

## **The Impact of Teaching Physics by Electronic Packages in Devolvement of critical thinking skills for 9th Grader's in Jordan.**

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### **ABSTRACT**

The study aimed to investigate the impact of teaching physics by Electronic packages on critical Thinking skills for 9<sup>th</sup> Grader's, A purpose sample consisted of (70) male student of 9th grader in the Second Educational Directorate of Zarqa at academy year (2018/2019) was selected, Critical Thinking Skills Test was prepared, it's validity and stability were examined, and the study followed the semi-experimental method. The results showed that the volume of impacting of the method of teaching on critical thinking skills was considerable, and practical significant amount (92.57%), and the differences between the mean of experimental group's performance scores and the mean of Control group's performance scores were statistically significant at ( $\alpha = 0.05$ ), in favor experimental group students, whose their Mean of the performance scores on critical thinking skills test amount (32.20), while the Mean of control group's performance scores on critical thinking skills test amount (18.10). In light of the result were number of recommendation, as: recommend teachers of physics to teach their students by Electronic Packages, and recommend education supervisors to training their teachers to use Electronic Packages in teaching.

**Key Words:** Electronic packages, Critical Thinking Skills, Teaching Physics, 9th graders.

## **Introduction**

In general, there is universally concerned in teaching critical thinking skills in curricula. Especially in science curriculum; because students with low cognitive abilities find difficult to understand abstract scientific concepts and principles, so, apply these principles and concepts, to solve the problems, which face them in their daily lives (Halpern, 2007).

The real science curriculum is a learning tool that provides to students different forms of scientific knowledge. it identifies the scientific skills, trends, and tendencies, that the student must acquire them, and takes into account the learners' needs and interests (Deng, 2007). specifically physics curriculum, and for all levels of education contains contexts that may be appropriate for the development of multiple skills for students, helping them acquire knowledge, and employ them in new situations; so that learning is meaningful, while students face difficulties in understanding the relationships between different physical concepts, which affects in their critical and creative thinking skills, which can be overcome through technology in learning and education (Popescu, Adriana; Morgan, James, 2007).

Current physics books do not take into account needs of the students, and their communities. They present facts to students, and show science as a collection of knowledge, information, and scientific facts, that have been drawn without error. These books focus on symbols and terminology. Then The learner save and recovery them at the test, despite this fact of physics books, they are still an essential tool in the teaching of physics, may be the key to change and improvement of these books in hand of physics teachers (Deng, 2007).

Physics as a subject of learning contains essentially basic scientific concepts. learn of knowledge construction of

any scientific subject begins to clarify the concepts, that composition of this building, for more stable from changed partial facts, therefore the focus on teaching of scientific concepts is one of the most important goals of scientific education, is language of science, and key to scientific knowledge, is necessary to format principles, generalizations, self-learning, continuous education, understand people and deal with each other. The learning process requires a good planning and providing the appropriate learning environment, in order to facilitate students' learning of scientific concepts, and helps increase the chance of practicing critical thinking skills. Therefore, the physics teacher needs to use appropriate teaching methods to help the learner to identify the best alternative, and solve the problems face him in his daily life (Nobes & Panagiotaki, 2007).

In order to be able to face the problems, the learner must build his independent personality, train him to self-reliant, improve his cognitive building, self-confidence, self-respect to be more responsible towards his learning, active initiator, thinker, and responding to issues and problems of life with interest and effectiveness. For the above, must shift in outlook to learning, as a process not limited by time or place, and Is a necessary need to facilitate adaptation of the individual with update in their environment, so, the active learning of thinking skills is more necessary than ever before; to enable learners to solve problems in a scientific method, able to make judgments, and take appropriate decisions (Schrag, 1992).

The critical thinking distinguishes between information and allegation, relevant and irrelevant cause. where the accuracy of the information is determined, also the arguments and evidence are examined, assumptions are assumed, it is reveals bias, reveals logical inaccuracies, identifies the inconsistency between the introduction and

result, determines the degree of severity of proof; in order to reach balanced judgments, based on logical scientific reasoning (Elder, 2004).

Critical thinking is a meaningful process in which justify self-government is by: interpretation, analysis, evaluation, and reasoning. It is a methodology and contextual considerations that depend on justification. on the other hand, critical thinking is the ability of individuals to think openly, independently, and rationally. The multiple stages of education include material whose content is not learned without thinking and intellectual processes, and ultimately students try to remember most of the information. However, students are expected to analyze and present information or learn how to use it. So far, individuals can not improve their critical thinking alone; certainly, it is responsibility of schools to help them acquire critical thinking skills, and analyze information (Paul & Elder, 2001; Korkmaz & Karakus, 2009).

Most educators confirm the importance of critical thinking. It helps to take autonomy, assess others knowledge, resolve conflicts, and to arrive at new decisions on complex problems. This kind of thinking requires to be learned to teaching aids in learn students how to think, in order to acquire them critical thinking skills (Linda & Lian, 2011).

Teaching critical thinking skills is controversial. Some experts believe that the process of teaching critical thinking skills is effective only if knowledge and thinking skills are integrated into a specific context. On other hand, other experts believe critical thinking skills must be studied separately from the cognitive content, critical thinking requires activity, initiative, reasoning, visualization and analysis. . The process of critical thinking employs discrimination and evaluates the information that is used to

making of judgments, and appropriate decisions (Linda & Lian, 2011).

In the age of technology and information, schools are good environments for training individuals to critical thinking. They use the information which they need successfully, employ and disseminate this information, actively use information technology, and employ the various techniques that can positively contribute to improve their critical thinking skills (Branch, 2000). to improve educational outcomes for learners, educators confirm on employ technology in learning, to help on develop learning methods, So, Distance learning, computerization of courses, and e-learning have appeared (Garrison, 2008).

The employing of technology in teaching will not be canceled role of the teacher, or practice of other methods in teaching. but the teacher will have more effective roles in the preparation, planning and implementation, and acquires new skills to deal with technology, where the ministry of education in jordan employed computerized teaching materials within the classroom , and the teacher uses these computerized materials as a tool of helping, in order to students require knowledge accurately and easily, considering that the student is the center of the educational process, he is a participant and producer of knowledge and not recipient, to generate the ability to interact with his community, to support this role, the student must possess technological competencies, such as: ability to use and deal with technology tools, search for information, benefit from other resources, such as: internet, libraries, project execution, research, and design classroom positions electronically (abu musa, 2008).

Learning by electronic bags is a good practice in technology-based classrooms. the reason for this preference is that teaching using electronic bags enriches the learning,

increase the practice of critical thinking skills, access to information, social communication, facilitate individual activities, and increase the efficiency of correction through social media via the Internet, such as: forums, virtual classroom environments, which supports individual and group activities in simultaneous and asynchronous learning, e-learning supports individual activities, learning models based on problem solving, and collaborative learning (Osguthorpe & Graham, 2003). Also, the electronic bags provide information to learners in a variety of formats, including: images, texts, charts, sounds, animations, video clips, and environments that help to link these informations together; to build new knowledge, the learner continues to connect these new knowledge with previous knowledge, to arrive at meaningful learning, by providing students with continuous training, which is reflected positively on the practice of critical thinking; because the learner deals with educational environments that allow the opportunity to practice critical thinking, and linking concepts with each other, in addition to the possibility of linking the computerized educational bags to the internal network, or the Internet, or the student's e-mail site (Garrison, 2008)

Most studies confirm on importance of using computers in teaching. Through computerized educational software, computerized books, electronic bags, computer simulations. In the study of (Ajlouni and Abu Zeina, 2006), which aimed to investigate the effect of teaching methods (electronic bags, traditional method) on secondary students achievement in Physics, and their attitudes toward electronic bags. A sample consisted of (78) male and female students was selected. The results showed that there are statistically significant differences due to the method of teaching, in favor of the method of electronic bags, and statistically significant differences due to gender variable, in favor of

females. But no statistically significant differences due to interaction between method and sex. And no statistically significant differences in the attitudes of students in the experimental group towards electronic bags due to sex.

As we note in study of (Bani Awad, 2006), which aimed to investigate the impact of teaching science according to Intel's education program for the future on students in eighth grade acquisition of scientific concepts compared to the traditional method. A sample consisted of (92) male and female students of the Second Irbid Directorate for the academic year 2006 was selected, is distributed in four groups; two groups taught by the electronic bag according to the Intel program, and two groups taught by the traditional method. The results showed there is a statistically significant difference in the acquisition of the eighth grade students of scientific concepts due to the method, in favor of the experimental group which taught by the electronic bag, but there are not statistically significant differences in the acquisition of the eighth grade students of scientific concepts due to gender, or the interaction between sex and the way. While the study of (Kukolja & Milan & Kresimir & Niksa, 2005), which aimed to investigate the impact of the use of problem-based learning based on the technology of the website on achievement in the physiology of acids and bases. A intentional sample of (121) male and female of second-year students at the faculty of medicine of the zagreb university was selected. The results showed there are statistically significant differences in the achievement of scientific studies in the physiology of acids and bases due to method, in favor of experimental group which taught by problem-based learning based on the technology of the website.

In the same context, study of (Huppert & Lomask & Lazarowitz, 2002), which aimed to investigate the effect

teaching of microbiology by computer simulations on scientific processes skills and academic achievement for basic stage students. A sample of (181) students from tenth grade was selected. The results showed that the academic achievement of the students in the experimental group was higher than the academic achievement of the students in the control group, and that students with low cognitive abilities were able to match their peers of students with high thinking skills in achievement, and use of problem solving skills. As that, the study of (Rothman,2000), which aimed to investigate the effect of teaching science by computerized book on critical thinking skills, achievement, and their attitudes towards science. A sample consisted of (209) fifth grade students enrolled in three schools in America was selected, into three gropes was divided, each group was treated with one of the following forms of teaching: blended learning focused on computer use as part of the science course, non-traditional technology-based teaching using a holder of computerized materials, traditional teaching based on the book only as a basis for teaching. The results showed that both non-traditional and computer-based teaching improved the attitudes of students towards science and the level of development of their English language, and appearance of positive trends but are not statistically significant to following outputs: general achievement in science, and development of critical thinking skills.

And stady of (Lazarowitz and Huppert, 1993), which aimed to investigate the effect of teaching by computer simulation on 10<sup>th</sup> grade student's achievement, and their ability to acquire science processes skills. A sample of (181) students in the microbiology course was selected, The results showed that the mean of academic achievement of the students in experimental group was higher than in the control group on the science skills test (communication,



interpretation of data, Adjust variables), but the level of understanding among the students in the two groups is equal, and there isn't difference due to gender, while the female performance results in the experimental group are better than in the control group.

Previous studies have shown rarity of studies that used electronic bags. most the studies have confirmed the positive impact of teaching by computer, through computerized educational software, computerized books, electronic bags, and computer simulations, in various dependent variables, Compared to traditional methods, as studies: (Kukulja et al., 2005);( Beni Awwad, 2006); (Ajlouni & Abu Zeina 2006) ; (Huppert, et al., 2002) ; (Lazarowitz & Huppert ,1993) ; (Rothman ,2000), and this study similar with some previous studies in the use of semi-experimental approach, While different from those in the sample, a sample of it is consisted of school students, while sample of other studies are consisted from university students, as a study of (Kukulja et al, 2005), While It is similar with some studies, they are consisted of school students , as studies: (Rothman, 2000); (Lazarowitz & Huppert , 1993); (Hubert et al., 2002); (Bani Awad , 2006); (Ajlouni & Abu Zeina, 2006), but it is different from them in the study society, and the age stage, this study investigated impact of teaching physics by electronic bags on development of critical thinking skills for ninth grade students, especially, there aren't studies that have examined impact of electronic bags on development of critical thinking skills for ninth grade students in jordan, and it may help to provide a scientific and practical guide to impact of electronic bags in teaching of physics, especially for the students of the basic stage in Jordan.

Maybe previous facts of teaching by electronic bags can contribute to improve cognitive outcomes and higher

thinking skills, to investigate of teaching and learning semantics by electronic bags, and investigate its impact on providing a learning-teaching environment that improves the level of critical thinking skills. Wherefore, the researcher taught physics by electronic bags.

### **Problem of Study:**

Many students in the upper and secondary elementary stages have a problem in learning of physics, and they face hard to learn it; because it needs high mathematical skills, and critical thinking skills (Salama, 2002; Linda & Lian, 2011). The physics is a suitable environment for developing higher thinking skills for students, because it provide opportunities for analysis, synthesis, reflection, imagination, critique, creativity, ideas generation, find solutions, and make sure for them. When a student learns and understands the matter, determines its data, and what is required of it, and summarizes it in his own language, be in the circle of critical thinking, and when he solves the matter in a way or in several ways, and represented by drawings or simulations; he is will be in the circle of creativity and generation of ideas, after the process of resolving the matter, he is sure the correct solution, then be back in the circle of critical thinking, so, It is difficult to learn physics without employing critical thinking skills (Wackermann, et al, 2010). The study answered the following question:

- Is there a difference between mean of performance scores on critical thinking skills test in physics for ninth grade students due to method of teaching (electronic bags, traditional)?

### **Purpose of Study**

The study aimed to investigate the impact of teaching physics by electronic bags on developing critical thinking skills for ninth grade students in Jordan.

### **Importance of Study**

- **Theoretical importance:** the detection of the impact of electronic bags in the teaching of physics, and their impact on the development of critical thinking skills in physics, subsequently support the educational literature that confirm on the effectiveness of electronic bags in teaching.

- **Practical importance:**

1. Design of an electronic bag in the teaching of physics, which researchers may build upon or develop it, or benefit teachers to design of similar bags in their physics teaching, and raise their interest in reviewing the usual practices in teaching.

2. The results of this study raise new opportunities for research in its field in different educational stages (basic, secondary, undergraduate), and in other scientific subjects (geology, chemistry, biology, science), and other geographical locations; to circulate appropriateness of the use of electronic bags for all scientific subjects in science, for all topics of scientific branches, and different levels of education.

### **Limitations of Study**

The results of the study are determined by the following limitations:

- **Human Limits:** The study was applied on a sample of ninth grade students.

- **Spatial Limits:** The study was applied in the schools of the Education Directorate of Zarqa II.

- **Time Limits:** The study was applied in the first semester of the academic year 2019/2018.

- **Objective limits:** The study was applied on the second unit of specific physics book for ninth grade in academic year 2019/2018, which is included the following topics: Description of the Movement, Newton's First Law, Newton's Second Law, Newton's Third Law, Newton's General Law of

Attraction, Workmanship and ability, Mechanical Energy, Conservation of Mechanical energy.

- **Determinants of the study:** The results of the study in light of the verification of the psychometric properties of the tool used.

### **Practical Definitions**

**Electronic bags:** the bag designed by the researcher entitled (laws of movement), and contains six folders: the first is the unit plan which contains the unit plan, the implementation plan, the performances document; the second is the unit support folder which contains the documents to support student learning, The third is a folder of diagnostic assessments; the fourth is a folder of pictures and sounds that were used in the bag, and the fifth is the students' models folder, which contains a presentation of the movement, pictures, video clips, a brief search, questions, and enrichment information, and the lessons included in the unit, the sixth is the links folder of scientific forums and sites, login link to Facebook page of the electronic bag, and linking of PREZIE website which the electronic bag was loaded on it.

**Critical Thinking Skills:** are a meaningful process that rationalizes the learner's autonomy, in which he practices number of the skills, as: interpretation, analysis, evaluation, and reasoning, as well as clarifying the methodology and contextual considerations used in these processes for justification (Paul & Elder, 2001).

For the purposes of this study, the following critical thinking skills were used: the first: accuracy in fact checking is understanding of the meaning of the text, ability to explain this understanding in a clear and consistent manner, and the clarification of the various indications of the text and its understanding. The second: the analysis is the assessment of the expected outputs, determines the possibilities, and

provides evidence to identify the underlying sub-problems of the main problem. The third: Evaluation is the process of determining expected outputs, assess their achievement, and determine underlying causes of the non-achievement of outputs. The forth: Inference is the work of conclusions on the subject or problem. The fifth: Interpretation is ability to justify based on research, or other logical sources, but not randomly. Critical thinking skills were measured procedurally by the acquired degree to learner on critical thinking skills test.

**Ninth Grade:** The ninth year of the school education system in Jordan from the basic stage divided into ten years.

### **Methodology and procedures**

#### **Sample of the study:**

A purpose sample consisted of (70) male student of 9th grader in the Second Educational Directorate of Zarqa at academy year (2018/2019) was selected; to facilitate application of the study procedures, and to obtain a close sample at the cognitive, cultural, economic, and social level. It was distributed into two groups: Experimental group (N = 35), which taught by electronic bag, and the control group (N = 35), which taught by traditional method.

#### **Study Tools**

The researcher used two tools to collect the data needed for the study. The following are the description of these tools and the procedures for their construction, validity and stability.

#### **First tool: Electronic bag**

An educational material was prepared by including the second unit (the laws of motion) from the physics book for the ninth grade students in the electronic bag as follows:

1. Review the educational literature and previous studies on how to prepare electronic bags.

2. Limiting the objectives in the content of the movement unit of the physics book for the ninth grade, and limiting the scientific concepts.

3. The unite was divided into lessons, each lesson included: learning outcomes on scientific concepts, solving important questions and terminology, diagnostic testing, illustrative examples to solve mathematical exercises included within the lesson content, explanatory examples of concepts included within lesson content, discussions and exercises Activities, and multiple electronic media include simulations, animations, educational video, self-training, and self-evaluation.

4. The electronic bag included enrichment and remedial activities, work papers as homework for learning proficiency, links to websites related to subjects of the unit, where the students can access the electronic bag at any time, both inside and outside the school.

5. Upload the electronic bag to the PREZI software on the Internet, and give each student the login name and password; so that he can access the bag at any time suits him. In addition, a page was created on the social networking site Facebook, especially for students of the electronic bag.

### **Validity OF Electronic Bag**

The validity of the electronic bag was verified by presenting it to number experts in Jordanian universities, educational supervisors, teachers, specialists in the field of science and physics teaching, and specialists in the design of electronic programs to verify their compatibility with the properties of the electronic bags, which are designed The lessons in light of them, clarity of formulation, and its relevance to ninth grade students, where these notes were modified in light of the observations of the experts.

### **The second tool: critical thinking skills test**

The test paragraphs were written in the light of theoretical literature, and previous studies, then paragraphs were selected off from pre-prepared local, and international tests (Mar'i and Nofal, 2006; Aldardor, 2001; Zoubi, 2006; Facione & Facione, 1998). This test consisted of (42) paragraphs in its initial form to measure five critical thinking skills: accuracy in fact checking, analysis, evaluation, reasoning, and interpretation.

#### **Validity of critical thinking skills test**

The validity of the content has been verified to test the skills of critical thinking by presenting it to a group of Jordanian university professors, educational supervisors, teachers, specialists in the fields of science, physics, measurement, assessment and educational psychology to verify its veracity in terms of clarity, ninth, its relevance to critical thinking skills designed to measure it. One paragraph was deleted and (6) paragraphs were modified in the light of the experts ' observations.

#### **Building Validity of critical thinking skills test**

The test was applied on a survey sample consisted of 40 students. The difficulty and discrimination coefficients were computed for the test paragraphs, and fields. The paragraphs were less than (0.25) of discrimination coefficient and less than (0.20) of difficult coefficient were deleted. Table (1) shows the extent of the difficult coefficient and the extent of the discrimination coefficients of the critical thinking skills test paragraphs.

**Table (1)**

**The extent of the difficulty coefficients and the extent of the discrimination coefficients (the correlation coefficients of the verbs with the field sign and the total test score) of the critical thinking skills test paragraphs**

Field	The extent of difficulty coefficients for paragraphs	The extent of the discrimination coefficients of the paragraphs (the correlation coefficients of the paragraphs with the field score)	The extent of the discrimination coefficients of paragraphs (paragraph correlation coefficients with the total test score)
<b>Evaluation</b>	0.19-0.70	0.56-0.66	0.47-0.78
<b>Analysis</b>	0.18-0.43	0.45-0.83	0.40-0.73
<b>Interpretation</b>	0.27-0.41	0.69-0.75	0.55-0.67
<b>Accuracy in fact checking</b>	0.44-0.76	0.46-0.81	0.48-0.74
<b>Inference</b>	0.35-0.65	0.16-0.84	0.42-0.79

Table (1) shows that the difficulty coefficients of test paragraphs ranged between (0.18-0.76), and discrimination coefficients of the paragraphs (the correlation coefficients of the paragraphs with the field score) ranged between (0.16-0.84), and discrimination coefficients of paragraphs (paragraph correlation coefficients with the total test score) ranged between (0.40-0.79), based on previous result, there is two paragraphs of coefficient of difficulty amount (0.19, 0.18), and one paragraph of discrimination coefficients amount (0.16) were deleted; because they aren't ability to measure what was designed for measurement (Odah, 2010). To become the final test is consisted of (38) paragraphs.



In order to verify the validity of the internal building of critical thinking skills test (analysis, interpretation, evaluation, reasoning, accuracy in the examination of facts), the correlation coefficients were computed between areas of critical thinking skills. Table (2) shows these coefficients:

**Table (2)**

**Interaction coefficients of Critical Thinking Skills**

areas	Evaluation	Analysis	Interpretation	Accuracy in fact checking	Inference
<b>Analysis</b>	0.40				
<b>Interpretation</b>	0.46	0.43			
<b>Accuracy in fact checking</b>	0.39	0.55	0.47		
<b>Inference</b>	0.59	0.51	0.44	0.47	
<b>Total</b>	0.66	0.71	0.64	0.87	0.61

Table (2) shows that the correlation coefficients of the area score with the total test score ranged between (0.61-0.87), and the correlation coefficients for the test domains ranged between (0.39-0.59). These are good indicators of the quality of the test construction (Hinkle, Wiersma, Jurs, 1988).

**Stability of critical thinking skills test**

The test was applied on a survey sample consisted of (35) students, with a time interval of three weeks between the two applications. The papers were then collected and corrected, the correct answer was given one sign and the wrong answer was zero. The coefficient of return stability (Pearson correlation coefficient) was calculated, amount

(0.89), also, the consistency of the internal consistency of the test and its fields was calculated using the Koder-Richardson coefficient (KR-20) on the pre-test amount (0.90). Table (3) shows these coefficients:

**Table (3)**  
**Stability coefficients of the critical thinking skills test of the test and return it and the coefficients of consistency of internal consistency for each of the areas of critical thinking and total testing**

<b>Areas of critical thinking</b>	<b>Stability of internal consistency</b>	<b>Coefficient of correlation</b>	<b>Number of paragraphs</b>
<b>Evaluation</b>	0.88	0.88	8
<b>Analysis</b>	0.81	0.92	6
<b>Interpretation</b>	0.83	0.90	8
<b>Accuracy in fact checking</b>	0.89	0.87	8
<b>Inference</b>	0.92	0.89	8
<b>Total</b>	0.90	0.89	38

Table (3) shows that the stability coefficient amount (0.89), and the internal consistency coefficient of the pre-test amount (0.90), these values consider good indicators of the quality of the test, and its ability to measure what was designed for measurement.

### Designing of study

The study was followed a semi-experimental approach for two equal groups. A intentionally sample of (70) students from the ninth grade in the Second Zarqa was selected, and distributed to two groups randomly: The first group consisted of (35) students taught the movement unit by the electronic bag, the second grope consisted of (35) students taught same unit by traditional method, and the pre -post test of critical thinking skills was applied, so the design of study can be represented as follows:

$$G_1: O_1 \times O_1$$

$$G_2: O_1 - O_1$$

According to the design of the study, the variables were as follows:

**First:** Independent variable: method of teaching and has two levels (electronic bag, traditional method).

**Second:** dependent variable: performance score of ninth grade students on the critical thinking skills test of the post-response.

### The results:

The study question was: Is there a difference between the scores mean on critical thinking skills test in physics for ninth grade students due to the teaching method (electronic bag, traditional method)?

In order to answer the question, the means and standard deviations of the performance scores on pre -post test of critical thinking skills were calculated. Table 4 shows these statistics.

**Table (4)**  
**Means for the performance scores of the two study groups according to the method of teaching on the pre - post test of critical thinking skills**

Group	Number of	Pre-test	Post- test
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	students				
<b>Control</b>	35	Mean	Standard Deviation	Mean	Standard Deviation
		13.20	2.45	18.10	2.60
<b>Experimental</b>	35	14.10	2.85	32.20	2.10
<b>Total</b>	70	13.65	2.65	25.15	2.35

**\*Maximum test score = 38**

Table (4) shows that the mean of the experimental group's performance scores on the pre-test of critical thinking skills was higher than the mean of the control group's performance scores, and the mean of the experimental group's performance scores on the post-critical thinking skills test was higher than the mean of the Control group's performance scores.

In order to test the significance of the differences between these means, the analysis of the variance associated with the performance scores was performed on pre -post test of critical thinking. Table (5) shows these statistics.

**Table (5)**

**The results of the analysis of the variance accompanying the performance scores of the two groups of the study sample on the pre -post test of critical thinking skills**

Source of variance	squares Total	Free Degrees	squares Mean	F	Level of significance	Practical significance

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<b>Contrast</b>	19.55	1	19.25	3.01	0.074	5.03%
<b>Group</b>	7340.22	1	7340.136	1146.44	*0.000	92.57%
<b>Error</b>	342.23	67	6.111			
<b>Total</b>	7702	69				

**\* Statistically significant at( $\alpha = 0.05$ )**

Table (5) shows that the volume of impacting of the method of teaching on critical thinking skills was considerable, and practical significant amount to (92.57%), the differences between mean of experimental group's performance scores and mean of the Control group's performance scores were statistically significant at ( $\alpha = 0.05$ ), in favor experimental group students, whose their mean of the performance scores on critical thinking skills test amount (32.20), while the mean of control group's performance scores on critical thinking skills test amount (18.10) according to table (4).

The superiority of impacting the electronic bag in critical thinking skills, compared to the traditional method can be explained the following:

The electronic bag provides learning contexts that face students with real scientific problems by computer, multimedia, simulation programs, Students conduct scientific research throw them, develop hypotheses, test them, reach to results, formulate generalizations, and practice thinking skills, such as: analysis, synthesis, reasoning and evaluation. The electronic bag connects the content to life throw learning situations related to phenomena, which are supported by movements, images, multimedia, then asking of students to accurately reflect these situations, and identify their main components, basic and secondary reasons beyond their occurrence, And provides a rationale based on the scientific

basis of this provision. As the e-bag provides learning environments that meet diversity in the abilities and needs of students, the student can continue to learn inside and outside of the school, Each student learns according to his abilities, uses the inferences to arrive to results, explains them clearly, and justifies the validity of them according on a scientific basis, Practicing critical thinking according to his energies, also, The electronic bag includes self-training, focusing on the practice of induction, reasoning, problems solving, the student face with phenomena; , to explain them, without stress toward score; where this can be positively reflected on development of critical thinking skills.

### **Recommendations**

In light of the results of the study and its discussions, the researcher recommends the following:

- In the field of the results and conclusions of the study, the results of this study have shown that teaching by electronic bag develops critical thinking skills, so it is recommended that physics teachers teach their students by electronic bags.
- Based on the results of previous studies and previous literature on the positive impact of electronic bags on development of different thinking skills, and in the improvement of cognitive products, it is recommended that educational supervisors to train teachers to employ electronic bags in teaching.
- In the field of scientific research on the subject of the study, the study recommends that studies on the use of electronic bags in the teaching of physics in higher level societies than in this study. This study and some previous studies have shown that these bags have an effective impact on the development of students' other studies may be needed to test this model for a longer period. Studies or research may include several modules. You may need a whole or more semester to know whether the effect is better than the study

or not; and other variables such as conceptual change, cognitive thinking, And creative thinking. This study also recommends similar studies in other sciences, such as: biology, chemistry, earth sciences.

- Making other studies to investigate the impacting of electronic bag on development of critical thinking skills in different educational materials.
- Increasing the number of computer labs connected to the Internet in schools.

### **References**

- Abu Musa, M. (2008). The impact of the use of the learning mix strategy on the achievement of students in the Arab Open University in the computer aided teaching curriculum and their attitudes towards it. *Journal of Action Research in Education*, 1 (4), 132-156, Arab Open University: Amman.
- Ani, W. (2000). The role of the Internet in promoting scientific research among Yarmouk University students. *Journal of King Saud University, Educational Sciences*, 12 (2), 307-308.
- Branch, J. (2000). *The Relationship among Critical Thinking, Clinical Decision Making, and Clinical Practice: A Comparative Study*. Unpublished Doctoral Dissertation Thesis, University of Idaho.
- Dardor, A. (2001). *The impact of the use of conceptual maps in the development of critical thinking among sixth grade students*. A magister message that is not published. Yarmouk University, Irbid, Jordan.
- Deng, Z. (2007). *Scientific Literacy as an Issue of Curriculum Inquiry, the University of Hong Kong*. Promoting Scientific Literacy: Science.

- Elder, V. (2004). Teaching Critical Thinking: Some lessons From Cognitive Science. *College Teaching*, 53(1), 41-46.
- Facione, P., & Facione, N. (1998). *California Critical Thinking Skills Test form A & form B: test manual*. USA- California, California Academic Press.
- Garrison, R & Vaughan, H. (2008). *Blended learning in Higher Education: Framework, principles and guidelines*. San Francisco: Jossey-Bass.
- Halpern, D. (2007). *Critical thinking across the curriculum: A brief edition of thought and knowledge*, Hillsdale, NJ: Lawrence Erlbaum Associates.
- Hinkle, D., Wiersma, W., & Jurs, S. (1988). *Applied Statics for the Behavioral Sciences (2<sup>ed</sup> Ed.)*. Houghton Mifflin Company.
- Huppert, P., Lomask, S., & Lazarowitz, R. (2002). Computer Simulation In The High School: Students Cognitive Stages, Science Process Skills and Academic Achievement In microbiology, *International Journal of Science Education*. 24 (8), 803-822.
- Kormaz, O & Karakus, U. (2009). The Impact of Blended learning Model on Student Attitudes Towards Geography Course and Their Critical Thinking Dispositions and Levels, *The Turkish Online Journal of Educational Technology*, 8(2).
- Kukolija, T., Milan, T., Kresimir, R., & Niksa, P. (2005). *Blending Problem – based learning with web technology positively impact student learning outcomes in acid – base physiology, Department physiology and immunology, University of Zagreb Medical school, Zagreb, croatia*, Retrieved January 17/2012, From <http://advan.Physiology.Org/cgi/reprint/29/7.PDF>.
- Lazarowitz, R & Huppert, J. (1993). Science Process Skills of 10<sup>th</sup> Grade Biology Students in A Computer-Assited



- Learning setting. *Journal of Research Computing in Education*, 25(3), 366-382.
- Linda, S., & Lian, N. (2011). Teaching Critical Thinking Skills in Higher Education: A Review of the Literature, *Journal of College Teaching & Learning*, 8(2).
- Mari, T; & Nawfal, M. (2006). The level of critical thinking skills among students of the Faculty of Educational Sciences, University of Anwarwa. *Al-Manara Magazine*, 13 (4): 289-341.
- Nobes, G., & Panagiotaki, G. (2007). Adults' representations of the Earth: Implications for children's acquisition of scientific concepts. *British Journal of Psychology*, 98(4), 645-665.
- Odah, A. (2010). *Measurement and evaluation in the teaching process*, e2. Irbid: House of Hope.
- Osguthrape, R., & Graham, R. (2003). Blended Learning and Enviroment: Definitions and Direction. *The Quarterly Review of Distance Edcation*. 4 (3), 227 – 233.
- Paul, R., & Elder, L. (2001). *Critical Thinking: Tools for Taking Charge of Your Learning and Your Life*. Upper Saddle River, NJ: Prentice Hall.
- Pereira. J., Pleguezuelos, E., Meri, A., Molina, R., Ani, M., Tomas, M., et al. (2007). Effectiveness of using blended learning strategies for teaching and learning human anatomy. *Medical Education*. 41(2), 189-195.
- Rothman, Alan H. (2000). *The Impact of Computer – based versus Traditional Textbook Science Instruction on selected Student Learning*: Temple University.
- Safety, P. (2002). *Methods of teaching science and its role in the development of thinking*, e2. Amman: Dar Al-Fikr.
- Schrag, F. (1992). *Relativity In Encyclopedia of Educational Research*( 6<sup>th</sup>. ed.). p 254-256.
- Wackermann, R., Trendel, G., & Fischer, H. (2010). Evaluation of a Theory of Instructional Sequences for

Physics Instruction. *Educational and Information  
Technologies*, 32 (7), 963-985.

Zoubi, A. (2006). *Build test critical thinking skills using  
paragraph response theory*. Unpublished PhD thesis.  
Yarmouk University, Irbid, Jordan.