The Impact of Using Some Participatory E-learning Strategies in Developing Skills of Designing and Producing Electronic Courses for A Sample of Umm Al-Qura University Students and their Innovative Thinking

Dr.Emad Mohammed Samra

Associate Professor of Education Technologies, College of Computer and Information Systems,

Umm Al-Qura University

Assistant Professor of Educational Technologies, Faculty of Education, Al-Azhar University

Abstract

The current research aims to reveal the impact of using some participatory e-learning strategies (participatory product - classroom web simulation) in developing cognitive achievement, electronic course design skills, and - skills list - Torrance test of innovative thinking). The tools of innovative thinking among a sample of Information Science students. To achieve the objectives of current research, the researcher designed an educational website to train students to produce electronic courses via the web, according to the two participatory e-learning strategies. The researcher used a set of tools represented in (achievement test research and experimental treatment were applied to a sample of the Faculty of Computer students at Umm Al-Qura University. The results found that both participatory product strategy and web simulation have an imact on developing learning aspects discussed in the research. As for which of the two strategies had a greater impact than the other, it turned out that the web simulation strategy had a greater impact than the participatory product strategy in developing these aspects.

Keywords: *E-learning Strategies- Skills- Electronic Courses- Innovative Thinking*

1. Introduction

Higher education institutions are currently adopting online education at an accelerating pace to reach more students; Higher education institutions are competing to offer qualitative academic programs offered online, with the responsibility to provide students with a successful learning experience through these programs; coinciding with the precautionary measures the world has faced to confront the Corona virus (19-COVID), in which education has shifted to a completely online distance learning mode [1].

E-learning is one of the most prominent modern and contemporary global trends that all countries of the world are quick to benefit from in developing their educational systems. The Kingdom of Saudi Arabia, as one of the countries that gives public education in general and university education in particular a clear attention, has attempted to take advantage of the implementation of e-learning programs, and adopting it as one of the methods used in higher education institutions. And it seeks to clearly visualize a new approach to e-learning that relies on performance and participation. The Ministry of Higher Education plays a pioneering role in making e-learning a participatory approach based on improving performance through the optimal use of various e-learning technologies, tools and strategies. [2]

The web 2.0 has changed the way the Internet is used, especially in terms of its creative and collaborative nature. The Internet is just a platform for student participation and interaction, supporting effective use, and the development of digital communities, as well as providing means and opportunities to develop students' online destinations, thus enriching and improving their progress. And (web 2.0) supports learning that calls for active learning, that is, it calls for participation, and effective dynamism, so that both time and space become less influential in the learning process. [3]

Information and technological progress and development have also led to the emergence of new concepts and strategies for teaching and learning, that take the form and name of the technology used. So, what's called participatory learning via the web, e-participatory learning strategies, educational platforms, digital learning resources, and more emerged [4].

Participatory learning has great potential in higher education, as it promotes the joint construction of knowledge, as well as its development of interacting skills, which result in more important learning processes. The participatory approach in virtual higher education focuses on joint activity in teaching and learning environments. [5]

Manuscript received March 5, 2023
Manuscript revised March 20, 2023
https://doi.org/10.22937/IJCSNS.2023.23.3.3

Several studies have emphasized the effectiveness of participatory e-learning in developing the cognitive and performance aspects of some skills, such as the studies of [4], [6], [7], [8].

Innovative thinking as a mode of thinking is a particular necessity of the modern era of technology that we live, because there are so many problems that rarely accept a single solution as they extend to the past and require more effective programs and solutions to ensure reaching the desired educational objectives; The educators emphasized that one of the modern teaching strategies objectives is to teach students how to think, not how to memorize; as there has become an increasing interest in studying thinking and its skills and calling for its development among students, as thinking occurs as a result of learning and continuous training [9].

Given the multiplicity for participatory e-learning strategies, the current research attempts to identify the impact of using two strategies (participatory product strategy, and web-based learning simulation strategy for classroom learning), taking advantage of the potential of the second generation web in a practical way, using e-learning tools that help to transfer the characteristics of face to face communication to the web-based e-learning environment, through the tools it provides, whether synchronous or asynchronous, so students have the opportunity to communicate with each other, read and see and respond to incoming messages, where students have an appropriate time in the sharing process, which leads to deepening their understanding, and improving their practical skills.

2. The Research Problems

The research problem stemmed from :

.1 View the results of the Information Science students' tests in the website development course regarding the skills of creating educational electronic courses, and the students' scores show a decrease in those scores among the students.

2. By conducting unstructured interviews with students of the Information Science Department to find out why they were unable to acquire the cognitive aspects and skilled performance of the website development course, and among of the most important reasons they had:

• There are individual differences among students, but they are not considered in theoretical and practical aspects.

• The teaching method used does not effectively affect students' acquisition of the cognitive aspects and skill performance of the course.

3. The recommendations of the Second International Conference on E-Learning and Distance Education (2013) urged universities to establish more flexible interactive educational systems that contain scientific courses in all disciplines, e-books, periodicals and scientific journals, and to evaluate, analyze and develop existing programs and systems in higher education institutions to ensure the optimal construction of these programs serve the educational process.[2]

4. The recommendations of the Fourth International Conference on E-Learning and Distance Education (2015) also emphasized that a culture of e-learning should be widely disseminated and introduced on in universities, schools and institutes.[10]

5. The recommendations of the First International Conference on Digital Education also emphasized the need to develop strategies for creating digital content and employing e-learning environments and platforms.[11]

With this great shift in educational technologies and innovation, the role of the student is no longer limited to be recipients of the learning process, but the skilled student is the one who gets opportunities to develop his basic and cognitive skills, understand other cultures and strengthen intercultural relation. Thus, to make sure that existing web-based applications are used for both teachers and students and enable them to collaborate effectively with the academic environment set up by their respective educational institutions. Participatory e-learning helps get students involved in the world we live in today and the world that will be taught in the future, by providing tools to guide, assist and monitor online learning activities. Participatory learning aims to support the student's active participation in the field of learning, by working together with the student in his/her group along with the teacher's guidance, while giving the student the opportunity to express his/her views and discuss the opinions of others in order to achieve the goal of learning.

3. Identify Research Problem:

The problem of the current research can be identified in the following main question:

"What is the impact of using some participatory e-learning strategies in developing the cognitive achievement and skills of designing and producing electronic courses for a sample of Umm Al-Qura University students and their innovative thinking"

The following questions arise from the previous question:

1- What skills are needed to design and produce electronic courses from the experts' and specialists' point of view?

2- What are the educational and technical standards related to designing and producing electronic courses from experts and specialists' point of view?

3- What is the impact of using a participatory product strategy as one of the participatory learning strategies on the development of: (cognitive achievement - practical performance - developing innovative thinking skills) related to the skills of electronic course deign and production for the students of Information Science Department at the Faculty of Computer at Umm Al-Qura University?

4- What is the impact of using a classroom web simulation strategy as one of the participatory learning strategies on the development of (cognitive achievement - practical performance - developing innovative thinking skills) related to the skills of electronic course deign and production for the students of Information Science Department at the Faculty of Computer at Umm Al-Qura University?

5- What impact did the differentness of the two participatory e-learning strategies (participatory product - classroom web simulation) have on each of: (cognitive achievement - practical performance - developing innovative thinking skills) related to the skills of electronic course design and production for the students of Information Science Department at the faculty of Computer at Umm Al-Qura University?

Research Objectives:

The current research aims to:

1) Reaching a list of the basic skills required to design and produce electronic courses.

2) Reaching a list of educational and technical standards related to electronic courses design and production.

3)To identify the impact of using two participatory e-learning strategies on the development of the information cognitive achievement related to the skills of electronic courses design and production.

4) To identify the impact of using two participatory e-learning strategies on developing the skills of electronic course design and production.

5) To identify the impact of using two participatory e-learning strategies on developing innovative thinking skills for Umm Al-Qura University students.

6) To determine the optimal strategy (participatory product – classroom web simulation) on each of (achievement, skills, innovative thinking).

The research limits:

The limits of the current research are as follows:

Using two participatory e-learning strategies (participatory product - classroom web simulation).

A sample of Information Science Department students at the Faculty of Computer and Information Systems, Umm Al-Qura University.

The content of the current research was limited to the cognitive information included in the developing websites course for students of Information Science Department

Cognitive achievement Measurement, skills development, and developing innovative thinking.

The researcher will use the Course Lab program, which is a program for designing and publishing electronic courses according to SCORM standards .

Importance of the research:

The research is expected to contribute to the following:

- Providing a list of the skills that Umm Al-Qura University students should have to design electronic courses.
- This study presents a proposed design for a participatory learning environment based on using some of its strategies, taking advantage of the capabilities and services of the second generation Web (Web.2).
- Keeping abreast of recent trends in the field of education in general and electronic education in particular.
- This study may encourage Umm Al-Qura University Administration in designing standards to ensure the quality of electronic courses produced by faculty members.
- Many sectors such as faculty members, instructional designers, and educational institutions can benefit the results of this study in designing online courses.
- Contribute to publishing the culture of quality electronic courses in university education.

Research Method:

The current research uses the descriptive approach to construct the questionnaire, prepare a list of the research skills, and reach to a list of educational and technical standards for the research. It also uses the experimental approach, which aims to investigate the impact of one or more independent variables on one or more dependent variables, where the current research included one independent variable which is: the participatory e-learning strategy and it has two patterns:

A- The participatory product strategy.
B- Classroom web simulation strategy.

Research sample:

The current research sample was selected from the Information Science Department students at the Faculty of Computer who are studying websites development courses, and was divided into two experimental groups: one of them studies participatory product strategy, and the other studies classroom web simulation.

Experimental design for research:

The experimental design known as (Extension of the two experimental groups with pre- and post-test) is used, and this design includes two experimental groups as shown in the following figure:

Strategy Pattern	Pre-test	experimental treatment	post-test
Participatory product strategy	O1	X1	O2
classroom web simulation strategy	O1	X2	O2

Figure (1) The experimental design of the research

Based on the previous, this research obviously compares the performance of an experimental group (1) to that of an experimental group (2), which are internally controlled to the other.

Research hypotheses:

.1. There is no statistically significant difference between the average scores of the sample members who study by using participatory product strategy in the pre and post measurements on the achievement test of cognitive information related to electronic course design and production skills.

2. There is no statistically significant difference between the average scores of the sample members who study by using participatory product strategy in the pre and post measurements on the practical performance observation card of the electronic course design and production skills.

3. There is no statistically significant difference between the average scores of the sample members who study by using participatory product strategy in the pre and post measurements on the innovative thinking scale of the electronic course design and production skills.

4.There is no statistically significant difference between the average scores of the sample members who study by using a classroom web simulation strategy in the pre and post measurements on the achievement test of cognitive information related to the electronic course design and production skills.

5. There is no statistically significant difference between the average scores of the sample members who study by using a classroom web simulation strategy in the pre and post measurements on the practical performance observation card of the electronic course design and production skills.

6. There is no statistically significant difference between the average scores of the sample members who study by using a classroom web simulation strategy in the pre and post measurements on the innovative thinking scale of the electronic course design and production skills.

7. There are no statistically significant differences between the average scores of the two experimental groups' students in the post-measurement on the achievement test of cognitive information related to the skills of designing and producing educational electronic courses, due to the impact of the difference between the participatory product strategy and the classroom web simulation strategy.

8 There are no statistically significant differences between the average scores of the two experimental groups' students in the post-measurement on the practical performance observation card of the skills of designing and producing electronic courses, due to the impact of the difference between the participatory product strategy and the classroom web simulation strategy.

9. There are no statistically significant differences between the average scores of the two experimental groups' students in the post-measurement on the innovative thinking test, due to the impact of the difference between the participatory product strategy and the classroom web simulation strategy.

Research tools:

This research depends on the following tools:

- An achievement test of the cognitive information related to the skills of designing and producing electronic courses for students of Information Science Department, Faculty of Computer, and Umm Al-Qura University.
- Practical performance observation card for electronic courses design and production skills.
- Torrance's innovative thinking test, which is codified on the Saudi environment, to measure the extent to which students develop innovative thinking skills.

Building experimental treatment materials and tools used in the current research :

First: Regarding the experimental treatment materials: The experimental treatment material of this research is the content presented through two participatory e-learning strategies, because of the nature of the research in that it aims to measure the impact of a two-level independent variable (participatory product, classroom web simulation), it required reviewing many instructional design models related to e-learning and its strategies, and what fits into the current research nature, The most important of these models are the general model of design, ADDIE, [12], [13], [14], [15],[16],[17] based on the study of the previous models, the researcher has constructed a model that appropriate to the nature of the current research and that helps achieve the research objective The model includes five basic stages: current reality study stage, design stage, programming and publishing stage, the application stage, the evaluation stage)

Current Reality Study Stage: This stage consists of the following steps:

- **Analyzing the problem and Determining learners' needs**: The problem is the need to develop electronic courses design and production skills through some participatory e-learning strategies, to determine the most appropriate strategy for students (participatory product/web simulation) which gives a high level of academic efficiency and excellence, improves the production of e-courses and develops their innovative thinking, thus the educational need of students is determined by the need to improve their knowledge and skills and develop their innovative thinking through a participatory e-learning environment.

- **Analyzing Learners' Characteristics:** The general characteristics of the current research sample were identified from students of Information Science Department at the Faculty of Computer at Umm Al-Qura University in Makkah Al-Mukarramah, who are studying the course on websites development, have never studied the course electronically, have basic skills to use computer and can use the Internet and they have skills that enable them to use and deal with electronic interaction tools.

- **Determining General Objectives:** The general objective is determined by the student's study of the educational content provided through some participatory e-learning strategies, and is to develop cognitive achievement and skills of designing and producing electronic courses, as well as the students' innovative thinking.

- **Identifying the Reality of Available Educational Resources**: Computer labs of Information Science Department at the Faculty of Computer were sometimes used, where the department has a set of computer labs equipped with high-specification computers for easy use by students. In addition, personal equipment's are available to students for easy access by them to study the content from anywhere other than the department labs, especially to share knowledge and skills using synchronous or asynchronous communication tools.

Design stage: This stage included the following steps:

Determining Procedural Educational Objectives: The objectives have been appropriately constructed to help determine the type of performance or behavior that the learner should successfully demonstrate after completing studying the program content according to the two participatory e-learning strategies, so that they are observable and objectively measured.

Determine the Participatory E-learning Strategy used: Since the problem of the current research is the low level of Information Science Department students at the faculty of Computer in electronic course design skills according to technical and educational standards, which prompted the researcher, according to the nature of the content and as a proposal to improve learning and skill performance, to develop innovative thinking to design a participatory learning environment based on the use of some of Its strategies (participatory product/classroom web simulation) to develop these skills, where the content, learning tasks and activities are presented in a participative learning manner, taking advantage of Web 2 capabilities, with the availability of synchronous and asynchronous interaction tools.

Determining Student-Teacher Communication Means: A set of student-teacher communication means and tools were identified according to the participatory learning strategy pattern used; in this participatory product strategy pattern, students communicate and share the product through the following tools: (chat room - e-mail – forum), in the web simulation strategy pattern, students and teacher use the following tools (video conferencing - chat room - e-mail – forum).

Designing a participatory product strategy: the researcher did the following:

Dividing the participatory product group into (6) groups, each group consisting of (5) students. Each group will participatly produce an electronic course based on the strategy defined, using the participatory tools available to them to interact and share with each other.

The group members plan and share with each other, and participate in order to implement the required product, while the researcher provides advice and support when asked and acts as a mentor, not a prompter.

The students of each group participate together in planning the electronic course that will be designed through group discussions, the distribution of roles within the group, and

the accountability of each student for his task. The group members evaluate the task of each member separately and participate in the final evaluation of the course.

- Through discussion rooms, each student discusses his task in order to reach a single final product for the group.

- An interaction occurs between each group of the groups among themselves, clarifying each group's work findings, to discuss them with everyone, comment on them, and benefitng from the experiences of each group members.

- One of the group members, chosen by all of its members, undertakes the task of coordinating between the group members, following up on the roles assigned to them, and ensuring that the product is implemented according to specified schedule.

▪ **Design a classroom web simulation strategy according to the following steps:**

-Introducing new education to students on the skills of designing and producing electronic courses through texts, video clips and other components of the educational content.

- Encouraging students' participation and activating their responses through educational activities and interim tests included into the educational content and followed by appropriate feedback on the student's response.

- Students interact with each other in sharing groups, and with their peers in the classroom face-to-face during learning in lecture hall, as well as through synchronous and asynchronous interaction tools such as chat rooms, e-mail and other tools during self-study.

- Students interact with the teacher via e-mail and chat rooms.

- Studying in classrooms or labs for practical training on the skills that require the teacher to be present with the students.

- Each student presents what he has produced to the rest of the group through the group's forum as a whole.

▪ **Programming and Publishing Stage:** where the design of the participatory e-learning environment was translated, practically produced, and built the interface elements of the interaction through the use of multimedia that suits the scientific content. And the page code and tools of the participatory e-learning environment were prepared, and then add the proposed content within the learning environment, so that learners begin to build new knowledge by exchanging opinions and files about the design and production of electronic courses, and the site's URL, http://www.designofelectroniccourses.com/, was identified.

▪ **Application Stage:** At this stage, the researchers applied the two participatory e-learning strategies to ensure that each strategy is valid for applying and actual use for the basic study sample. This stage consisted of:

Experimental application of both participatory e-learning strategies to an exploratory sample: to identify obstacles that core experience students may face when using either of these participatory learning strategies, student acceptance of these strategies, and the lake of software problems related to the learning environment, The exploratory study sample consisted of (10) students from Information Science Department at Faculty of Computer at Umm Al-Qura University in Makkah Al-Mukarramah, in the first semester of the academic year (1441/1442). The results of the exploratory experiment showed that both strategies were appropriate for their actual application.

Actual application of the two participatory e-learning strategies: After completing the exploratory experiment and ensuring its validity for application, the actual application was carried out on the research basic sample, numbering (30) students, were divided into two groups according to the participatory e-learning strategy used, and the application took (20) days of the first semester of the academic year.(1441/1442)

Evaluation stage: In this stage, the two participatory e-learning strategies were evaluated through the post-measurement of research tools and statistical processing of results.

Presentation, discussion and interpretation of the results: First: findings for electronic courses design and production skills list:

A number of (26) main skills required to design and produce electronic courses using the Course Lab program were reached, with up to (250) sub-skills falling under each main skill.

This axis findings are related to question No. (1) of the research questions, which read:

1-**What are the skills of designing and producing electronic courses using the Course Lab program?**

This question has been answered; where the data obtained from the application of the questionnaire was processed, using the Ka-square (Ka2), and a significance level (0.05) of the vocabulary (skills) of which (Ka2) is a function was used at this level, to represent the skills of designing and producing electronic courses needed for Information Science students from the experts and specialists' point of view, thus answering the first question of the research and which read:

What skills are needed for designing and producing electronic courses from experts and specialists' point of view?

Second: The results related to identification of educational and technical standards for the design and production of electronic courses from the point of view of experts and specialists:

A list of educational and technical standards required for designing and producing electronic courses has been answered from the point of view of experts and specialists. The researcher prepared a list of educational and technical standards and presented them to a group of specialized experts. The statistical method known as KA2 was used. A number of eight (8) standards were established to be met for the design and production of electronic courses. Each standard fell under a total of (79) sub-standards. Thus, the first question of the research was answered and which read:

What are the educational and technical standards related to the design and production of electronic courses from the point of view of experts and specialists?

Third: The results of the impact of using the participatory product strategy in developing the skills of designing and producing electronic courses and innovative thinking:

This has been done according to the following steps : With regard to the results of using the participatory product strategy in developing the cognitive achievement associated with the skills of designing and producing electronic courses:

The significance of differences between the average scores of the (participatory product) group in the pre and post application of the cognitive achievement test was calculated using the t-test. And the results shown in the following table No. (1) are reached:

Measurement / Variables	Pre		Post		T value	significance
	M	SD	M	SD		
participatory product strategy	27.77	6.46	33.03	7.15	2.993	0.01

The previous table revealed that the calculated (t) value, which is (2.993), is greater than the tabulated (t) value at the level of significance (0.01), which indicates there is a statistically significant difference between the average scores of the (participatory product) group in the pre-measurement of the cognitive achievement test. , which amounted (27.77), and between their average scores in the post-measurement, which amounted (33.03), in favor of the higher average; which is their average scores in the post-measurement.

Accordingly, the first hypothesis of the research was rejected, and the alternative hypothesis was accepted; which states, "there is a statistically significant difference between the average scores of the sample members who are studying using the participatory product strategy in the pre and post measurements on the achievement test of cognitive information related to the skills of designing and producing electronic courses in favor of the post-measurement".

Thus, the first part (a) of the third question of the current research has been answered.

This result can be traced back to:

The website was professionally and attractively designed that helped provide students with knowledge of the foundations and skills of designing electronic courses, which led to a noticeable improvement of their knowledge between the pre-test and the post-test.

-The website provided the opportunity for students to re-study the content frequently, which helped to remember and benefit from the website, in addition to presenting a new, effective and enjoyable learning environment. The students were psychologically prepared through what the researcher noticed of satisfaction, pleasure and enthusiasm in the learning process using the participatory website.

What is based on the participatory product strategy of sharing among group members and exchanging experiences and knowledge in order to reach a participated product between them led to firm up the information related to the required product, and thus, increased the cognitive achievement level of the research sample.

The individual responsibility of each learner within the group made him feel as if the whole matter of his group was based on him and thus worked on mastering the work and accessing knowledge related to the required task, which was positively reflected on the cognitive achievement results.

With regard to the results of using the participatory product strategy in developing practical performance related to the skills of designing and producing electronic courses:

The significance of differences between the average scores of the (participatory product) group in the two pre- and post-applications of practical performance observation

card was calculated using the t-test. And the results shown in the following table No. (2) were reached.

Measurement / Variables	Pre		Post		T value	significance
	M	SD	M	SD		
participatory product strategy	324.37	117.91	425.50	114.03	3.377	0.01

Previous table revealed that the calculated (t) value, which is (3.377), is greater than the tabulated (t) value at the level of significance (0.01), which indicates there is a statistically significant difference between the average scores of the (participatory product) group in the pre-measurement of the practical performance observation card, which amounted (324.37), and their average scores in the post-measurement, which amounted (425.50), in favor of the higher average; which is their average scores in the post-measurement.

Accordingly, the second hypothesis of the research was rejected, and the alternative hypothesis was accepted; which states "there is a statistically significant difference between the average scores of the sample members who are studying using the participatory product strategy in the pre- and post-measurements on the practical performance observation card of the electronic courses design and production skills in favor of the post-measurement".

Thus, the second part (b) of the third question of the current research has been answered.

This result can be traced back to:

The modernity of the program's topic, which is the design of electronic courses, and the sense in students of its importance and their desire to learn it, especially as they electronically deal with courses for faculty members, has prompted them to desire to study, train and master the content. The availability of each content study all the time without restrictions, and communication tools between group members, which enabled students to follow the program topics at a time convenient for them and thus helped to develop skills .The group's participation in the participatory product is mainly based on the product being reviewed by the group members as a whole, expressing an opinion about it, and being modified according to what has been agreed upon, made everyone acquire the skills well and thus increasing their skill acquisition. These results agree with the results of [4] study, which found the effectiveness of the participatory product strategy in developing practical performance skills.

With regard to the results of using the participatory product strategy in developing innovative thinking skills related to skills of designing and producing electronic courses:

The significance of differences between the average scores of the (participatory product) group was calculated in the two pre- and post-applications of innovative thinking test using the t-test. And the results shown in the following table No. (3) were reached.

Measurement / Variables	Pre		Post		T value	significance
	M	SD	M	SD		
Fluency	14.6	4.13	17.84	5.02	3.07	0.001
Flexibility	460.56	135.73	542.56	153.83	2.15	0.01
Originality	12.52	4.24	15.67	5.81	2.43	0.01

The previous table revealed that the calculated (T) value; which is (3.07), (2.15), and (2.43) for each of thinking test dimensions (fluency, originality, flexibility), is greater than the tabulated (T) value at the significance levels (0.01), and (0.001), which indicates that there is a statistically significant difference between the average scores of the (participatory product) group in the pre-measurement of innovative thinking test; which amounted (14.16), (460.56), and (12.52) for the three dimensions of the test and their average scores in the post-measurement, which amounted (17.84), (542.56), and (15.76) in favor of the higher average; which is their average scores in the post-measurement.

Accordingly, the third hypothesis of the research was rejected, and the alternative hypothesis was accepted; which states "there is a statistically significant difference between the average scores of the sample members who are studying using the participatory product strategy in the pre and post measurements on the innovative thinking scale for the skills of designing and producing electronic courses in favor of the post-measurement.

Thus, the third part (c) of the third question of the current research has been answered.

This result can be traced back to:

- The program was presented through a website based on Web 2 tools, and thus the students studied the content without being restricted to actual attendance of lectures, which broke the study routine and provided an opportunity for innovation.

- Clarity of learning objectives and organizing interaction between students of the participatory product group through communication tools, in addition to the students being positive in learning process, all of which contributed greatly to encouraging their innovation.

- The content, presentation of ideas, freedom of expression, sharing and building new knowledge through the work of the group led to creating an environment that stimulated thinking and innovation, and allowing all students to participate in decision-making and to think creatively about the problems they face, which is reflected in their academic achievement and innovative thinking.

Fourth: The results of the impact of using classroom web simulation strategy in developing the skills of designing and producing electronic courses and innovative thinking:

This has been done according to the following steps:

- With regard to the results of using web simulation strategy in developing the cognitive achievement related to the skills of designing and producing electronic courses:

The significance of differences between the average scores of the (web simulation) group in the pre- and post-applications of the cognitive achievement test was calculated using the t-test. And the results shown in the following table No. (4) were reached.

Measurement / Variables	Pre		Post		T value	significance
	M	SD	M	SD		
Web simulation s	29.67	4.97	35.43	5.23	4.374	0.01

The previous table revealed that the calculated (t) value, which is (4.374) is greater than the tabular (t) value at the significance level (0.001), which indicates that there is a statistically significant difference between the average scores of the (web simulation) group in the pre-measurement of the cognitive achievement test. , which reached (29.67), and their average score in the post-measurement, which reached (35.43), in favor of the higher average; which is their average scores in the post-measurement.

Accordingly, the fourth hypothesis of the research was rejected, and the alternative hypothesis was accepted, which states that "there is a statistically significant difference between the average scores of the sample members who are studying using a classroom web simulation strategy in the pre and post measurements on the cognitive information achievement test related to the electronic course design and production skills in favor of post-measurement.

Thus, the first part (a) of the fourth question of the current research has been answered.

This result can be traced back to:

Introducing the program to members of the web simulation group through web2 technologies and participatory learning strategies helped provide participation among students the group at an appropriate time and place for each student, which helped in increasing the cognitive achievement associated with the current research.

Manuscript received March 5, 2023
Manuscript revised March 20, 2023
https://doi.org/10.22937/IJCSNS.2023.23.3.3

- Integration that the classroom web simulation strategy based on, and availability of a set of synchronous and asynchronous communication and sharing tools provided a variety of information acquisition and support, whether by students or teacher, which helped to firm the information in learner's mind, and thus being remembered easily, which in turn reflected on their scores in the achievement test.

- Communication and interaction between students and teacher about the knowledge and concepts provided through the program and exchange of experiences helped achieve high grades in academic achievement.

- The students' study of the content provided them with a lot of information related to the foundations of electronic course design and production, that was not available to them before, of which contributed to students' obtaining high scores in the post-measurement of the cognitive information achievement test related to skills of designing and producing electronic courses, comparing to their grades in the pre-measurement.

To identify the impact of using the web simulation strategy in developing practical performance related to skills of designing and producing electronic courses, the significance of differences between the average scores of the (web simulation) group in pre and post applications of the practical performance observation card was calculated using the t-test. The results shown in the following table No. (5) were reached.

Measurement / Variables	Pre		Post		T value	significance
	M	SD	M	SD		
Web simu strategy	295.57	92.95	405.03	125.94	3.830	0.01

The previous table revealed that the calculated (t) value, which is (3.830), is greater than the tabular (t) value at the significance level (0.001), which indicates that there is a statistically significant difference between the average scores of the (web simulation) group in the pre-measurement of the practical performance observation card, which amounted (295.57), and their average score in the post-measurement, which amounted (405.03), in favor of the higher average; which is their average scores in the post-measurement.

Accordingly, the fifth hypothesis of the research was rejected, and the alternative hypothesis was accepted, which states that "there is a statistically significant difference between the average scores of the sample members who are studying using the web simulation strategy in the pre and post measurements on the practical performance observation card of electronic course design and production skills in favor of the post-measurement.

Thus, the second part (b) of the fourth question of the current research has been answered.

This result can be traced back to:

Communication and participation of students about the performance of practical skills within that group was multi-participation and cooperation among students and teachers, and therefore the assessment, modification and improvement of skills were of effective value, which led to an improvement in their grades in the practical aspect.

Cognitive development of students in this group has an impact on increasing and developing the practical performance of the skills related to cognitive achievement.

The students of this group became increasingly improved in practical aspect as a result of the multiplicity and variety of communication tools available to them, which made them performed well and improve their skills.

With regard to the results of using the web simulation strategy in developing innovative thinking skills related to the skills of designing and producing electronic courses:

The significance of differences between the average scores of the (web simulation) group in the pre and post applications of innovative thinking test was calculated using the t-test. And the results shown in the following table No. (6) were reached.

Measurement / Variables	Pre		Post		T value	significance
	M	SD	M	SD		
Fluency	32.48	6.35	37.60	5.83	3.20	0.001
Flexibility	367.40	158.65	440.60	170.30	2.86	0.01
Originality	30.56	8.81	36.16	8.99	2.39	0.01

The previous table revealed that the calculate

(T) value, which is (3.20), (2.86), and (2.39) for each of thinking test dimensions (fluency, originality, flexibility), is greater than the tabular (T) value atthe significance levels (0.01), and (0.001), which indicates that there is a statistically significant difference between the average scores of the (web simulation) group in the pre-measurement of innovative thinking test, which amounted to (32.48), (367.40), (30.56) for the three dimensions of the test and their average scores in the post-measurement, which amounted to (37.60), (440.60), (36.16) in favor of the higher average; which is their average scores in the post-measurement.

Accordingly, the sixth hypothesis of the research was rejected, and the alternative hypothesis was accepted, which states that “there is a statistically significant difference between the average scores of the sample members who are studying using the web simulation strategy in the pre and post measurements on the innovative thinking scale for the skills of designing and producing electronic courses in favor of the post-measurement.

Thus, the third part (c) of the fourth question of the current research has been answered.

This result can be traced back to:

- The educational content has been presented in a way that attracts students' attention, increases their participation and motivation towards learning, positive participation and fruitful effective discussions in the educational process, which led to an improvement in the students' innovative thinking skills.

- The use of learning based on integration between classroom and web has created a kind of communication and interaction between teacher and students and increased human relations, which increased students’ motivation to learn and interact, which has led to the development of their innovative thinking skills.

Fifth: The results of the impact of using both the participatory product strategy and classroom web simulation in developing skills of designing and producing electronic courses and innovative thinking :

This has been done according to the following steps:

With regard to the results of the impact of using any of both strategies of participatory product and web simulation in developing cognitive achievement related to skills of designing and producing electronic courses:

The significance of differences between the average scores of the two research groups (participatory product and web simulation) in the post application of cognitive achievement test was calculated using the t-test. And the results shown in the following table No. (7) were reached.

Measurement / Variables	Participatory product		Web simulation		T value	significance
	M	SD	M	SD		
Post - measu of the achiev test	26.33	6.08	30.90	7.038	2.688	0.01

The previous table revealed that the calculated (t) value, which is (2.688), is greater than the tabulated (t) value at the significance level (0.01), which indicates that there is a statistically significant difference between the average scores of the two groups (participatory product and web simulation) of the research in the post-measurement of cognitive achievement test, in favor of the higher average, which is the average of the web simulation group, which reached (30.90).

Accordingly, the seventh hypothesis of the research was rejected, and the alternative hypothesis was accepted, which states that “there is a statistically significant difference between the average scores of the group studied using the participatory product strategy and students of the group studied using a classroom web simulation strategy in the cognitive achievement test for cognitive information related to skills of designing and producing electronic courses infavor of web simulation group.

Thus, the first part (a) of the fifth question of the current research has been answered.

This result can be traced back to:

- The educational program presented using the web simulation strategy has led to the development of cognitive achievement, due to the various communication tools that the site has provided to the students, which have served to motivate the students to participate with interest in the content, which has increased the effectiveness of the web simulation strategy and made it superior to the participatory product in terms of achievement.

- The web simulation strategy contributed to the creation of an environment in which all members seek to achieve academic excellence through interaction and sharing among group members, thus increasing the information and concepts among group members and achieving a high level of achievement over their peers in the participatory product group.

- The variety of interaction and communication tools in the web simulation strategy resulted in more than one source of feedback during learning, which motivated the best performance in the web simulation sample's cognitive achievement test, which was not available as the same quantity in participatory product sample.

With regard to the results of the impact of using participatory product and web simulation strategies in developing practical performance related to skills of designing and producing electronic courses:

The significance of differences between the average scores of the two research groups (participatory product and web simulation) in the post application of the practical performance observation card for skills of designing and producing electronic courses was calculated using the t-test. And the results shown in the following table No. (8) were reached.

Measurement / Variables	Participatory product		Web simulation		T value	significance
	M	SD	M	SD		
Post - measu of the achiev test	299.23	109.63	361.13	132.39	1.972	0.05

The previous table revealed that the calculated (t) value, which is (1.972), is greater than the tabular (t) value at the level of significance (0.05), which indicates that there is a statistically significant difference between the average scores of the two research groups (participatory product and web simulation) in the pot-measurement of practical performance observation card related to skills of designing and producing electronic courses, in favor of the higher average, which is the average of the web simulation group, which reached (361.13).

Accordingly, the eighth hypothesis of the research was rejected, and the alternative hypothesis was accepted, which states that "there is a statistically significant difference between the average scores of the group that studied using participatory product strategy and the students of the group that studied using classroom web simulation strategy on the practical performance observation card of e- course design and production skills, in favor of web simulation group.

Thus, the first part (b) of the fifth question of the current research has been answered.

This result can be traced back to:

The educational content presented using the web simulation strategy has led to the development of innovative thinking among students, because the various and different means of interaction and communication provided by the program aroused the motivation and abilities of the students, which led them to participate with interest in studying the content, and attempt to devise different ways of designing and creating the course, which positively impact on the development of their innovative thinking skills and, consequently, their performance skills.

The web simulation strategy for the classroom takes advantage of various synchronous and asynchronous web tools that build a social interaction in which students in the group share knowledge with each other and each of student and teacher, and thus transfer face-to-face communication characteristics that are available in the lecture hall, which in turn correctly influenced the learning of skills, and significantly reflected on the performance of students.

With regard to the results of the impact of using any of the strategies of the participatory product and web simulation in developing innovative thinking related to the skills of designing and producing electronic courses

The significance of differences between the average scores of the two research groups (participatory product and web simulation) in the post application of the innovative thinking test related to the skills of designing and producing electronic courses was calculated using the t-test. And the results shown in the following table No. (9) were reached.

Measurement / Variables	Participatory Produ		Web Simulation		T value	significance
	M	SD	M	SD		
Fluency	21.40	6.35	6.18	23.13	1.012	Non
Flexibility	621.60	158.65	142.30	572.56	1.373	Non
Originality	26.61	8.81	8.97	23.53	1.226	Non

The previous table revealed that the calculated value of (t) for the dimensions (fluency, flexibility, and originality), which is (1.012), (1.373), and (1.226) is less than the tabular value of (t), which indicates that there is no statistically significant difference between the average scores of the two research groups (Participatory Product and Web Simulation) in the post-measurement of innovative thinking test related to e-course design and production skills.

Accordingly, the ninth hypothesis of the research was accepted, which states that "there is no statistically significant difference between the average scores of the group that studied using the participatory product strategy and the students of the group that studied using the classroom web simulation strategy on the test of innovative thinking related to the skills of designing and producing electronic course".

Thus, the third part (c) of the fifth question of the current research has been answered.

This result can be traced back to:

-The content presented using participatory learning strategies is equal in all its procedures used and thus led to the effectiveness of either of the two strategies in developing innovative thinking.

- Using communication and interaction tools in each of the two strategies, whether synchronous or asynchronous, contributed to innovative thinking development of the two research groups.

- The educational program presented through the participatory learning strategies included a series of educational activities to which the students of both groups were examined and implemented, led to the acquisition of thinking experiences and skills that were employed during the students' performance of innovative thinking test after the completion of the study, which led to the development of innovative thinking skills of students in both groups.

- It can be said that one of the reasons why the two learning strategies (participatory product - web simulation) are equal in innovative thinking test is the advantages that both strategies have, which helped to generate information, keep information in their memory and successfully recall it at the time of need closely to each group and provide many communication and sharing tools, whether synchronous or asynchronous, which facilitated to get feedback from different sources and express an opinion about the final product and modify it creatively. A more general reason for this result is the flexibility of the learning environment in that the learner is free to control the number of learning times, to learn skills included in the content and to take sufficient time without limiting it to a certain amount of time, which allows the learner in the two groups the opportunity to learn and train without any kind of stress. This was reflected on the two groups' performance in the innovative thinking test and resulted in that there is no statistically significant difference between them in this aspect.

Recommendations :

Based on the results of the current research, the following recommendations can be offered:

Benefiting from the two participatory e-learning strategies used in the current research, in the design of educational courses taught by students of Information Science Department at the Faculty of Computer, where the results showed that both strategies are effective for students.

Diversity in choosing teaching strategies and the most appropriate choise of them so that the different mental abilities of the students can be optimized, and in proportion to individual differences and educational preferences of the students.

Attention to employing Web2 applications in education because of their effective and positive impact on raising the knowledge and skill level of students.

Activating the transformation of traditional courses into electronic courses and encouraging and training teachers to produce these courses in line with the changes of the current era.

Attention to developing innovative thinking among students and providing study programs that promote this type of thinking.

Suggested Research:

Based on the findings of the research, the following research can be suggested:

1. Since the current research has focused on the impact of only two types of participatory e-learning strategies, and since there are many participatory learning strategies, it is possible to conduct more studies and research dealing with their effectiveness in developing many different aspects of learning .

2. To study the impact of using communication tools in e-learning sites on the development of critical thinking skills of Computer Faculty students.

.3 Conducting research similar to that deals with different educational content taught by students, and the results may vary depending on students' degree of interest, inclinations and motivation towards their subjects .

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