achievement test, The results showed that there was a weakness in students' possession of higher-order thinking skills, and the relationship between higher-order thinking skills and mathematical achievement was a weak positive correlation.
- 3- (Jasem,2013) in Iraq, The study aimed to know the "communication skills and mathematical coherence and their relationship to high-ranking thinking among fifth-grade students of middle school", The study sample consisted of (115) female students who were randomly selected, The study tools were a test of communication and mathematical coherence and a test of high-ranking thinking skills, Statistical methods were used, including one-sample t-test, and Pearson's correlation coefficient, The results showed a statistically significant relationship between association skills, mathematical communication and high-order thinking.

### **Chapter three: methodology and procedures**

**Research Methodology:** The descriptive approach was adopted to achieve the objectives of the research, as it is one of the most common and widespread research methods, especially in educational research, works on the investigation of educational and psychological phenomena, as they exist in the present, with the aim of diagnosing them, revealing their aspects and determining the relationship between their elements. (Al-Zoba'i and Muhammad, 1981: 51), By classifying data and facts to reach generalizations about the phenomenon in question. (Atawi, 2011: 172).

**Research community :** The research included educationally qualified physics teachers who hold a bachelor's degree in the College of Education and whose service is not less than three years, who study the fourth scientific in secondary and preparatory day schools of the Directorate of Education in Dhi Qar, and their number is (135) teachers after deleting 3 teachers for their few years of service,

And students of the research community's teachers from the fourth preparatory scientific grade in secondary and preparatory day schools affiliated to the Directorate of Education in Dhi Qar for the academic year (2021/2022), and their number is (18433), with one section for each teacher.

**Research sample:** The proportion of the research sample was represented by (74%) of the teachers of the research community who study in (25) schools, which represents the proportion of (40%) of the schools of the research community out of (62) schools based on the random class method. My agencies are:

- **Teachers sample:** (100) physics teachers who teach educationally qualified fourth grade students who have served at least three years in the schools of the research community in order to achieve the representation of the original community.
- **Student sample:** The fourth scientific grade students were randomly assigned to the classrooms of the research sample by one class, the number of its students is (40) students, with the dimensions of the repeaters, and thus the sample amounted to (4000) students to apply the preventive awareness test.

#### **Research tools:**

- 1- **High-ranking Thinking Scale:** In order to know the degree of awareness of high-ranking thinking skills for physics teachers, previous studies and literature were reviewed that dealt with high-ranking thinking as a study (Hussain, 2012), and a study (Jassem, 2013). Prepare a high-ranking thinking scale consisting of (53) items. In front of each paragraph, five alternatives (a quintuple rating) are prepared, and these alternatives are (a lot, often, rarely, sometimes, never), and a weight is set (5, 4, 3, 2, 1) for each Alternatively, respectively, so that the degree of the scale ranges from (50, 250).

**The validity of the high-ranking thinking scale:** The scale was presented to a group of arbitrators from the methods of teaching science and methods of teaching physics, measurement and evaluation, and to determine the acceptance or rejection of each paragraph of the tool, the percentage (80%) was adopted for acceptance according to Cooper's equation, (Al-Gharib, 1970: 780) and their observations were taken into account, some notes were modified and some were deleted, which is paragraph (28,44), and thus the number of paragraphs of the scale became (50) paragraphs in its final form.

**The stability of the higher-order thinking scale:** In order to extract the stability of the scale, it was distributed to a sample of five physics teachers who were randomly selected from among the schools of the research community from the preparatory day schools of the Directorate of Education in Dhi Qar, which are (Shatrah, Al-Murtada, Al-Fursan, Ibrahim Al-Khalil, Al-Urwah), and after quantifying the answers' estimates The sample was divided into degrees and then the reliability coefficient was calculated using the alpha-kron-bach equation. The stability coefficient calculated in this way reached (0.82). This is a good stability coefficient. Obet indicates that the correlation coefficient if it exceeds (80%) indicates that the level of stability is high (Khairy, 1977). : 95).

**Final Application of the Higher Order Thinking Scale:** After verifying the validity and reliability of the scale, the scale is ready for application and includes (50) paragraphs, The scale was applied to the research sample of

physics teachers who study the fourth scientific grade students for the academic year (2021/2022) The number of them is (100) teachers, as the researcher started applying the scale on Wednesday (15/12/2021), and ended on Tuesday (25/1/2022).

- 2- preventive awareness test:** To verify the extent of the awareness of physics teachers' awareness of higher-order thinking skills and the preventive awareness of their students, the researcher adopted the test that he built, after reviewing the literature, research and studies concerned with building psychological and educational measures related to preventive education, the test was prepared in its initial form, Appendix (9) It consists of paragraphs, for each paragraph four alternatives, including health and environmental situations represented by environmental pollution (material and immaterial) and some phenomena and malpractices in the laboratory. The test included three domains (cognitive, skill and emotional domain).

**test validity:** The best way to ascertain the validity of the test is for a number of experts or arbitrators to estimate the extent to which the paragraphs fulfill the characteristic or qualities to be measured. Therefore, the test was presented to a number of experts and specialists in the methods of teaching science To express their opinions about the test in terms of the accuracy of the wording of the questions, their linguistic and scientific integrity, and their relevance to the areas that were designed to measure them. The result of their opinions was the deletion of three paragraphs, (40,18,9) and the rest of the paragraphs obtained an 80% agreement with some modifications to some of the paragraphs. Accordingly, the number of test items became (46) items.

After the researchers applied the test to an exploratory sample of the research community students, its psychometric properties were confirmed, including the strength of paragraph discrimination, the coefficient of difficulty, and the effectiveness of the wrong alternatives, all of which were acceptable.

**Final application for the test:** The test was applied to the research sample of the fourth scientific grade students who study in the middle and secondary day schools of the Dhi Qar Education Directorate on Wednesday 15/12/2021, and the results were extracted.

**Statistical means:** The equation of difficulty coefficient, discrimination coefficient, effectiveness of wrong alternatives, Kewder-Redchardson equation 20, agreement ratio equation of Cooper and Alpha Kron-Bach, Pearson correlation coefficient and the Statistical Package for Social Sciences (SPSS) were used.

#### **chapter four: research results**

- 1- The extent of awareness of the research sample teachers of high-ranking thinking skills

Table No. (1)  
Represents the responses of (100) physics teachers on the scale items

sequence	skill	paragraph number	Paragraph	arithmetic average	standard deviation	percentage	sample direction
1	6	35	Optional for a solution that is in line with the standards and objectives	4.5	1.12	90	a lot
2	4	19	Retrieve important information related to the topic.	4.3	1.14	86	a lot
3	2	10	I speak with difficulty about the similarities and differences between the stimuli.	4.15	1.42	83	a lot
4	1	8	Asking incomprehensible questions	4.05	1.16	81	a lot
5	4	26	Use photos and videos while presenting the lesson	4	1.41	80	a lot
6	5	31	Get the desired result from the course.	3.93	0.67	78.6	often
7	6	40	I assign my students research that requires the use of the Internet	3.91	0.49	78.2	often
8	6	34	I can maintain a good focus when listening or reading.	3.85	0.96	77	often
9	4	16	I allow my students to make the appropriate modifications to the lesson with confidence	3.7	1.35	74	often
10	4	17	I have the ability to change ways of thinking	3.6	1.28	72	often
11	9	48	I can evaluate well the evidence with which the writer or speaker wants to prove his position	3.45	0.92	69	often
12	1	5	I avoid focusing on the stimuli that distract me in the topic.	3.3	1.35	66	often
13	9	47	Use questions that prompt my students to think and conclude	3.13	0.77	62.6	often
14	6	41	Encourage students to research and discover new information after they have presented the book's information	3.1	0.83	62	often
15	7	43	Lower the pressure to lower the settings	3.1	0.99	62	often
16	4	22	The answer provided by the students depends on discussion and exchange of ideas (dialogue	3.09	1.69	61.8	often

			style.(				
17	4	15	Allow my students to initiate the solution without following a previous model	3	1.41	60	often
18	4	27	I use school maps and graphs	3	0.77	60	often
19	4	28	I encourage my students to use the computer and the internet	3	0.71	60	often
20	6	32	My use of the existing information is fruitful	3	0.77	60	often
21	6	38	I adopt methods of encouragement and motivation when presenting ideas	2.94	0.88	58.8	rarely
22	7	44	I am good at recognizing the misleading skills of persuasion, whether from a writer or a speaker.	2.88	0.86	57.6	rarely
23	1	1	Classify stimuli and ideas according to specific rules or system.	2.85	0.85	57	rarely
24	6	39	Talk to the students about various ideas that they present	2.82	0.78	56.4	rarely
25	3	14	Use the characteristics found in the stimuli of the topic in other cases	2.7	1.19	54	rarely
26	1	4	I can deduce hidden ideas that the writer did not mention	2.5	1.43	50	rarely
27	1	9	Using teaching strategies that stimulate thinking and dialogue among students	2.4	1.43	48	rarely
28	9	49	I am aware of the a priori effect of my inner beliefs when I judge things.	2.34	0.78	46.8	rarely
29	6	36	Instruct the students not to make mistakes when answering my questions	2.32	0.82	46.4	rarely
30	2	12	I can fairly compare the different points of view	2.3	1.35	46	rarely
31	6	33	I arrive at a conclusion based on the logical premises I have.	2.25	0.83	45	rarely
32	1	3	I work to arrange the characteristics of the subject, so that the speech is accurate.	2.15	1.31	43	rarely
33	4	20	If I am not sure about something I will look to find out more.	2.15	0.64	43	rarely
34	8	46	Demonstrate the validity of the parts by their logical existence within the framework of the whole.	2.14	0.77	42.8	rarely
35	9	50	Demonstrate the logicity of the	2.14	0.77	42.8	rarely

			ideas by having them in the appropriate order.				
36	7	42	Pay close attention to the new details in physics	2.13	0.58	42.6	rarely
37	2	11	Show the differences between ideas that appear to be similar, and similarities that appear to be different.	2.1	1.37	42	rarely
38	4	29	Avoid using inhibiting methods of thinking	2.07	0.67	41.4	rarely
39	4	30	I can add things from my personal experience and elicit meaning from them.	2.04	0.49	40.8	rarely
40	1	6	It is very easy to separate the main ideas from the others.	2	1.41	40	rarely
41	1	7	The questions I ask the students are multiple possibilities	1.9	1.26	38	sometimes
42	4	18	Use modern and innovative teaching methods	1.85	1.42	37	sometimes
43	6	37	Assign the students some exercises to be solved in class	1.76	1.21	35.2	sometimes
44	1	2	Distinguish between main ideas and subsidiary ideas.	1.65	1.15	33	sometimes
45	4	21	Give my students enough time to answer my questions	1.65	1.15	33	sometimes
46	7	45	I feel comfortable pointing out mistakes or lapses of some expert or celebrity.	1.65	1.15	33	sometimes
47	4	24	I accept all answers to the questions directed to the students	1.57	0.87	31.4	sometimes
48	4	23	Involve the students in solving the lesson by presenting different methods	1.53	0.77	30.6	sometimes
49	2	13	Allow students to learn by trial and error	1.5	1.12	30	sometimes
50	4	25	Use modern means to present the lesson, such as data and the computer	1.38	0.91	27.6	sometimes
total				2.70	1.03	53.93	A lot

From the table (1) above, it was found that teachers' awareness of higher-order thinking skills reached an arithmetic average for the items as a whole (2.7) and the percentage (53.9%).

2- For each skill of the scale, as in Table No. (2)

Table No. (2)  
It represents the responses of physics teachers to the scale skills

sequence	skill	arithmetic average	standard deviation	percentage	sample direction
1	Discrimination	2.53	1.26	50.67	sometimes
2	similarities and differences	3.21	1.32	64.25	often
3	installation	2.7	1.19	54	rarely
4	application	2.64	1.05	52.81	rarely
5	objectivity	3.93	0.67	78.6	often
6	concentration	2.485	0.771	49.691	sometimes
7	Observation	2.44	0.90	48.80	rarely
8	analysis	2.14	0.77	42.8	sometimes
9	Evaluation	2.77	0.81	55.30	rarely
Total		2.76	0.97	55.21	rarely

It is evident from the table (3) that teachers' awareness of high-ranking thinking skills of the teachers of the research sample enjoys a level of quality, as the calculated T value reached (24,424) at the degree of freedom (99), which is greater than the tabular value (2), so this is considered indicative at the level of significance (0.05).

Table No. (3)  
represents teachers' awareness of high-ranking thinking skills for the scale as a whole

n	Average teacher grades	The hypothetical mean of the scale	Df	T value		Indication level	indicate
				calculated	tabular		
100	167.61	65.69	99	1.47	1.43	0.05	statistically significant

The researcher extracted the Pearson correlation coefficient to identify the relationship between teachers' awareness of high-ranking thinking skills and the students' scores on the preventive awareness scale, The Pearson correlation coefficient (0.886) was used, and the correlation coefficient must be converted to the value of (Z) in order to become useful, Where the calculated (Z) value reached (1.47) with a degree of freedom (99) at the significance level (0.05), as shown in Table (4).

Table No. (4)

represents the relationship between teachers' awareness of higher-order thinking skills and students' scores on the preventive awareness scale

n	Average teacher grades	Student average	Df	correlation coefficient	Z . value		Indication level	indicate
					calculated	tabular		
100	167.61	43.18	99	0.886	1.47	1.43	0.05	statistically significant

### Conclusions

A - Physics teachers have awareness of high-ranking thinking skills according to the scale.

B - The relationship between physics teachers' possession of high-ranking thinking skills and the protective awareness of their students is a medium positive relationship.

### Recommendation

The researchers recommend the following:

- 1- Holding cultural awareness sessions for teachers in education to make them aware of the importance of high-ranking thinking in the teaching process in the classroom, and that the various skills of high-ranking thinking are of great importance in developing the quality of education and developing the student's mentality in line with the requirements of the current era.
- 2- Implementation of training workshops aimed at developing the multiple skills of high-ranking thinking in teaching in general and physics teachers in particular, with the importance of focusing on all skills and not just on one skill.
- 3- It is necessary to keep pace with global changes and developments as a step to modernizing schools and continuous improvement and permanent development of teachers' thinking patterns, to ensure that they acquire the skills of the twenty-first century teacher, including high-ranking thinking skills.
- 4- Paying attention to the need to spread preventive awareness among students because of its great importance in maintaining the health of students first and its importance in reducing accidents that occur during experiments that cause damage to laboratories and equipment.

**Proposals:** As a continuation of the current research, the researchers proposes to benefit from it in conducting many of the following studies and research:

- 1- An experimental study to reveal the effect of teaching using higher-order thinking skills on dependent variables other than preventive awareness such as: (decision-making, science processes, scientific tendencies, critical thinking, concept acquisition, reflective thinking, pivotal thinking, lateral thinking, ... and others ).

- 2- A similar study at different academic levels.
- 3- A similar study on other subjects.
- 4- A parallel empirical study between teaching according to higher-order thinking skills and other educational strategies and models and their impact on preventive awareness.
- 5- A study to evaluate the physics curriculum in the different academic levels according to high-ranking thinking skills.

## Reference

1. Abd al-Salam, Mustafa Abd al-Salam, (2001): Modern trends in science teaching, 1st edition, Arab Thought House, Egypt.
2. Abdel Masih, Abdel Masih Semaan, (2004): "The Effectiveness of a Program for Developing Environmental Enlightenment for Preparatory Stage Science Teachers and the Possibility of Predicting their Environmental Behavior", Journal of Scientific Education, Volume 7, No. 2, Ain Shams University, Faculty of Education - Cairo.
3. Al Jasser R, Al Sarhan M, Al Otaibi D, Al Oraini S. Awareness toward COVID-19 precautions among different levels of dental students in King Saud University, Riyadh, Saudi Arabia. J Multidiscip Healthc. 2020;13:1317–1324. doi:10.2147/JMDH.S267956
4. Al-Ahdal, Asmaa Zain Sadiq, (2006): "The effectiveness of a developed educational unit in preventive education to confront natural hazards and its impact on the acquisition of some geographical concepts and the trend towards geography for first-grade intermediate students in Jeddah", Journal of the Arabian Gulf Resala, Issue 100, University of Jeddah.
5. Al-Ahmadi, Ali bin Hassan bin Hussein, (2003): "The level of health awareness among second-year secondary school students is normal and its relationship to their health attitudes in Madinah Al-Munawwarah", an unpublished master's thesis, Umm Al-Qura University, College of Education.
6. Al-Atoum, Adnan Youssef, Abdel Nasser Diab Al-Jarrah and Muwaffaq Bishara, (2007): Developing thinking skills, theoretical models and practical applications, Dar Al-Masira, Amman.
7. Al-Atoum, Adnan Youssef, Abdel Nasser Diab Al-Jarrah and Muwaffaq Bishara, (2011): Developing thinking skills (theoretical models and practical applications), 3rd edition, Dar Al Masirah for Publishing and Distribution, Amman.
8. Al-Khalili, Khalil Youssef, and others, (1996): Teaching science in general education stages, 1st Edition, Dar Al-Qalam for Publishing and Distribution, Dubai.
9. Al-Najdi, Ahmed, and others, (1999): Teaching Science in the Contemporary World: Introduction to Teaching Science, Dar Al-Fikr Al-Arabi, Cairo.
10. Al-Sudani, Abdul-Karim Abdul-Samad, (2008): "Preventive Education in the Holy Qur'an and the Noble Hadith and the extent to which it is included in science books and biology for the primary and secondary levels," Al-Ustaz Journal, Issue 74, Al-Qadisiyah University, College of Education.
11. Al-Tamimi, Asmaa Fawzi, (2011): "Higher thinking skills and their relationship to mathematical achievement among students of teacher training institutes," Educational Studies, Center for Research and Educational Studies, Volume (4), Number (13).

12. Al-Zoba'i, Abdul-Jalil, and Al-Ghannam, Muhammad Ahmad, (1981): *Research Methods in Education*. Baghdad. Iraq: Part One, Baghdad University Press.
13. Atwi, Jawdat Ezzat, (2011): *Modern school administration, its theoretical concepts and scientific applications*. Jordan: House of Culture.
14. Awareness of the Pandemic H1N1 Influenza global outbreak 2009 among medical students in Karachi, Pakistan, *J Infect Dev Ctries*, 5 (3) (2011), pp. 151-155
15. Bandari, Nadia Mahmoud Mohamed, (2002): "A program for developing environmental awareness among children in relation to assertiveness, PhD thesis, Faculty of Education, Zagazig University, Egypt.
16. Bransford, J.; Sherwood, R.; Vye, N. & Rieser, J. (1986): *Teaching Thinking and Problem – Solving*. *American Psychologist*, 41, 1078-1089.
17. Bruner, J. S. (1960). *The Process of education*. Cambridge, Mass.: Harvard University Press.
18. Cappelli, P, & Neumark, D. (2001). "Do high-performance Work Practices Improve Establishment-level Outcomes?", *Industrial and Labor Relations Review*, 54, 4, 737-775.
19. Cheirf & Adams, (2013): *Why Do Students Fail? Student's Perspective*, NCA, HLC, Annual Conference, Hyatt Regency Chicago, Illinois.
20. Darwish, Atallah, Tayseer Mahmoud Nashwan, (2001): "The impact of the environmental education course on the level of environmental enlightenment for students of the College of Education Al-Azhar University in Gaza and their attitudes towards the environment and its problems", Fifth Scientific Conference, *Scientific Education for Citizenship*, 7/29/1/8 /2001, The Egyptian Society for Scientific Education, Alexandria.
21. de Bono, E. (1976). *Teaching thinking*. London: Penguin.
22. Friedman. Haladina. *The Politically Correct Handbook*. (1992). September 1, 2006. In the UK however since the 'term' Asian is universally assumed to mean South Asian Oriental is regarded as an acceptable term for someone of East Asian descent.
23. Hossam El-Din, Laila Abdullah Hussein, (2000): *A proposed unit of endemic diseases in the Egyptian countryside and its impact on developing health awareness among rural women*, *Journal of Scientific Education*, Volume 3, Number 1, Arab Society for Scientific Education, Ain Shams University, Cairo
24. Jaber, Abdel Hamid and others, (1985): *"Teaching Skills"*, 2nd Edition, Dar Al-Nahda Al-Arabiya, Cairo, Egypt.
25. Jani, J. R., Bajamal, A. H., Utomo, S. A., Parenrengi, M. A., Fauzi, A. A., Utomo, B., & Dwihapsari, Y. (2021). Correlation between magnetic resonance imaging (MRI) and dynamic mechanical analysis (DMA) in assessing consistency of brain tumor. *International Journal of Health & Medical Sciences*, 4(2), 260-266. <https://doi.org/10.31295/ijhms.v4n2.1737>
26. Khairi, Mr. Muhammad, (1977): *"Statistics in Educational, Psychological and Social Research"*, 2nd Edition, Dar Al-Fikr Al-Arabi, Cairo, Egypt.
27. Khattab, Muhammad Salih, (2004): "An educational complex on the use of higher-order thinking process questions in classroom education", Dar Al Masirah, Amman, Jordan.

28. Limbach, B., & Waugh, W. (2010). Developing Higher Level Thinking, *Journal of Instructional Pedagogies Academic and Business Research Institute* , Vol.7, No.2 , United States.
29. Lipman,M(1991): strengthening Reasoning and Judgment Through Philosophy. In: *Learning to think, think to Learning*, (Maclure,S,and Davis, P),(Eds.) UK program on press plc. Oxford.
30. Martin Zwanenburg, (2013). International Humanitarian law Interoperability in Multinational Operations", *international Review of the Red Cross* Vol.95, No.891, pp. 681-705.
31. Nour El-Din, Wedad Abdel Samie Ismael, (2000): "Preventive Education in Primary School Science Curricula in the Kingdom of Saudi Arabia - An Evaluation Study", *Journal of Teachers' Colleges, Educational Sciences*, Volume (7), Number (2).
32. Resnick (1987): *Education and Learning to think* Washington, DC: National Academy press.
33. Resnick, (1987). *Education and Learning to Think*. Washington, DC: The National Academies Press Reference Manager Publication.
34. Shehata, Hassan and Zainab Al-Najjar, (2003): *A Dictionary of Educational and Psychological Terms*, 1st Edition, The Egyptian Lebanese House, Cairo.
35. Simons,J., Leitsehuh,C.,&Popa(2011): The Effect of Body Awareness Training of Pre school Children Based on The Sherborne Developmental Movement Method Versus Regular Physical Education Class, *European Psychomotricity Journal*.4(1). 38-50
36. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, 6(1), i-v. <https://doi.org/10.53730/ijhs.v6n1.5949>
37. Tian, L., Huebner, E. S., & Zhu, X. (2018). Relations among academic achievement, self-esteem, and subjective well-being in school among elementary school students: A longitudinal mediation model. *School Psychology*, 34(3), 328–340.
38. Z.A. Khowaja, M.I. Soomro, A.K. Pirzada, M.A. Yoosuf, V. Kumar
39. Zangana, Hussein Abdul Rahman, (2008): "Pictorial and theoretical foundations in the curricula of humanities and applied sciences. Baghdad: House of Books and Documents."