

THE IMPACT OF USING E-LEARNING IN TEACHING BIOLOGY ON THE ACADEMIC ACHIEVEMENT OF TENTH-GRADE STUDENTS

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ABSTRACT

This study explored the impact of e-learning in teaching biology on the academic achievement of tenth-grade students. The study used the quasi-experimental approach and was applied to a sample of (80) male and female students, divided into two groups, the first experimental (40 students), and the second control (40 students). The test was prepared in the subject of biology to measure students' level. The findings showed that there were no significant differences in the academic achievement test in the pre-test for the experimental and control groups. The results also revealed the existence of apparent differences in the mean scores of the post-measurement of biology in favour of the experimental group. Findings also revealed the presence of differences in the academic achievement test in biology in the post-measurement due to the gender variable, in favour of females.

Keywords: E-Learning, Biology, Academic Achievement, Tenth-grade Students.

INTRODUCTION

Our current era has witnessed tremendous and comprehensive development in technology and an explosion of knowledge in all aspects of life. New technologies has led to progress and development to a large degree, as it has become used in all areas of life, and also contributed to the enhancement of the educational process, and the emergence of new methods and applications for education to increase the effectiveness and efficiency of the educational process and benefit from human resources and technologies (Malkawi, 2015). E-learning is considered essential in the improvement of the educational process as new technologies opened the gate for new methods of communication. All of these means made it possible for everyone to receive education with minimal effort and time (Abu Hajar, 2021). Many educational institutions have adopted technology because it helps to create an effective learning process. New concepts have emerged in the educational process through the e-book, the virtual school, the electronic library and many other electronic means that help the learner to learn anywhere he wants and in any way, and at any time that suits him without being bound to attend classes at certain times (Al-Harbi, 2017).

Academic achievement is a major component of the educational system, its main operations and one of its outputs, as it contributes to the development and evaluation of the educational system, and occupies the interest of the teacher, the learner, and the parents. It is one of the most important criteria by which the learner moves from one educational stage to another (Al-Bardini, 2020).

The Problem of the Study

The reality of the educational process has shown an urgent need to use modern teaching methods and find new techniques. The teacher has moved from the role of the tutor to a problem-diagnose, facilitator and guide to learning, and transferred the student from his

role as a store of knowledge to a discoverer, researcher and implementer of it so that the student is the center of the educational process. The use of e-learning in teaching biology has provided new possibilities in placing the learner in an active and positive position during the learning process. It was necessary for educational systems that found themselves in front of a strategic choice and a great challenge to reformulate educational concepts in a modern way and bring about a significant change in the school's intellectual structure, educational curricula and strategies for learning and teaching, and rebuilding diverse learning environments commensurate with the requirements of integrating information technology into their educational systems.

Students suffer from difficulties in the process of assimilation of scientific concepts in biology, as well as the difficulties that biology labs suffer in the process of teaching and communicating scientific content to students, which leads to low levels of achievement in biology.

Objectives

The purpose of the current study is to explore the impact of using e-learning in teaching biology on the academic achievement of tenth-grade students in the Hashemite Kingdom of Jordan. The following sub-objectives are derived from the main objective:

1. Detection of differences between the mean scores of the members of the two groups (experimental and control) for the pre-achievement test.
2. Detection of statistically significant differences in the post-achievement test among the experimental group and the control group.
3. Detection of differences in the academic achievement test for the experimental group students in the posttest due to the gender variable.

Questions of the Study

The study answers the following questions:

1. Are there any statistically significant differences between the mean scores of the two groups (experimental and control) in the pre-achievement?
2. Are there statistically significant differences in the post-achievement test between the experimental group and the control group?
3. Are there statistically significant differences in the posttest due to the gender variable?

Significance of the Study

1. Supporting the learning process using technological media that are linked to e-learning environments.
2. To draw the attention of those in charge of education to the necessity of providing all the necessary capabilities to activate e-learning to increase students' academic achievement.
3. Helping teachers in designing electronic lessons to teach biology.
4. The results of the study provide data and information that help in developing e-learning and increasing its effectiveness in teaching biology.

Limitations of the Study

1. Human limits: the tenth-grade students in the Mu'ta Schools for Girls and Boys.
2. Time limits: This study was applied during the first semester of the academic year 2022/2023.
3. Spatial limits: This study was applied in Mu'ta Schools for Girls and Boys.

LITERATURE REVIEW

E-Learning

The use of technology in the educational process leads to the creation of intelligent environments that motivate students to explore topics that are not included in the curriculum, and give them the ability to provide educational opportunities and experiences through simulation and modelling. It provides special methods for developing the thinking skills of

learners at an early age, thus reducing the difficulties of the educational process, especially since computerized programs have many benefits, the most important of which is that they help students to learn and think in a better way (Al-Bardini, 2020).

An E-learning system is based on the use of computers and the Internet to facilitate the learning process anywhere and at any time. It provides the ability to publish all types of files such as images, texts, videos and presentations, and to interact with the teacher through chat and text messages (Epignosis, 2014). It is the most accurate type of education used in educational institutions, which depends mainly on the use of modern technology tools and means and electronic media in providing educational content by the teacher to the student (Al-Akhras, 2018; Al-yameen and Sadartah, 2019).

E-learning is classified into two types. The first is synchronous learning, where the learner and teacher access the Internet at the same time to teach the material and conduct a discussion on topics, research, and lessons. The second is asynchronous learning, which does not need the teacher and the learner to be at the same time, and the learner can obtain lessons through a planned educational program in which he chooses places and times that suit his circumstances (Al-Basel, 2021).

E-Learning aims at providing a multi-source and rich learning environment that benefits the educational process in all its aspects. It also aims at creating an interactive environment that supports the relationship between the external environment and educational institutions and made available various educational resources that allow comparison, discussion, evaluation and analysis. It helps in training the learner and the teacher on what contributes to facilitating the use of these techniques. And finally, it helps in preparing a generation of students and teachers capable of dealing with the skills of the times, technologies and developments that the world is witnessing (Al-Moqrin, 2016).

Characteristics of E-Learning

E-Learning is characterized by a set of characteristics (Al-akhdar, 2016):

1. Positivity: Education is based on the learner's effort, whether learning with others through groups using multiple electronic media or by self, and this requires the learner to be active during learning situations, searching, searching and criticizing information.
2. Individuality: E-learning provides educational situations to take into account the individual differences between students to reach a large percentage of students to high levels of achievement and achievement, which leads to achieving balance in the educational process and achieving the principle of equal educational opportunities.
3. Diversity: E-learning provides a multi-learning environment in the styles and methods of providing educational content, so the learner can deal with audio and written texts, illustrations and calligraphy, and can also see static and moving images, which increases the excitement of the learner's mental abilities and increases the effectiveness and efficiency of learning.

Academic Achievement

Students' performance is an essential elements in education and an essential pillar of it, and it is a major component of the educational process and is in line with it in all its steps, where the teacher follows tests as a common method for evaluating students, and this is what highlighted the importance of academic achievement to evaluate and follow up academic achievement by demonstrating the effective role of the teacher In various directions, the importance of evaluation and its benefits appear on the personality of the student (Al-Hayek, 2022).

Academic achievement is the sum of the academic gains achieved by the student in the subject or subjects of the school program to make the student more adaptable to the

school environment and to identify the obstacles that prevent him from succeeding (Ben Kassimeh, 2021).

It is all that the student does within the academic subjects to reach a certain level of competence that helps him to solve the problems that he may face in his daily life in light of the school curricula and its objectives, and this is measured through school exams (Khawaldeh, 2021). The student's cognitive outcome is represented by performance in school subjects that are estimated by the grades obtained in the tests at the end of the semester or year (Ghbari, et al, 2014).

Previous Studies

Al-Suraihi (2022) identified the effectiveness of using gamification by Kahoot in virtual classrooms via the Madrasati platform in increasing the academic achievement of sixth-grade students in mathematics. The study included (80) students from the sixth grade in Al-Waleed Bin Qais Primary School. The results showed that there is an effect of using the Kahoot application through the virtual classrooms on the Madrasati platform on increasing the academic achievement of sixth graders in mathematics.

Al-Essa & Nimr (2022) explored the impact of computer use on academic achievement in the first year of secondary school in Jerusalem. The study used the descriptive survey method, and designed a questionnaire as an instrument. The findings revealed that there is an impact of the computer on achievement and that there are differences between the averages of teachers' responses to the impact of computer use on academic achievement due to the two variables.

Radwan (2022) identified the impact of e-learning on the achievement of high school students in psychology and sociology. The study covered (70) female students at Asmaa Bint Abi Bakr Secondary School in Suez, divided into two groups. The results of the study showed that there are differences between the mean scores of both groups in academic achievement by the post measurement.

Al-Dhafiri & Nassef (2021) explored e-learning and achievement and developing the skills of using technological innovations among students of the College of Basic Education at Kuwait University. The findings showed differences between the mean scores of the students in the experimental group and the students of the control group in favour of the students of the experimental group, where the results showed that there is an effect of e-learning.

Al-Juhani (2021) explored the use of blended learning in the achievement of third-grade intermediate students in mathematics. The study sample consisted of (144) students in Al-Ameen Intermediate School and Bashir Bin Al-Bara Intermediate School in Riyadh. The results of the study showed the impact of the use of blended learning when teaching the unit of analysis. to the factors of the experimental group students. The results also showed that the use of blended learning in teaching increases the levels of memory and understanding of students.

Harahap et al (2019) explored the relationship between blended learning and the educational attainment and scientific process skills of students in the plant tissue culture course at the University of Nigeria Maidan. The quasi-experimental approach was used, and the study sample consisted of eighth-grade students in an education program neighborhood, they were divided into two groups, the first experimental and the second control. The results of the study showed that there was approval for the use of the blended learning strategy in enhancing the educational achievement and skills of the educational process for students.

Lin et al (2014) explored the impact of e-learning on achievement in accounting and learning motivation. The quasi-experimental approach was used, e-learning was applied to the experimental group, the control group was studied traditionally, and the effectiveness of learning on the experimental group was examined. Six weeks later, the results of the study

showed that there was no effect of e-learning in terms of achievement in the students' accounting section, and showed that there are differences in e-learning in terms of learning motivation.

METHODOLOGY

The study used the quasi-experimental method to conduct the current study, which focuses on knowing the effect of the independent variable (teaching an electronic unit for tenth-grade students), on the dependent variable (academic achievement). The control group was studied traditionally.

Sampling

The sample include (80) students from both genders, who were divided into two groups, the first experimental and consisting of (40) female students who were taught the unit of classification of living things using e-learning, and the second group was a control group and consisted of (40) male and female students who were taught the unit of classification of living things by the traditional method (Table 1).

Group	Experimental	Control	Total
Gender			
Male	20	20	40
Female	20	20	40
Total	40	40	80

The study designed an achievement test to measure the academic achievement of the subjects prescribed in biology for the tenth grade in the third unit (classification of living things). The test aimed to measure the degree of students' achievement in the topics of the unit (Classification of Living Organisms) in the subject of biology (Al-Fakhri, 2018).

Validity

The researcher presented the test to judges from professors of curricula and teaching methods, and a group of teachers who hold high degrees in curricula and teaching methods to find out their opinions on the test vocabulary and whether they measure what they were prepared for, such as clarity and accuracy and the wording of the vocabulary and the extent of its suitability with the level of the students. In light of that, modifications, deletions and additions were made based on those directives (Al-Arimi, 2014).

Reliability

The stability of the test was confirmed by calculating Cronbach's alpha coefficient, where Cronbach's alpha coefficient was (0.87), and this indicates that the test has a high degree of stability.

RESULTS AND DISCUSSION

Results of the First Question

The means scores, standard deviations, and t-tests for independent samples were used to find significant differences between the mean of the experimental group and the control group, and the following Table 2 illustrates this.

Variable	Group	NO.	Mean score	St. Dev	T	Sig.
Biology achievement test	Experimental	20	33.200	5.52125	0.982	0.332
	Control	20	31.5500	5.09360		

Table 2 shows the presence of differences between the mean scores of both groups in the academic achievement test in biology for boys, and this indicates the equality of the two groups before applying the experiment and ensures that it does not affect the results.

Variable	Group	NO.	Mean score	St. Dev	T	Sig.
Biology achievement test	Experimental	20	34.4000	4.07043	0.578	0.351
	Control	20	33.0500	4.93617		

Table 3 shows the existence of differences between the mean scores of the experimental and control groups in the academic achievement test in biology for girls, and this indicates the equality of the two groups before applying the experiment and ensures that it does not affect the results.

Results of the Second Question

The mean scores, standard deviations, and t-tests for independent samples were used to find out whether there were statistically significant differences in the post-measurement of the academic achievement test among the experimental group and the control group.

Variable	Group	NO.	Mean score	St. Dev	T	Sig.
Biology achievement test	Experimental	40	44.8500	2.45539	10.536	0.000
	Control	40	34.8000	3.48833		

Table 4 shows that the value of T (7,726) is a function at the significance level (α 0.05 \geq), which confirms the differences in the post-measurement of the academic achievement test in biology for the students and favour of the experimental group, and this indicates that the use of e-learning leads to the superiority of the experimental group in the post-measurement of the achievement test in biology compared to the control group.

This result could be because e-learning provides modern and enjoyable ways of teaching in both synchronous and asynchronous ways, through what is presented in the video, audio and forms that attract students to learning, and that students can learn without being restricted to a specific place or time. This is what allows students to learn at anytime and anywhere, and thus students can be provided with information in the best way, which improves their academic achievement compared to students who learn by traditional methods.

This result could be because e-learning provides the teacher with a variety of ways to present the scientific material to the students, taking into consideration their abilities and needs, and this positively affects academic achievement. As for the traditional methods, these methods are not possible. This result is consistent with previous studies (Al-Suraihi, 2022; Al-Essa and Nimr, 2022; Al-Dhafiri and Nasif, 2021; Al-Juhani, 2021; Harahap, et al, 2019; Aljaser, 2019; Lin, et al, 2014).

Results of the Third Question

The mean scores, standard deviations, and a t-test for independent samples was used to detect differences according to the gender variable.

Variable	Group	No.	Mean score	St. Dev	T	Sig.
Academic achievement	Male	20	37.5000	4.28584	2.288	0.028
	Female	20	40.2500	3.24240		

Table 5 shows that the T-value (2.028) is a function at the significance level ($0.05 \geq \alpha$), which confirms the differences in the post-measurement of the academic achievement test in biology for the experimental group students and favour of females, for the achievement test in biology compared to males.

This result could be because females are interested in the graphics, shapes, and colors that were displayed in the lessons that were presented electronically, and this led to more attention to the information that was presented, the preservation of the displayed information, and a higher academic achievement compared to males.

Recommendations

1. Increasing the tendency to use electronic methods for teaching biology and other study subjects for all academic levels.
2. Increasing teachers' awareness of the importance of e-learning and its role in improving students' performance in biology and other subjects and increasing their understanding of the subjects, which leads to improving their academic achievement.
3. Training teachers on how to use e-learning to teach biology and other subjects.
4. Providing e-learning requirements of communication devices, networks and all tools that contribute to activating e-learning in schools.
5. Motivating and encouraging teachers to use an e-learning by granting prizes to teachers and schools that activate e-learning in the education process.

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