The Effect of Using Prezi Presentations in Science Teaching: Achievement and Attitudes

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This study aimed to reveal the impact of Prezi presentations in science teaching on the achievement and attitudes toward it. The sample of the study consisted of 46 students from the eighth grade in Laureate Academy of Education, affiliated with the Directorate of Education, Bani Ubaid, in the governorate of Irbid, Jordan. To achieve the goal of the study, the researchers constructed a multiple-choice test comprised of 20 items. After verifying its validity and reliability, the test was applied to the study sample. The sample of the study consisted of 24 students in the experimental group and 22 students in the control group who were all randomly selected from the eighth grade in Lorette Educational Academy in Irbid Governorate in the second semester of the academic year 2018-2019. A 15- item scale was also constructed and verified to reveal the experimental group students' attitudes towards using Prezi presentations in learning science. The results showed that there were statistically significant differences between the averages of the responses of the sample members on the achievement test in favour of the students of the experimental group who studied using Prezi presentations. The averages came out high for the items and that indicated that Prezi presentations provided them with summarised lessons that attracted their attention, and increased their awareness and understanding of the scientific subject.

Key words: *Prezi presentations, Achievement, Teaching science, Attitudes.*

Introduction

In light of the scientific and technological progress and the enormous cognitive explosion that takes place day after day in the twenty-first century, educational institutions had to cope with this development and the problems resulting from these rapid operations; such as the continuous increase in the number of students, the low achievement, and the presence of individual differences among students. This has been achieved by developing the educational system, computerising educational programs, finding modern methods and strategies based on integrating technology and computing in teaching, and helping learners to learn according to their capabilities, energies and speed of their learning. This has led to the emergence of what is known as e-learning, through which electronic educational programs and presentations with multiple features in the field of education have been developed to raise the level of educational outcomes.

Keeping pace with the scientific and technical revolution in the field of teaching has become an imperative in our time, and to achieve that, the situation in our schools had to change by using and employing new computer technologies in the field of teaching, and encouraging teachers to search for modern methods to implement the educational content, especially with regard to scientific materials such as science and mathematics at various study levels. This has led to the development of computerised curricula that are commensurate with scientific and technological progress, and the emergence of many electronic programs for presentations to improve the learning environment. Thus, they contribute to increasing students' achievement, and their motivation towards learning.

The presentations of Prezi program are considered as a non-traditional display because of its ability to merge written and non-linear presentations compared to traditional presentations, which are structured in a way that makes Prezi a superior program in displaying the links and connections between the ideas of the topic, and the possibility of creating, editing or displaying presentations, as well as storing and sharing presentations in a way that makes it possible to view images with a larger size.

The Prezi program is the most recent of these programs, as it began appearing in Budapest Blmager, by an engineer and fine artist named Adam Fisher in partnership with Professor Peter Arvai from the University of Budapest to create Prezi in 2009. The Prezi program presentations differ from other presentations since it is based on cognitive theory and supports the virtual community. The Prezi program is one of the most suitable programs to display the lectures in an attractive way, and students can create creative presentations individually or collectively. It promotes cooperation between students in joint projects, and allows the presentation of content via visual maps, and building a meaningful knowledge base that makes it easier for students to

learn, memorise and understand the material, and increase their motivation towards learning (Al-Deroshi and Sarhan, 2018; Al-Hoshani, 2016).

Based on this, the idea of this research contributes to supporting and enriching previous studies related to the use of the Prezi program for presentations in science teaching, and revealing the impact of the use of these presentations on the achievement of the eighth grade students in Jordan, and their attitudes towards using it during learning science. This is a new study in Jordan as traditional science teachers have never used the Prezi presentations in their classrooms. This study might contribute to the enrichment of theoretical literature related to the effectiveness of the use of presentations by using the Prezi program in teaching science on the achievement of eighth grade students and their attitudes towards their use compared to the ordinary teaching. In addition to that, the results of this study may encourage researchers to move towards conducting more similar studies related to the effective use of Prezi presentations in science education at various academic levels. Moreover, this study may contribute to helping decision makers in educational institutions use and employ the Prezi program for presentations in science education, organise and conduct training programs for teachers in preparing and designing presentations, and implement it in teaching, in an effort to activate teaching and the development of the educational learning process. In terms of its means, it may contribute to the development of student performance, and to improve the quality of the educational process outputs.

Literature Review

In 1990, Microsoft officially launched a program; PowerPoint, for presentations on May 22nd, and individuals mainly used this app to show their slide-based presentations. As a result, it has become very prevalent. It also depended on it in previous years as the main presentation program in the marketplace due to the lack of reliable competition. PowerPoint has been installed on more than a billion computers worldwide. There are about 500 million application users around the world, about 30 million PowerPoint presentations are presented daily, and at this moment it still has the highest percentage of presentations. However, despite this and with the existence of many previous studies that focused on its role in education in terms of the impact of these presentations on participation, motivation, achievement and active learning, the majority of people, including teachers, learners, administrators, scholars and other members of the educational community, have become very bored and disturbed by the frequent use of this application, and this reflected negatively on the motivation of learners towards its use in learning (Akgün, Babur, & Albayrak, 2016).

Using a Prezi program requires thinking differently about how things are presented and discussed. This is by providing the ability to navigate between graphics, video clips and texts, and zooming in and out of various elements and images to achieve vision details, and zooming in or out of video clips, as well as zooming in on the details presented in a portion of the text,

and zooming back into a group of objects to see the image in maximized or minimized format. Thus, the Prezi program displays a prototype for a user interface by zooming in or out, organising portions of the content (large groups) in context and linking them logically and in a special way with others (subgroups). The user is also able to move non-linearly by zooming in and out the content, switching Between the "big picture" view and the "detail" view; this mechanism is used throughout the document and viewed in the form of presentations using Prezi software to make complex concepts or ideas more simple by explaining things in the easiest possible ways. Figure 1 shows an illustrative example of the Prezi presentation interface that was used in this study (Moulton & et al, 2017; Abdellatif, 2015; Strasser,2014).

Figure 1. A sample of the Prezi presentation's view interface for the current study

In light of this, it becomes clear that the advantages of the Prezi program for presentations are represented in the ability to provide text, audio and video, and to include links, and PDF documents in a way to allow zooming in or out within the content, and the ability to share presentations via the Internet or social networking sites, and keep its original copy on the Prezi website or on personal computers. Thus, Prezi presentations increase the motivation of students to participate in joint projects, as well as activate the use of hyperlink (Al-Khidr, 2018; Safar, 2015).

As for the disadvantages of using Prezi presentations, perhaps the most prominent of them is the lack of support for the Arabic language, and the use of the English language as an official language for communication and design. Therefore, it requires the ability to use ready-made templates, designs or slide shows in the form of images within the forms of the Prezi electronic program. It may be possible to solve the Arabic language problem by adding the font type code to the program editor in a certain way so that we can write in the Arabic language within the templates (Abdullatif, 2015).

Several studies have recommended the importance of using the Prezi program in teaching and learning in all its educational stages (such as the study of Al-Atawi, 2016; Al-Hoshani, 2016; Bander & Bull, 2012; and Brock & Brodeh, 2013), so that its users can create presentations in its overall image and then create parts branching out, with the ability to zoom in to highlight each one and show the connection between them. Prezi presentations also achieve the visual and practical attractiveness of learners, estimate information for them in a non-linear manner, and demonstrate the interconnectedness of ideas with each other. It also allows users the ability to enlarge and reduce them, and easily move between them via a path defined by the user with the ability to include texts, pictures, videos, or links to presentations. In addition to that, the Prezi program allows learners to create individual and group presentations, design creative presentations, invite others to use and edit them, make adjustments to them, and encourage knowledge building, where the learner can learn about the patterns of relationships, the similarties and differences between information, identify them during learning, and build a knowledge hierarchy that links previous and subsequent information. This would help learners to better organise their information and ideas and encouraging them to write their daily notes on lessons, as it contributes to maintaining the attention of learners and involving them in the educational process. The most prominent of these studies that dealt with the Prezi program and its effectiveness in teaching are addressed below.

Al-Deroushi and Sarhan (2018) conducted a study that aimed at identifying the effect of using the Prezi program supported by educational media on academic achievement and the direction towards the program among students of the College of Basic Education at Duhok University in Iraq. The researchers in this study used the experimental approach. To achieve the goal of the study, the researchers designed 9 lectures using the Prezi program and an achievement test in the course of teaching methods. They were applied to the study sample that consisted of 82 students from the Department of Education, which was distributed to two groups, one of them was experimental and consisted of 40 students that studied using the Prezi program, and the other was composed of 42 students that studied in the ordinary way. After applying and analysing the study tools, the results showed that there was a statistically significant difference in the academic achievement between the two groups in the post-test in favour of the experimental group. It also showed the high level of experimental group attitudes towards the Prezi program in university teaching.

Ismail, Zulbahrin Haji, et al. (2017) also conducted a study that aimed at identifying how to effectively use the Prezi presentation platform via the Internet as an educational and learning tool for the subject of history. The study sample consisted of 21 male and female students (13 males and 8 females) from history students in the ninth year of a government secondary school in Brunei Darussalam, ranging in age from 11-14 years. To achieve the goal of the study, students were given introductory questions about historical topics before they were divided

into groups and assigned to make their own presentations for these historical topics using the Prezi program to the whole class. After completing the class presentation, they were given post-test questions. The results, after analysing the data, showed an increase in the acquired knowledge as a result of the students working on the content and creating their own Prezi presentations. The results also indicated that the students were keen to explore new technological platforms while studying history and this increased their technological orientation.

Kiss (2016) conducted a study to reveal the effect of the presentation tool using both the PowerPoint program and the Prezi program on the achievement of new students at the university. To achieve the goal of the study, two tests were prepared for students to reveal the degree of their learning of the material presented to them through the presentations. The study sample consisted of two groups, the first group (A) reached 320 students who were taught the first test subject through the PowerPoint program, and the second group (B), which reached 378 students, were taught the first test subject through the Prezi program. After that, both groups were taught the second test subject using the PowerPoint program. The number of participants from group (A) reached 276 students, compared to 364 students participating in group (B). The researcher assumed that the group in which Prezi was used as a presentation tool would achieve better results in the test. After evaluating the results of the first test, the results showed the superiority of the students who used the Prezi program, while in the second test, which studied its material in both groups using the PowerPoint program, the results showed that there were no statistically significant differences between the two groups. This confirms the effectiveness of using the Prezi program to improve the performance of students who studied through it, as they obtaining better results in the tests presented to them.

Al-Ataiwi (2016) conducted a study that aimed in investigating the effectiveness of the Prezi program in the achievement of female students of the College of Education in a course of special teaching methods compared to the ordinary method. The sample of the study consisted of 72 female students from a course of special teaching methods for kindergarten in the College of Education in the Qaseem University. They were distributed to two divisions, one of them was chosen to be the experimental group who studied the course using the Prezi program, and the other is to be the control group, who studied the course in the ordinary way. To achieve the goal of the study, the researcher prepared an achievement test, and after applying the test and analysing its results, the results showed that there was a statistically significant difference between the experimental and control groups in the post test attributed to the teaching method in favour of the experimental group.

In another study conducted by Duffy, et al, 2015, the Prezi technique was tested in teaching a mental health course for medical and physiotherapy students to identify their strengths and weaknesses. The sample of the study consisted of 74 medical and physiotherapy students in

the fourth year in the College of Medicine and Medical Sciences at the University College Dublin UCD, Ireland, and the lectures were made available online. The results showed that 98.6% of the students considered that the mental maps provided by Prezi were useful, and that 31.1% of the students faced some problems when using the program in their personal studies.

Bender & Bull (2012) conducted a study that aimed at examining and investigating the effect of using the non-linear multimedia presentation model in the Prezi program on the attitudes of middle school students towards learning science. To achieve the goal of the study, the Prezi program was used as a basic 6-week educational model in seventh grade teaching in North Carolina in the United States of America. The results were shown after applying and analysing the data of the study tools. Students showed positive attitudes and directions towards the use of Prezi in the teaching of science.

Mustaffa et al. (2013) conducted a study that aimed at exploring the effectiveness of the use of the Prezi program in Islamic education among high school students in Malaysia, and their attitudes toward its use in teaching Islamic education content. To achieve the goal of the study, a questionnaire was prepared to measure students' attitudes towards the Prezi program and its use in education. It was applied to a sample of 22 students. The results of the study showed that there are positive attitudes among students towards the use of the Prezi program and that the presentations of the Prezi program and its technical applications are easy and helpful in developing innovative and stimulating educational strategies for Islamic education teachers in Malaysia.

The above studies proved the effectiveness of the Prezi program in the achievement and attitudes of students in various disciplines and age groups. This study comes to uniquely reveal the impact of the Prezi presentations in science education on the achievement and attitudes of eighth grade students in Jordan; a study that was not conducted previously.

Method

This study is one of the semi-experimental designs of two groups with two tests, which are pre-test and post-test. Based on this design, two groups were randomly selected from the eighth-grade students. One of them was chosen to be an experimental group and the other as a control group. The pre-achievement test of science was given to the study sample members of the experimental and control groups before teaching started.

After the content classes were implemented for both groups (Experimental with Prezi presentations and control group with the ordinary way), the achievement test was applied to both groups. A scale was applied to the experimental group. We can symbolically design the study in the following way:

O x O O1 = EG

O – O = CG

Since:

EG: Experimental group that was taught using Prezi Presentations.

CG: Control group that was taught in the ordinary way.

X: Processing by applying the effect of using Prezi's presentations.

O: the pre and post achievement test of science.

O1: A scale of experimental group attitudes toward the use of Prezi's science presentations

Study Questions

This study aimed to answer two research questions:

1. What is the effect of using the Prezi presentations in science education on the achievement of the eighth-grade students in Jordan?
2. What are the attitudes of the eighth-grade students in Jordan towards using Prezi presentations in learning science?

Study Sample

The sample of the study was chosen intentionally, and two groups were randomly chosen from among the eighth-grade students in the Laureate Academy of the Directorate of Education of Major General Bani Ubaid in Irbid Governorate for the second semester of the 2018-2019 academic year. One of the groups was chosen to be an experimental group, and consisted of 24 students that were instructed using Prezi's presentations. The other group consisted of 22 students who were chosen to be the control group and were taught in the ordinary way.

Study Tools
Achievement Test for Science

To achieve the objectives of this study, a science achievement test and a measure of the experimental group's attitudes towards the use of the Prezi presentations program in science learning was prepared. The test was validated with different methods of test validity and reliability. Content validity was performed by sending the test to a group of seven referees with expertise in the Arabic language, measurement and evaluation, curricula and methods of teaching science. To ensure the items' validity and clarity, the referees' opinions and suggestions were taken into consideration in order to modify the test by adding, editing or replacing items. The test in its final form yielded 20 items. As for the test's reliability, a pilot study was conducted to verify the consistency. A sample consisting of 15 students (out of the study sample) was selected to examine the internal consistency of the test by counting the

coefficient difficulty levels using the Koder Richardson formula (KR-20). The values of the difficulty coefficients for the test's items ranged between 0.34- 0.78, and the discrimination factors ranged between 0.48- 0.78. The value of the stability coefficient was calculated with this equation and was found to be 0.84. Overall, the results indicated a high stability degree suitable for the purposes of this study.

Attitudes Scale towards Using the Prezi Program

This scale was designed to reveal the attitudes of eighth-grade students toward using the Prezi program in learning science. After reviewing the theoretical literature and previous studies related to the study, it included 18 items in its initial form. The response on the scale was graded according to the 3-point Likert scale (agree, disagree, neutral).

To verify the validity of the content of the attitudes scale, the scale was presented to a group of seven specialised referees in the field of curricula and methods of teaching sciences, measurement and evaluation, and the Arabic language. They were all asked to express their comments and opinions regarding the appropriateness of the items, their relevance and clarity, the soundness of their language formulation, and to make appropriate modifications. In light of the observations and opinions identified by the referees, the amendment of the scale was made in accordance with the comments received from the referees. In its final form, the scale consisted of 15 items.

The same pilot study was used to examine the test's reliability. The Construction reliability indicators were used to examine the correlation coefficients. The scale items were analysed and the correlation coefficient was calculated for each of the items. The correlation coefficient represents a sign of reliability for each item in the form of a correlation coefficient between each item and the total score. The values of the correlation coefficients of the items of the attitudes scale towards the use of the Prezi program in science with the total degree on the scale ranged between 0.42- 0.78. It was noted from the indications of previous construction validity tests that all the items had a correlation coefficient with the total degree of the scale higher than 0.30. These values are considered acceptable to maintain the items with no deletion or modification according to the Hattie criterion (Hattie, 1985). Thus, in its final form, the scale consisted of 15 items.

To ensure the consistency of the attitudes scale towards using the Prezi program in science, a test-retest method was used by applying the scale and re-applying it after two weeks to a group from outside the study sample consisting of 15 students. Pearson correlation coefficient was then calculated between their two-time estimates on the scale: its value was 0.79. The stability factor was calculated using the method of internal consistency according to the Cronbach alpha

equation, and its value was 0.86. This result indicated that the scale has a high degree of stability.

The scale of attitudes toward the use of presentations of the Prezi program in the science subject in its final form consisted of 15 items, in which the student responded according to a three-point evaluation that includes the following alternatives: agree, since when the scale was corrected, it is given 3 points; neutral, since when the scale was corrected, it is given 2 points; disagree, since when the scale was corrected, it is given 1 point. The gradient was reversed in the case of negative items (15,11,8), thus the scale scores as a whole ranged from 45 to 15. To determine the level of these attitudes among members of the experimental group, their responses were classified into three levels according to the mean: low (less than 1.67), medium ranging (1.67 - 2.33), high (more than 2.33).

Results and Discussion

This study aimed to reveal the impact of the use of Prezi presentations on the achievement of eighth grade students in science in Jordan and their attitudes towards using them in learning science by answering the following questions:

To answer the first research question, Arithmetic averages and standard deviations for the performance of the sample members in the control and experimental groups on the achievement test in science were calculated, as shown in Table 1.

Table 1: Arithmetic averages and standard deviations for the performance of the members of the experimental and control groups on the achievement test of science according to the group variable

Variable	Group	Experimental N=24		Control N= 22	
		Mean	standard deviations	Mean	Standard Deviations
Achievement in Science	Pre-measurement	6.96	2.03	7.18	1.87
	Post- measurement	14.75	2.29	10.45	2.48

It is clear from table 1 that there are apparent differences between the arithmetic means of the scores of the members of the experimental and control groups on the achievement test of the science subject. To verify the substance of the apparent differences, One-way ANOVA was used, after taking into consideration the pre-measurement scores on the achievement test of science for each of the two groups as an accompanying variable, as shown in Table 2.

Table 2: One-way analysis of variance associated with the achievement test of the science subject in the post test according to the group variable

Variance source	Sum of squares	Degrees of freedom	Means of squares sum	F	Statistical significance	η^2 The size of the impact
Pre-measure Achievement Test	0.846	1	0.846	0.146	0.704	0.003
Group	212.626	1	212.626	36.703	0.000*	0.460
Error	249.108	43	5.793			
Total	461.739	45				

Statistical significance ($\alpha = 0.05$)

It is clear from Table 2 that there are statistically significant differences at the level of significance ($\alpha = 0.05$) between the two arithmetic averages for the dimensional measurement of the performance of eighth grade students in the achievement of the science subject. The results were in favour of students in the experimental group who were taught using Prezi presentations, where the value of F was 212.626, and statistical significance of 0.000). The effect size for the program (η^2) was 0.460. This means that the use of Prezi presentations in teaching contributed with 46% to raise the level of achievement of eighth grade' students in the science subject, which indicates a practical meaningful effect of using Prezi presentations in raising the level of eighth grade students' achievement in the subject of science. The researchers attribute this to the fact that the use of the Prezi program while teaching science stimulated students visually, making them more active learners. It increased their attention and ability to focus and interact as well as use more than one sense to perceive and understand the content and summaries of scientific lessons. This reflected on the level of their understanding of the scientific content.

To answer the second research question, Arithmetic averages and standard deviations were calculated for the responses of the study sample individuals on the attitude scale towards the use of Prezi presentations in learning science, as shown in Table 3.

Table 3: The arithmetic average and the standard deviations of the responses of the study sample individuals on the items of the attitudes scale towards the use of Prezi presentations in learning science in descending order according to the arithmetic average.

Number	Item	Mean	SD	Level
1	Using the program for pictures and videos increased my awareness of scientific phenomena.	2.87	0.46	High
2	The Prezi presentation helped catch my attention to the lesson.	2.83	0.49	High
3	Provided scientific lessons in a concise and attractive way.	2.78	0.52	High
4	Showed lessons in an interesting way.	2.78	0.52	High
5	I didn't feel the class time when the teacher used Prezi presentation.	2.70	0.63	High
6	Helped me understand the content of the lesson.	2.65	0.63	High
7	Encouraged me to interact and participate while learning.	2.48	0.73	High
8	Allowed me to discuss and ask questions on the topics of the lesson.	2.43	0.73	High
9	I felt excited and willing to learn science.	2.43	0.66	High
10	It helped the teacher in class discipline.	2.30	0.70	Medium
11	Helped me connect the lesson topics.	2.30	0.88	Medium
12	I felt we need to use this program in all subjects.	2.04	0.71	Medium
13	I feel that using the traditional instruction is better than Prezi presentation.	1.96	0.82	Medium
14	It is difficult for me to focus when presenting lessons through it.	1.61	0.89	Low
15	I felt bored when it is used by a teacher.	1.48	0.73	Low
The scale as a whole		2.38	0.29	High

It is clear from Table 2 that the overall arithmetic mean of the attitude scale towards the use of Prezi presentations in learning science was high after classifying their responses to three levels according to the arithmetic mean: low (less than 1.67), medium between (1.67 - 2.33), high (more than 2.33). The value of the total arithmetic average reached 2.38, whereas the arithmetic mean of the items of the attitude scale towards the use of Prezi presentations in learning science ranged between 1.48 - 2.87, where item (9) of the scale came at a high level. The highest of which was item 1, which indicated that "using the program for pictures and video increases my awareness of scientific phenomena," followed by item 2 with an average of 2.83, which

indicates that "the Prezi program helped attract my attention to the lesson." Item 4 came at the intermediate level. The highest were items 10 and 11 with an average of 2.30, which indicated that the Prezi program made students more disciplined in the class, and helped in linking the topics of the lesson. The arithmetic averages of items 14 and 15 came in the low level of the presence of the trait, which indicated "the difficulty of focus when presenting the lesson during the Prezi program," and that "the students feel bored when the teacher used the Prezi program." The researchers attribute the presence of positive attitudes with high averages regarding the "use of the Prezi program has provided students with an atmosphere of pleasure and excitement while learning science," and the presence of a diversity of educational media used through Prezi presentations, to the increased interest and attention of students and the opportunity to understand the scientific content. This has led to high positive attitude to use the Prezi program in learning science. This result is consistent with the results of previous studies (such as Al-Deroushi and Sarhan 2018; Duffy et al, 2015; Mustaffa, et al, 2013; and Bander & Bull, 2012).

The Limitations of the Study

Human and Spatial Limits: This study was applied to eighth-grade students at the Lorette Educational Academy affiliated with the Directorate of Education, Bani Ubaid in the Irbid Governorate.

*Time Limits***:** This study was conducted in the second semester of the academic year (2018-2019).

*The Objective Limits***:** The content of the first semester of the seventh unit, entitled "The Structure and Dynamics of the Earth," was taught in the science curriculum for the eighth grade for the year 2019.

*Study limits***:** The ability to generalise the results of the study is determined by the degree of validity and reliability of the used tools and the degree of reliability of the response of the study members.

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