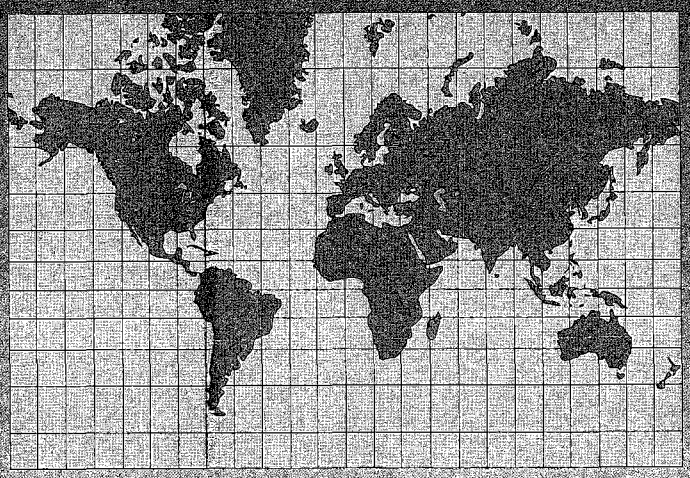
EDUCATION



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FEATURES OF COMPUTERIZED EDUCATIONAL GAMES IN SCIENCES OF THE ELEMENTARY PHASE IN JORDAN FROM THE POINT OF VIEW OF SPECIALISTS IN TEACHING SCIENCE AND COMPUTER SUBJECTS

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The study aims at introducing the features of the computerized educational games in sciences at the elementary school in Jordan according to the specialists in teaching science and computer subjects, through answering some questions such as: What are the features of the computerized educational games in sciences at the elementary schools in Jordan in the perspective of specialists in teaching science and computer? Can these features vary according to the major of the specialist, or his contact with this kind of games?

The study sample consisted of 160 specialists in teaching science and computer, as for the data analysis, frequencies, percentage rates, and indications were used, in addition to the use of Two-Way Anova tests for variance analysis of factorial design (2X2), Welx Lambda values calculation for the One-Way Variances tests, if needed. This study reached to several results: the participants enjoy a high awareness level with the features of the computerized educational games, and believe that it is important to insert these features in games' design, but they showed no interest in the features of explorative learning and creative learning. It also unveiled the lack of differences of statistical signs in the individuals' estimations of the computerized educational games' features, owing to the specialization, or to the interaction between the academic specialization and the exposure to training in the computerized educational games designing field; while there are differences that can be attributed to the training exposure, and for the benefit of those who engaged in the training.

According to the study's results, researchers recommend executing training programs for the teachers and the computerized educational experiences designers on the composition tools which fall under the building programs of computerized educational games.

Introduction

Formal science teaching in the class room does not exceed one fifth of the school day of the students in the best conditions, while the "informal" science learning outdoors includes a set of activities, events, methods, and institutions like the scientific museums, documentaries, radio, and the society's establishments such as the summer camps, home, friends, work sites, and internet. A number of parenting specialists stress the importance of learning sciences in an informal way, since it represents one of the educational resources that contribute to building the student (Dierking et. al., 2003).

In research context, many educational studies tended to search about the influence of the scientific museums outside the school to develop the students' experiences and their scientific concepts. Notwithstanding, there is scarcity in experimental educational studies that search in the methods and other informal resources of scientific education. Roberts (Roberts, 1999) emphasized the importance of these resources in regard to their effectiveness in the children engagement with such resources for long durations; the child spend over 38 hours weekly in using there resources like TV, simplified books, videos, and video games. Noting that TV is the most dominant on children's time (more than three hours daily), the vidfeo games and computers are increasingly playing effective roles in filling the children's time, especially the males.

Definition of educational games differs wit the contexts of using the related terminologies, for instance, Dempsy and his colleagues (Dempsy et. al., 2002) define the game as a set of activities, that requires one player or more, and achieves a certain goal, controlled by a group of determiners, with various levels and difficulty. The game, in general, is designed according to rules, with a manufactured nature (previously designed), it also oncludes some kind of competition, even if it was competition with one's self. Prensky (2001) added a new feature for the game, which is the State of Flow, so as to represent an expression for the child's feeling of gradual and full engagement in the game's activities. When the game is well designed, the players lose the sense of passing time, and spend lots of time doing the game's tasks. This is what pushed the student's motivation to its highest levels in regard to excitement and maintaining the drive during the whole playing time.

It is hopefully expected that games can make children's learning significant and connected with their interests and wishes (Provenzo 1992). Some studies showed that there is a positive impact of the computer games as a teaching manner, which indicates that they are able to improve the teaching results in general (McFarlane, Sparrowhawk, & Heald, 2002), and able to develop the knowledge abilities of the students (Jenkins, 2002), increase their drive toward learning (McFarlane et. al., 2002), as well as enhance their attention and concentration (McFarlane et. al.,2002).

Computer games improve learning through providing the students with visual experiences and enabling them to experience and create in the game (Betz, 1995), in addition to connecting the scientific concepts with the real world, which helps reduce the knowledge dispersion, and helps the students also to use his/her memory to do the higher thinking tasks. Some games which include resolving problems, require changing things and assets existing in the game, which forces the player to think in analyzing and correcting the information, and to make decisions in later steps. Although computer games are wildly spread, they are still separated from the school curricula and do not meet them (Egenfeldt-Nielsen, 2005). Researchers of educational games stress on the importance of merging contemplation in the games, as it is a main component of the game, noting

that players might not practice contemplation during the game (Garris, Ahlers, & Driskell, 2002; Gee, 2003).

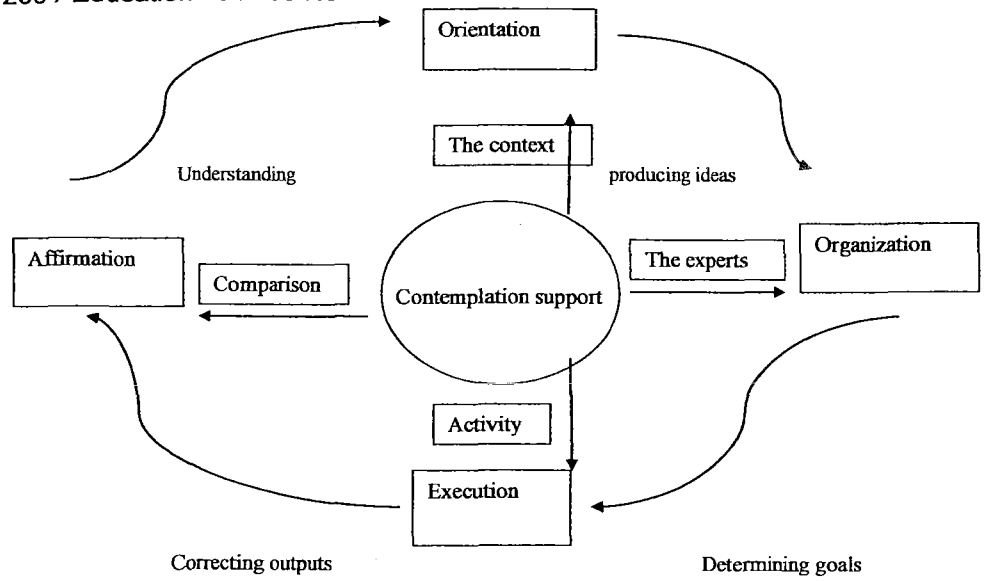
Therefore, and as it is important to learn how to practice meditation, educational games designers merged this component (meditation) in the games that require solving problems. Such problems are designed as a circle which starts with producing ideas, defining goals, correcting the outputs, and then building the concepts and models of knowledge. Developing the meditation process shall be taking place in an interactive environment which the game provides in each phase of the problem solving phases: orientation, organization, execution, and affirmation (Kiili, 2007). In the first phase, orientation, the player works on correcting and figuring out the problems of the game, here, contemplation interferes through building it over a real and true context for the problems suggested in the game. This step pulls the students' attention to the game and helps them concentrate in its problems to understand them. The ideas produced by the player are renowned for irregularity and vagueness, they also might be uncontrolled by the game's determiners and system, and they are expected to lead to new solutions.

In the second phase, organization, the player becomes busy in planning the behaviors, and watching the procedures and the performances to find resolutions. Here, contemplation interferes through providing the player with a group of the experts' suggestions to solve the problems and motivate the player's thinking to help hem/her formulate the goals, plus the sub-goals, as well as execute the resolution plan, draw expressive sketches of the plans and the resolutions, and finally organize the data in new image/s. In this phase the goals become clearer, which helps the students develop the resolution plans, taking into consideration the system determiners of the game and its resources.

Execution, the third phase, in which the students involve in organizing the behaviors as in the solution plans. Contemplation in this phase applies through providing the player with activities related to implementing the set goals to raise their conscious and contemplation in the problem solving, while the players are fixing their plans. Games shall contain a feedback option to enable the students correct their learning outcomes.

While the forth stage, affirmation, it calls on the playing students to correct the decisions they have made regarding the resolution plan execution and the results they got. The role which contemplation plays in this phase is represented in enabling the players do the calculations, build the models and express them in symbolic or modal images; this actually helps them correct their decisions and ensure that the resolution manners do match, followed by the procedures adopted by the experts in this area upon the ways they use to sole the problems. Assertion and check help the students in building cognitive concepts and forms, and enable them to discover new and better solutions for the problems. The following sketch represents the problems-solving circle to be followed while designing educational games, and shows the contemplation relationship with each phase of the problems solving process.

With respect to the effects of childrens' use of computer games on the teaching process, studies have showed that there is a big change in the students' expectations. The students' expectations do change regarding the teaching ways and methods, and its implementation manners in the class, effected by the strategies they acquired during from educational and recreational games they are used to play. Therefore, the students expect that the teaching be in a faster pace with an interactive nature, where they control the situations and the tasks, and play the main role exactly as in the games they play (Prensky 2001). This



fact calls on the education specialists to think seriously in merging educational games in the learning-teaching system for all the school phases, and in the primary phase in particular.

To give the educational games advantages, motivation, and preservation, a research shall be conducted on the features of these games related to the children's desires, and another about the features of the scientific games with attraction for students in the primary school. There are many computer educational games that focus on social learning for the student, and it is necessary to ensure that such games do consider the changes which occurred to the cognitive models of the new generation, the generation of technology. It does not make any sense to design these games upon the cognitive models of the adults. A research shall also be conducted about the motivation internal factors that must be considered while designing computer educational games.

The problem of the study:

To have all needed information and data available to design scientific educational games of real value for the primary school, and related to the students' requirements on the one hand, and the science subject on the other, this study looks for the answer of the following question:

What are the features of the computer scientific games, that suite the elementary school students in Jordan?

In specific, the study will attempt to answer the following sub-questions:

1. What are the features of computerized educational games for science in the elementary school in Jordan, according to the specialists in teaching science and computer subjects?
2. Do the computerized educational games' features for science in the elementary school in Jordan, according to the science and computer subjects teaching specialists, vary according to the academic major and the specialist's contact with such games?

Significance of the study:

The importance of this study emanates from the following:

1. Tackling a modern special topic that constitutes a base for using computer-

ized educational games in science for the elementary school in Jordan.

2. Benefiting the programs planning needed for educational development projects that aim at raising the general level of education.
3. Helping the concerned sides in designing computerized educational games in the field of defining the features of the educational games which fit to the elementary school in Jordan.

Previous studies:

Many studies have tackled the computer games topic and their role in the educational process.

The study conducted by Mitchell & Savill-Smith, 2004, reviewed the educational conducts related to the advantages of computer games in learning and teaching. It reached to the following advantages: computer educational games are a joy for the child, especially that they follow a simple principle based on profit and loss, directly give results and outcomes, they use real modeling and the aspects that attract the kid's attention, through connecting the kid's delight with visual feedback, they also provide him/her with an interactive environment of playing that furnish them with deep experiences, these games are found to find several ways and solutions for the problems which children encounter while playing the game.

Blunt, 2006, made a study with the aim of finding the effect of video games on the performance of university students majoring in management. The researcher used the trial method; a group of students learned the subject using video games, while another group learned by the traditional way. For data analysis, the researcher used the variance analysis and Kay squares, and the T test to ensure the effectiveness of the used method. Results showed that the students who used the video games in learning gained better notes and marks than those who used the traditional method.

Pinder, 2008, also conducted a study to discover the influence of computerized educational games on improving the conceptual knowledge and motivation levels of the academic action for public teaching students from KG to primary phases. To reach the goals of this study, the researcher applied the quantity and description methods, and it the sample included 16 male and female students and three science teachers. The results unveiled that using educational games is very useful during the primary school as of KG to the fifth grade.

Toprac, 2008, executed a study that aimed at identifying the effect of the learning based on playing, by applying the problems solving pedagogy to the students' motivation to learn science. The researcher implemented his experience through merging 44 students of the 7th grade in a game to solve problems for 9 hours. To collect the data, the researcher used the research approach based on design, as he employed the triangulation of the quality and quantity data, he also applied different tests to collect the sciences and self-evaluation questionnaires which the students respond to regarding the drive level and conserving it. These tests were executed before and after the experiment. As for the quality data, they were gathered through interviewing the students, class notes, written responses, and the interview with the science teacher. The results came up to prove that students who study the subject through a game, expressed higher motivation and drive to learn, without even depending on the game. Notwithstanding, the data was not enough to build a model for the motivation continuity, that can foresee the performance in science.

Lee & Chen, 2009, conducted a study to address the effect of an educational game for math, which depends on variation of the proposed questions and the previous knowledge,

on the students' ability to sole new unconventional questions. The experiment was applied on 78 students from the 7th grade in a public school, and it took 6 weeks. The results reflected a progress in the students' performance in solving unconventional problems.

Papastergiou, 2009, performed a study to discover the effect of teaching the computer's memory concepts through computer games on the students' performance and drive. To realize this study, the researcher divided 88 male and female students into two groups, the experimental group (47 students) studied the subject by using computer games, while the control group (41 students) used the usual way to study. For data collection purposes, the researcher applied the computer memory concepts test on both groups before and after teaching. She further executed a set of class notes during the experiment, as well as a questionnaire to discover the students' expectations of the experiment they passed through to learn the subject. Results showed that teaching through computer games enjoys big influence and statistical significance in the students earning of the concepts, it also increases their drive toward learning compared to the traditional ways.

Leng. et. al., 2010, brought a study with the aim of detecting the computer games' effect on developing creativity in the children of the age category (13- 14) years. The researchers adopted the experimental design method; the experimental group was taught using computer games that require investigation, the control group was taught with the sole learning method. The researchers recommended paying attention to the educational strategies that employ games design as it is the most influential element in the learning process.

To summarize, there are many studies conducted about the educational games in general, and computerized educational games in particular. All these studies emphasized the effect of these games on motivating the student's drive towards the learning topic. To have incentive computerized educational games, their design shall consider a set of principles, and aspects that form the specifications of the game. This is one of important research areas, as it connects between the design technique of computerized educational games on one hand, and the developments in educational sciences on the other, especially when we realize the importance of the primary school as the construction phase.

Notably, educational studies are rare in the area of computerized educational games' features for the phase, while there are many studies regarding their effect on the student's academic drive and performance. Even though, many researchers took advantage from these studies in setting up the goals of the current study, its questions, procedures, building its tools, and addressing its results. What distinguished this study the most is the research tool built after detecting the motivation aspects which had proven their importance to the students, and the types of games the designers try to innovate.

The approach and the procedures:

The study aimed at introducing the features of computer educational games that suit the elementary school students in Jordan. To achieve this goal, the study adopted the descriptive approach.

The study sample:

The sample of the study included 160 specialists in teaching science and computer subjects, 95 specialists in science, and 65 specialists in computer, in the directorates of education and private education in the capital. Table number (1) clarifies the sample distribution on the study's variables.

Research tool:

The research tool consists of two parts: the first contains general information for the

Table 1. Sample distribution on the study's variables.

The variable	Categories	Frequency	Percentage
Major	Scientific subjects	95	59,38 %
	Computer	65	40,62 %
Exposure to training	Yes	30	18,75 %
	No	130	81,25 %
Total		160	100%

respondent, and they are: major and exposure to training. The second part is a questionnaire about the modern trends of considering the computerized educational games' features during designing them, these trends have been developed based on previous studies and theories on this domain. The questionnaire included 25 paragraphs, and the answer consists of three ranks each represents the relation of every paragraph's content with the modern trends of considering the games' features during designing them, the ranks are: (agree, neutral, disagree). The respondents were asked to determine the agreement level to the content according to the triple standard. This measurement gives the following ranks:

- If the answer is (agree) it acquires rank 3
- If the answer is (neutral) it acquires the rank 2
- If the answer is (disagree) it acquires the rank 1.

Research tool honesty:

The apparent tool's honesty was inspected by reviewing it before a group of 5 arbiters from the teaching committee members at the University of Jordan, to benefit from their opinions and experience about the paragraph's rank suitability to the study fields, also to tackle the level of clarity of the paragraphs and their grammatical accuracy, and to eventually delete or add any phrase they consider as necessary. Afterwards, the paragraphs, which more than half of the arbiters approved, were selected, and all their notes were considered whether about the linguistic formulation, the paragraphs clarity, or the relation between the rank and the paragraph, as well as amendment and deletion; and finally they were edited to their final form.

The tool stability:

The researchers calculated the stability coefficient through Test- Re Test method on a sample of 30 specialists in teaching sciences, and education techniques. The period between each test was two weeks. The stability coefficient was calculated also by applying Pearson Correlation which amounted to 0,82. This indicates the effectiveness and the validity of this tool to accomplish the objectives of this study.

Statistic processing:

Statistic processing related to the main inquiries of the study:

1. To answer the first question, frequencies, rates, and order were used to define the study individuals' estimations of each feature of the computerized educational games'.
2. To respond to the second question the multiple dual variance analysis of factorial design (2X2) was used.

The study's results review and discussion:

First: the result regarding the first question:

What are the features of the computerized educational games for science in the elementary school in Jordan according to the specialists in teaching science and computer subjects?

To answer this question, the arithmetic averages and standards deviations were calculated, with the order of each paragraph. The following scaling was adopted to describe the estimations' level of the respondents:

Table 2. The averages, standard deviations, and the order of each paragraph of the special paragraphs in the field "characteristics and types of games" and the estimation level of the individuals participating in the study to each of them

Order	"characteristics and types of games	Mean	standard deviation	The level
1	games include challenges and problems requiring solutions by the player	2.69	0.62	High
2	games require classifying objects or placing them in groups	2.66	0.59	High
3	Games requires dealing with things and change	2.58	0.65	High
4	Games contain change in people run by multiple limited- number players	2.56	0.63	High
5	games include a change in resources to meet the challenges of multiple paths to achieve high success	2.41	0.75	High
6	games include changes in people in the game or between the players	2.39	0.67	High
7	Games contain changes in the people within the game so it is run by a single player	2.36	0.70	High
8	Games contain changes in people, which is run by the cooperative, non-limited players	2.28	0.81	Medium
9	the tasks of the Sub-game is time-bound which forces a child to speed performance	2.21	0.78	Medium
10	The game includes building (creating) real or virtual products within its environment	2.20	0.77	Medium
11	The games include virtual environments containing hidden or undiscovered fields	2.11	0.72	Medium

- If the arithmetic average of te paragraph ranges between (1 – 1,76) it gives a high level of estimation.
- If the arithmetic average of the paragraph ranges between (1,76 – 2,33) it gives a medium level of estimation.

If the Mean to the item ranged between (33.2 3), the evaluation would give a low level.

Table (2) shows a summary of the Means, standard deviations, and the order of each paragraph of the special paragraphs in the field "characteristics and types of games" and the level of individuals estimation involved in the study to each of them.

As shown in table (2) the respondents provides awareness and high estimation for adopting a problem-solving strategies in the design of computerized educational games since the three items which received the top order are related to the characteristics games of the kind that is designed according to the problem solving method which is considered a valuable, and educational approach in terms of the learner's way to deal with the supreme thinking skills. It requires that the learner deals with the problems which challenge his thinking and require innovative solutions by him. In addition, these forced player to classify things and put them in groups according to certain criteria, in addition to dealing with existing issues in the game through changing it.

That was followed in the evaluation by the games kinds of collective ones which require players (learners) (more than two), but they are limited in their numbers. This result strengthens the awareness of respondents to the social learning and its importance. This

item ranks the fourth; the items concerned with social playing rank the sixth, seventh, and eighth order. These items Include games changing (control) in people in the game or players, and contains a change in people within the same game as it is run by a single player. The game contains a change in people run by cooperative and number-limited players, respectively. However, the involvement of the not number-limited players has gained the medium evaluation.

This result reflects awareness owned by the study individuals with the necessity of involvement the data of social learning in the design of computerized, educational games within the context of players limitation, but this awareness is not enough to reach a degree of involvement of designs that allow control of the game by an unlimited number of players and it reflects the real –life fact characterized by interdependence and interrelatedness.

The item where the games "include change in resources to meet the challenges of multiple paths to achieve success", which relates to strategic playing, which includes dealing with resources and thinking about the multiple paths to achieve success required by the game ranked five, and thed the level of evaluation is high, which indicates the awareness of the study individuals with the necessity of involvement such ideas in the design of computerized educational games. Besides, this stresses the fact that awareness of the educators with the courses of learning that must be included in the games in terms of providing opportunities for students to be included in the practice of strategic thinking that is considered one of leading life skills needed to the learner

The item " creating the tasks of the secondary game which has a specific time forcing the child to speed performance," is related to the active learning , and it ranked seven and the evaluation is medium . The results referred study individuals do not believe that the design of the games tasks must determine a time to the learner, which forces him to speed the performance in the tasks needed for the game. This is the characteristic that provides active learning for the learner due to an estimate of study individuals to give priority to single-education data significantly in the content of computerized educational games and operations. As the item " " The game builds (creates) real or virtual products within the their environment," is related to the creative playing that enables the individual to exercise his creative thinking skills that pave the road to the player to be able to create products and installation by innovative modalities within the virtual environment provided by the game, this item ranked ten the evaluation was medium. This reflects the lack of sample individuals' appreciation to the importance creative thinking in the design of computerized, educational computer games; skills which are very important and are regarded as targets to the scientific education in any educational system.

The item entitled "The games include virtual environments containing hidden or undiscovered fields "ranked eleven, and the evaluation was medium. This item relates to exploratory learning, which depends on unclearness of the educational stream which the player (learner) has to deal with. This result indicates a lack of focus of the study individuals and their non-appreciation to importance to create such a type in the educational streams which especially pave the way to students to seize opportunities of practicing the behavior of scientists on a narrow and simple scope which helps them to apply scientific research skills in its all operations

In the field of shifts in the patterns of knowledge in this generation of learners and the study individuals' estimates to the items of this field , averages, standard deviations and levels of evaluation to each item have been computed . Table (3) shows Means, standard deviations and levels of evaluation to each item related with the field of "knowledgeable

Table 3. Averages, standard deviations and levels of evaluation to each item related with the field of "knowledgeable patterns " and the study individuals' estimates involved in the study to each of them.

Order	knowledgeable patterns	Mean	standard deviation	The level
1	Show the connections between parts of the total content rather than introducing it In the form of separate parts.	2.55	.65	High
2	show the images included in the game quickly	2.54	.69	High
3	Bidding on the player's attachment to technology rather than fearing from.	2.49	.68	High
4	Rely on humor in the structure of the game instead of realism and rigor.	2.44	.74	High
5	Adopting the fun instead of direction and selection in the presentation of experiences	2.44	.72	High
6	Adopting ideas of the rapid cut of the performance rather than patience to do so.	2.43	.70	High
7	Adopting fun ideas to playing instead of working restricted to achieve	2.42	.69	High
8	Depend on images rather than passages	2.41	.67	High
9	show a range of expertise all on one time instead of introducing them experience by experience sequentially	2.41	.75	High
10	Adopting the help to handle instead of the linear curve in the design of the game	2.41	.68	High

patterns " and the study individuals' estimates involved in the study to each of them.

It is noted from the previous table, the members of the study estimate with a high level all items in this area, so it refers to the study individuals' awareness to the transformations that have occurred on the patterns of knowledge for learners of this generation, and reflect their eagerness to apply these transformations in the educational experience provided by the computerized educational games can be applied in learning science in the primary stage in Jordan

In the field of internal sources of motivation and estimates of study individuals to the items in this field, averages, standard

Table 4. Averages, standard deviations and levels of evaluation to each item related to internal sources of motivation and estimates of study individuals to the items.

Order	internal sources of motivation	Mean	standard deviation	The level
1	Provide surprising information to the player, which deals with the lack of his knowledge	2.44	.71	High
2	the tasks of the game Include current difficulties and challenges to players	2.42	.72	High
3	Providing the player with options and highly-controlled potentials in results of his learning while playing	2.42	.72	High
4	The game contains a degree of fun and excitement Through the high simulation	2.41	.69	High

Table 5. Means, standard deviations to the study sample individuals' estimations on the questionnaire that reveals the characteristics of the computerized, educational games

The field	Specialization	Training	Mean	Standard deviation
Games types	Scientific materials	Yes	28.75	3.08
		No	25.93	2.79
		Total	26.28	3.11
	Computer	Yes	28.61	2.75
		No	25.83	2.27
		Total	26.61	2.71
	The total	Yes	28.67	2.83
		No	28.89	2.73
		Total	26.42	2.95
Knowledgeable patters	Scientific materials	Yes	23.92	4.81
		No	24.59	4.14
		Total	24.51	4.21
	Computer	Yes	25.11	3.94
		No	24.3	3.08
		Total	24.55	3.33
	The total	Yes	24.63	4.27
		No	24.50	3.79
		Total	24.52	3.87
internal sources of motivation	Scientific materials	Yes	9.75	2.09
		No	9.71	1.97
		Total	9.72	1.98
	Computer	Yes	9.39	2.28
		No	9.74	2.17
		Total	9.64	2.19
	The total	Yes	9.53	2.18
		No	9.72	2.04
		Total	9.69	2.06

deviations and levels of evaluation to each item have been computed. Table (4) shows averages, standard deviations and levels of evaluation to each item related to internal sources of motivation and estimates of study individuals to the items.

It is noted from the previous table, the members of the study estimate with a high level all items in this area, so it refers to the study individuals' awareness to the necessity of involvement the challenge to educational experience provided by the computerized, educational games and the development of curiosity, and providing a higher level of player's responsibility for his learning and control of the proceedings, and his streams . In addition, these four characteristics make learning of the playing great importance in stimulating the motivation of learners and its protection throughout the time of the game.

Table 6. The results of the values of Wilks Lambda for the variables of the specification and training and the interaction between them and F value and its statistical significance

Variation resource	values of Wilks Lambda	F	The virtual freedom degrees	The wrong freedom degrees	The significance level
Specification	.995	.234	3	153	.872
Training	.865	7.991	3	153	.0000
the specification * training	.991	.464	3	153	.708

* (0.05 > ά)

Second: the findings related to the second questions and discussion

Do the characteristics of the computerized, educational games vary in the Science in the primary stage in Jordan, as seen by specialists in the teaching of science and computer materials with regard to the differences in their academic specializations or their contact with the design of computerized games?

To answer this question, averages, standard deviations were calculated according to the levels of the study variables; table 5 shows these results

It is noted from the previous table that there is a difference in the mathematical, descriptive values (apparently) for Statistics of the study sample individuals' estimations for each area of the tool. Accordingly, the effect of each variable of the academic specialization of the respondent , in addition to being subject to training in designing the computerized educational games has been tested by using -MANOVA Multivariate Analysis of Variance to estimate the study sample members on the questionnaire. Table (6) shows the results of the values of Wilks Lambda for each variable and the interaction between the two variables.

It is noted from the previous table that the values and Wilkes Lambda corresponding to each of academic specialization and interaction between academic specialization and exposure to training was not statistically significant, and there are no statistically significant differences in the estimates of the participants in the study to the items included in the questionnaire can be attributed to any of the academic specialization or the interaction between specialization and training.

The value of Wilks Lambda corresponding to the training was statistically significant, so the researchers conducted a unilateral analysis of variance of variables for each of the three fields of the questionnaire. Table No. (7) below illustrates the analysis results

It is noticed from the table (7) that there is not differences with the statistical signif-

Table 7. The results of a unilateral analysis of variance of variables to every field of the questionnaire

The field	Squares sum	Freedom degrees	Squares average	F value	The significance level
Games types	182.086	1	182.086	23.783	.000*
Knowledgeable patters	0.072	1	0.072	.005	0.945
Internal sources of motivation	0.560	1	0.560	0.130	0.719

* With statistical significance at the level (0.05 > ά)

Table 8. The Means, Standard Deviations Standard errors for estimating the study sample members on the fields of the computerized educational games according to the variable of being exposed to training.

Exposure to training	Mean	Standard deviation	Standard errors
Yes	28.67	2.83	.52
No	25.92	2.73	.24
Total	26.43	2.95	.23

icance of the values of "F" corresponding to each field of the patterns of knowledge, or those corresponding to the field of internal sources of motivation, while the value of F corresponding to the types of games with statistical significance, suggesting that exposure to training in the field of the computerized, educational games has an impact on the study individuals' estimations to the items of the kinds of games.

In order to identify the nature of the impact of training in variation of the study individuals' estimates to the items of the kinds of games , averages and standard deviations of respondents were calculated according to levels of variable of exposure to training, and Table No. (8) below illustrates this.

This table shows that the mean to estimating of study individual members to the field as a whole from those who were exposed to designing the electrical educational games amounted to (28.67), and it is the highest – with statistical significance - from the average of the estimates of study members to the field as a whole who were not exposed to training on designing the electronic educational games, and which amounted to (25.92). To ensure this result, the researchers conducted analysis - variance according to a variable training, and Table No. (9) below shows the results of the analysis It is noted that there is a statistically significance (S = 0.000) of the value of "F" (24.360) and the result means that there is a statistical difference between the Means of estimating the study sample individuals due to the impact of variable exposed to training in the design of the computerized educational games to the favor of those who took the training.

The results indicate in whole that the exposure in training the design of the computerized educational games would deepen the understanding of professionals in teaching the materials of science and computer with the characteristics that must be available in educational games, and this result is attributed to the recent issue of the computerized, educational games especially when it is commonly used as the regular games that are being marketed for the purposes of entertainment and rarely linked to a particular content knowledge.

Deficiencies in the computerized games related to curriculum with the enormous cost

Table 9. The results of One Way analysis of Variance to field of the estimates of study members to the field of games kinds according to a variable training

Variance resource	Squares sum	Freedom degrees	Squares average	F value	The significance level
Among the groups	184.508	1	184.508	24.36	.0000*
Within the groups	1196.736	158	7.574		
Total	1381.244	159			

that is required for the production of a particular game to learn certain scientific concepts. (Oblinger, 2006) stresses that the enormous cost to produce the computerized games in general and the educational in particular are the reason that justifies the reluctance of educators to use these games in the educational attitudes.

Recommendations:

In the light of the results of the study researchers recommend the following:

- Providing the educators with the characteristics of educational games in general and the computerized educational games in terms of types and suitability for shifting in the patterns of knowledge for the new generation of learners, in addition to taking into account the internal sources of motivation.
- Implement the training programs of teachers and designers of educational and educational experiences on the authoring tools included in programs of building the computerized educational games.
- Conduct further studies to look in the preferences of students to various types of educational games.

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