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The Effectiveness of the (Ahaslides) Program in Teaching Geography and Measuring its Impact on Developing Students' Understanding of Geographical Models and Geographical Forecasting

By

First author

Nehad Adel Kharoobi
Ph.D. Student
Yarmouk University – Irbid
College of Education
Post Office Code: 21163
Emai nehadkharopi@gmail.com

Second author

Khaled F. Alazzi
Yarmouk University – Irbid
College of Education
Post Office Code: 21163
Email: khalidf@yu.edu.jo

Abstract

This study explores the impact of the AhaSlides program on enhancing ninth-grade students' knowledge of geographical models and geographical forecasting skill. The study used a quasi-experimental design involving two groups: an experimental group on the AhaSlides program and a control group on traditional techniques. A random sample of 60 female students from Bayt Ras Secondary School for Girls in Irbid were selected. The sample size of subjects on trial comprised 30 students exposed to the AhaSlides technology, while 30 students for the control condition were instructed based on standard practices. Data collection was achieved by way of pre-test and post-test intended for determining the students' understanding of geographical models as well as the ability to predict geographical events. The tests were supplemented by a geographical prediction scale, in accordance with the research objectives, having 25 items that directly target various areas of geographical prediction. Reliability and validity of the instruments were ascertained by expert screening and statistical validation, such as Cronbach's alpha for internal reliability and test-retest.

The study's findings, by Analysis of Covariance (ANCOVA) interpretation, revealed statistically significant differences between the experimental and control groups, wherein the experimental group showed significant improvement in their understanding of geographical models as well as forecasting ability. The AhaSlides program accounted for approximately 59.2% of the variance in post-test scores of the geographical model and 54.1% of the variance in post-test scores of the geographical forecasting scale. The study highlights the power of employing dynamic interactive tools like AhaSlides in geography education and presents tangible suggestions regarding the capability of technology in cultivating the forecasting and analytic abilities of students. The findings show that the AhaSlides software has the potential to significantly improve students' understanding of intricate geographical processes and facilitate modern learning methods that stress active learning and critical thinking.

Keywords: AhaSlides, geographical models, geographical forecasting, e-learning, education technology, quasi-experimental design, ANCOVA.

Introduction

The world is witnessing significant changes due to advancements in science and technology, particularly in education. Technology has become an essential tool, especially after the COVID-19 pandemic, which led to the complete reliance on online platforms like Zoom for remote learning. This shift necessitates that societies adapt to modern educational methods, moving away from traditional systems to create interactive learning environments that foster motivation, higher-order thinking skills, collaboration, and practical application (Clarke, 2004).

According to the UNESCO Institute for Statistics (2009), technology can reform traditional educational systems, enhance learning outcomes, and ensure lifelong learning. Al-Mamari and Al-Masroori (2013) argue that integrating technology into education changes every aspect of the learning process, including curriculum goals, content, activities, assessment methods, and the roles of teachers and students. Teachers now act as facilitators, guiding the learning process, while students take on more responsibility for their own learning. Modern educational trends focus on tools like online learning, interactive multimedia, and communication technologies (Al-Freijaat, 2014).

Technology, including multimedia tools like images, videos, and interactive components, is particularly useful in teaching geography, as it aids in understanding geographical phenomena and their interrelations (Ismail, 2022). E-learning technologies allow information to be delivered more efficiently and require a curriculum that aligns with digital presentation methods, encouraging a shift to interactive learning approaches (Al-Dhufairi, 2004). The effectiveness of e-learning also relies heavily on the competence of teachers and an adequate learning environment (Al-Turki, 2010). As learning systems adapt to the developments in technology, expansion of the application of new technology and tools becomes imperative in building academic achievements as well as fostering skills (Al-Hassnawi, 2019).

The technological progress that we are experiencing has caused an explosion in information and communication. Education systems must equip both students and instructors with the needed competence in managing the changes. Schools must develop digital content and use electronic media to support learning (Quteit, 2015). A good example is the AhaSlides program, which has proved to be useful in making students comprehend geographical models better. This AI-powered slide maker facilitates the inclusion of quizzes, games, and surveys with the potential for more interactive learning and better comprehension.

Geographical models reduce and abbreviate the complexity of phenomena and are forecasting tools. With geographical models, geographers can examine issues and forecast about the future condition (Al-Khair, 2000). Use of geographical models helps learners to understand recurring relationship and patterns in nature and understand complex issues more easily. Models facilitate tests of theory and laws and thus scientific understanding.

Modern education aims at preparing students for coping with inevitable changes, and among the essential skills they have to acquire is the predictive skill of anticipating future phenomena (Abd Al-Shafi, 2023). Predictive skills are basic skills in most disciplines, particularly geography, as they help in interpreting and providing solutions to social problems (Saada, 2009). This study aims to examine the impact of AhaSlides on students' understanding of geographical models and their forecasting capacity. It aims to assist in enhancing pedagogical practice using technology, enhancing students' analytical mind and supplementing the objectives of the education system for improving the quality of education and adapting to the needs of today.

Problem of the Study

Geography as a subject is limited in providing students with quality and complete information on geographical models and data. These limitations are also exaggerated by cost, administrative, and technological hurdles that hinder quality content delivery. The use of technology within the classroom has the capability of bridging these limitations as it supports speeding up the learning process and enhancing content delivery. With the rapid growth of technology, new tools like AhaSlides have the ability to offer novel solutions to meet the educational needs of geography so that teachers can present an integrated and modern curriculum.

The main problem of the study is the difficulty of students to understand and apply geographical models and their weak abilities in making geographical predictions in the traditional learning environments. This results in a lack of analytical capabilities and decision-making authorities in the area of geographical issues. The study aims to explore how using AhaSlides can improve students' comprehension of geographical models and enhance their prediction skills, ultimately contributing to the development of teaching methods and fostering critical thinking and analytical skills in students.

Research Questions

1. Are there statistically significant differences at the significance level ($\alpha = 0.05$) between the mean scores of the experimental group and the control group in the geographical model comprehension test, attributed to the teaching method using the AhaSlides program versus the traditional method?
2. Are there statistically significant differences at the significance level ($\alpha = 0.05$) between the mean scores of the experimental group and the control group on the geographical prediction scale, attributed to the teaching method using the AhaSlides program versus the traditional method?

Objectives of the Study

1. To measure the impact of using the program on enhancing students' understanding of various geographical models.
2. To improve geographical prediction: Assess the effectiveness of the program in enhancing students' skills in predicting geographical issues.

Importance of the Study

First: Theoretical Importance

This study contributes to enriching the literature related to the use of technology in geographical education, helping to understand how interactive programs affect the enhancement of geographical model comprehension and geographical prediction. There is a scarcity of previous studies addressing the impact of the AhaSlides program in improving the understanding of geographical models and geographical prediction among female students in geography. This study responds to modern technological trends.

Second: Practical Importance

The practical significance lies in providing effective strategies to improve teaching methods, as it enhances student interaction and participation, which contributes to increasing academic achievement. It also provides a model that can be applied in classrooms, supporting teachers in using innovative educational tools to enhance the learning experience. Additionally, the study may encourage the Ministry of Education to organize training courses related to technology and its applications, including the AhaSlides program.

Limitations of the Study

This study is limited by the following boundaries:

- **Subject Limit**: The study was applied to the fourth unit of the geography textbook for the ninth-grade students in the second semester of the 2024/2025 academic year.
- **Spatial Limit**: The study was conducted with a sample of ninth-grade female students from Beit Ras Secondary School for Girls.
- **Time Limit**: The study was conducted with the study sample during the second semester of the 2024/2025 academic year.
- **Human Limit**: This study is limited to female students of the ninth grade at Beit Ras Secondary School for Girls.

Theoretical Framework and Previous Studies

Theoretical Framework

This section describes the theoretical framework and the most important previous studies, both Arab and foreign, related to the study variables. It has been divided into two sections:

First: Theoretical Literature

This part of the section aims to present the theoretical literature of the study, which is divided into several key sections:

E-learning

Due to the rapid advancements in educational technology, numerous technical innovations have emerged, becoming necessary for enhancing educational efficiency. One of the most notable innovations is e-learning, which began spreading in the mid-1990s and has become widely used. E-learning refers to the method of learning and knowledge exchange using multimedia and electronic devices, without the constraint of time or place. Teachers and learners communicate via various communication means, enabling students to learn according to their circumstances, readiness, and abilities (Al-Warfli, 2011).

E-learning has transformed educational practices, where technology is now an essential part of the learning process. It helps students acquire new skills and develop a deeper understanding through interaction with smart technologies. This promotes self-learning and critical thinking, which not only affects students but also requires teachers to adapt to new teaching methods and interact with students using modern tools (Eduardo, 2008). E-learning is a vital tool for developing digital skills, demanding a rethink of curricula and teaching methods (Monsalve, 2014).

E-learning is defined as delivering educational content electronically via computers and networks, allowing active interaction with content at any time and pace suited to the learner, either synchronously or asynchronously (Zaitoun, 2005).

AhaSlides Program

AhaSlides is an interactive tool used in education to enhance engagement by incorporating interactive activities like real-time polls, word clouds, and quizzes into presentations. The platform helps make the learning experience more dynamic and interactive, offering teachers the ability to integrate these activities into their lessons. Its simple and user-friendly interface allows integration with other programs like PowerPoint and Google Slides (AhaSlides, 2025).

The program has been shown to improve active learning by fostering better communication between teachers and students, creating a dynamic learning environment that encourages participation from all students, including those who are typically reluctant to engage verbally (Student-Centered World, 2024).

Geographical Models

A geographical model is a tool used to simplify and represent complex geographical phenomena. The term "model" is derived from the Latin word meaning "scale" or "standard," and it is primarily based on simulation, where the original subject is replaced with a similar object for studying its basic characteristics. Models are simplified representations of reality, allowing effective study while maintaining the core structure of the subject (Diab, 2010).

Models are used to understand the real world from various angles. They help in simplifying and interpreting complex phenomena and play a significant role in understanding dynamic processes and helping researchers measure key elements in a study. Various types of models, including mathematical, statistical, and computational models, are used in geographical studies.

Geographical Prediction

Geographical prediction is a significant tool that geographers utilize to describe and predict the future development of geography, whether man-made or natural. Geographical prediction is carried out by scrutinizing past evidence and applying models of science in order to arrive at accurate estimates for the future. Geographical prediction is applied in numerous contexts, such as disaster management, urbanization, and climate change (Zghoul, 2021). Geographical forecasting involves the application of different methods, such as statistical analysis, GIS, remote sensing, and computer models to predict future environmental change and human activity.

Previous Studies

In 2008, Al-Habbad conducted a study that examined the effect of PowerPoint presentation on teaching geography to fourth-grade students. The study aimed at answering four main questions: How are PowerPoint presentations used to impact students' academic performance? What is the impact of using PowerPoint presentation on students' attitudes towards computer use? Is there any relationship between academic performance and students' attitudes towards PowerPoint? And, how do the presentations impact learning recall? Al-Habbad's study revealed that the use of PowerPoint led to improved academic performance, long-term learning, and positive attitude of students towards technology. There was also a significant correlation between students' academic performance and their inclination towards technology.

In 2011, Al-Bushra carried out a study in Sudan to test the role of e-learning in enhancing the first year secondary school geography students' performance. The study was descriptive-analytical and included 30 geography teachers from 11 schools in Khartoum, Sudan. The results indicated that e-learning was a successful method of improving the learning process, creating an appropriate environment for role reversal between teachers and students, critical thinking, and discovery. It was also discovered that e-learning helped to make the learning process more interesting, therefore boosting students' performance in geography, even though there were some setbacks like insufficient finance and an awareness of how important technology is.

Abu Saud and Ali, in 2014, conducted a study that spoke about the problem of slums and the reasons for their expansion, with emphasis on applying GIS to forecast possible areas of growth for slums. The researchers wished to plan preventive policies in order to contain the growth of informal settlements and limit their negative impacts on urbanization and environmental degradation. The study highlighted the fact that informal settlements were largely spreading on the fringes of cities, particularly between old and new cities, such as Cairo and Giza. They also concluded the key causes of this expansion, such as land affordability, poor urban planning, regional disparities in development, internal migration, and absence of rural development. The study also emphasized the significance of a regional vision and consolidated planning to maintain rural and urban areas in proportion, offering GIS as a mechanism for determining and classifying the areas of likely informal settlement.

Zar'a in 2014 investigated the effects of interactive smart games in teaching geography among learning disability gifted children in fourth-grade primary school. His study applied a mixed method, which is experimental and theoretical. In his results, there were clear statistical differences in the performance of students in tests of economic concepts and thinking visually ability. The experimental group performed better, which meant interactive games really enhanced students' understanding of the topic. Zar'a recommended teachers' and students' training in applying such learning games to enhance academic achievement, in consideration of the need for the appropriate environment for learning.

Al-Harasi et al. (2018) conducted a study to assess the impact of latest technologies on the academic performance of 12th-grade geography students. The research separated 70 students into two groups: a control group and an experimental group that used modern technology to study. In spite of varying post-test scores, the statistical significant level of 0.30 confirmed that no differences were significant between the two groups. The researchers attributed this result to the complexity of the geography syllabus despite the use of modern teaching techniques. As per the results, they proposed modifying the curriculum to enhance its flexibility and accessibility.

Al-Jabari and co-authors formulated a spatial visualization model of water levels and water volume computation of Al-Tharthar Lake in 2019. Their work involved converting topographic maps to three-dimensional digital models with an accuracy of 98.3% for lake area and 99.99% for water volume. This exercise demonstrated the power of geospatial technologies to provide accurate, cost-effective solutions to the issue compared to traditional methods. This study also recommended applying geospatial information to improve water resource management techniques in Iraq.

In 2020, Al-Abadi investigated the efficacy of Kahoot in enhancing motivation and academic performance among eighth-grade students in history at Naur District in Jordan. The quasi-experimental design was employed with 60 students who were assigned to two groups: an experimental group that utilized Kahoot and a control group. Statistically significant gains in motivation and academic performance were observed for the experimental group, reflecting the positive effect of Kahoot on students' learning experience.

Abdelrahman, in 2020, explored the role of educational games in fostering geographical knowledge and critical thinking among Azhar primary school pupils. From the study, educational games positively affected the critical thinking among pupils and enabled them to understand topical geographical problems such as environmental problems. It identified the importance of using educational games to strengthen the ability of pupils to understand and analyze geographical phenomena critically.

A 2021 University of Abu Dhabi case study investigated the usage of AhaSlides to support learning motivation and engagement in students. The study found that the use of AhaSlides helped to increase interaction among students a lot, particularly for shy or hesitant students. Students noted that the program caused them to appreciate educational ideas a lot more effectively through its neat and sleek style. The study recommended an enhancement of the use of interactive technological tools in education and training staff to use them to the best.

Hamouda (2023) contributed to a research that focused on the utilization of modern technologies including GIS, remote sensing, and GPS in building an integrated geographical database for the Dakhla Oasis. The research established the capability of the advanced technologies to be powerful tools for decision-makers in planning for resource development for ensuring sustainable development in the oasis. The research pointed out the advantages of the geospatial technologies over the traditional methods due to their ability to adapt easily, are more rapid, and accurate.

In 2024, Al-Sharnoubi examined the role played by computer models and maps in applied geographical research in urban development and land use. The study revealed the necessity of applying remote sensing and computing in data collection and analysis to make geographers provide enhanced and optimal decisions.

Al-Owaidi (2024) conducted a study on the usage of GIS for determining the availability of health services in Hail City, Saudi Arabia. The study highlighted the role of GIS in making decision for the distribution of health services and recommended GIS use for health infrastructure planning and management.

Methodology and Procedures

This section is a fundamental part of the thesis as it aims to present the research methodology used in the study "The Impact of AhaSlides on Enhancing Students' Understanding of Geographical Models and Geographical Forecasting." It will discuss the research design, data collection tools, and procedures for implementing the study. By using innovative tools like AhaSlides, the study seeks to improve geographical understanding and enhance geographical forecasting among students.

Study Methodology

A quasi-experimental design was employed as the general study plan. The method allows one to compare the impact of using AhaSlides on students' knowledge of geographical models and forecast. The study will be based on real classroom experiments, before-and-after measurements while using the program. The subjects will be divided into two groups at random: an experimental group using the program and a control group that is not, which will enable the researcher to assess the difference between the two groups.

Study Population and Sample

The population used for the study is ninth-grade female students from Bayt Ras Secondary School for Girls in the Irbid Governorate. A random sample of 60 students will be chosen, comprising an experimental group of 30 students who will utilize AhaSlides and a control group of 30 students who will not utilize AhaSlides. Random sampling provides an equal representation of the class.

Data Collection Tools

The data collection tools in this study are designed to answer the study's research questions:

1. **AhaSlides Program**: An interactive tool that allows teachers to create interactive content, including quick quizzes and polls. It will be used to present six lessons from Unit 4, incorporating questions related to each lesson.
2. **Geographical Model Enhancement Test**: A pre-test and post-test will be prepared to assess students' understanding of geographical models. The test will measure how well students meet the learning outcomes of Unit 4 (Contemporary Environmental Problems) in the geography curriculum. The content of the test will be based on the textbook and the teacher's guide. It will be designed to enhance students' understanding of geographical models.

Test Validity

Validity of the test will be checked by reviewing the first draft, which will include a specifications table and the behavioural objectives for enhancing geographical models. The test will be reviewed by a panel of expert judges to confirm that it meets the objectives and is suitable for the content and student level. Changes in the test items will be made on the basis of the judges' feedback prior to finalizing the version.

Test Reliability

To determine the test of geographical model improvement reliability, it will be administered to an independent sample of 20 students. Two approaches will be utilized in determining the reliability coefficient: the test-retest and the internal consistency using the KR-20 formula to determine how consistent the items on the test are.

Geographical Forecasting Scale

A geographical forecasting scale will be developed from the research objectives. The scale will have 25 items, derived from previous research or adapted to fit the geographical forecasting context. The items will be chosen very wisely in order to include all aspects of geographical forecasting.

Scale Validity

The geographical prediction scale will be reviewed by a panel of experts in the field of geography to ensure that it is accurate and applicable to the students and the subject matter. After receiving input from the experts, the scale will be adjusted and standardized.

Scale Reliability

The reliability of the geographical forecasting scale will be determined using statistical methods to assess the consistency of the scale items and the agreement among the experts.

Teaching Plan Using AhaSlides

Pre-Application:

A teaching plan will be developed for Unit 4 of the ninth-grade geography curriculum, using AhaSlides. The plan will include:

1. Educational objectives for each lesson.
2. Educational tools suitable for the content.
3. Teaching methods and activities to be used during the lessons.

The content will be developed using AhaSlides to create interactive lessons for the six subjects: Atmospheric Problems, Biosphere Problems, Water Pollution, The Dead Sea Shrinking, Food Problems in the Arab World, and Energy in the Arab World. Interactive questions and polls will be included in every lesson to engage with the students and assess their comprehension of the concepts.

In-Class Application:

For every lesson, the material will be taught through AhaSlides, with students being able to engage with the questions that are asked in the moment. Short tests will be conducted during the lesson to assess students' comprehension of geographical models as well as the capability of applying these models in geographical forecasting. The feedback will be shown on the screen, providing instant feedback and discussion of students' responses.

Post-Application:

After completing the lessons, data will be collected from the AhaSlides results, including the percentages of correct and incorrect answers.

Proposed Geographical Models

The following geographical models will be used based on the lessons of Unit 4:

- **Atmospheric Model**
- **Biosphere-Water Interaction Model**
- **Dead Sea Shrinking Model**: Explanation of causes and effects using maps and charts.
- **Food Production Model**: Analysis of factors affecting agricultural production in the Arab world using statistical data.
- **Energy Sources Model**: Explanation of the distribution of different energy sources in the Arab world and their economic impact.

Study Variables

The study variables are defined as follows:

- **Independent Variable**: The teaching method using AhaSlides and the traditional method.
- **Dependent Variables**: The enhancement of geographical models and the geographical forecasting ability.

Study Tools

To achieve the objectives of the study, which aim to examine the effectiveness of the Ahaslides program in teaching geography and measuring its impact on the development of understanding geographic models and geographic forecasting, the following tools were used:

First: Geographic Models Test

Table (1): Difficulty and Discrimination Indices for the Test Items.

Item Number	Difficulty Index	Discrimination Index	Item Number	Difficulty Index	Discrimination Index
1	0.30	0.40	14	0.25	0.30
2	0.30	0.40	15	0.35	0.30
3	0.35	0.50	16	0.30	0.40
4	0.40	0.40	17	0.35	0.30
5	0.45	0.50	18	0.30	0.40
6	0.35	0.50	19	0.35	0.30
7	0.30	0.40	20	0.40	0.40
8	0.25	0.50	21	0.45	0.50
9	0.30	0.40	22	0.40	0.40

10	0.25	0.30	23	0.35	0.30
11	0.40	0.40	24	0.35	0.30
12	0.35	0.30	25	0.45	0.50
13	0.30	0.40			

It can be observed from Table (1) that the difficulty indices ranged between 0.25 and 0.45. According to Auda (2014), an item is considered good and acceptable for the test if its difficulty index ranges between 0.20 and 0.80. Therefore, none of the items were removed from the test. The table also shows that the discrimination indices ranged between 0.30 and 0.50. Based on Auda's (2014) criteria, an item is considered good and acceptable for the test if its discrimination index is higher than 0.25. As a result, none of the items were removed, and all the items were retained, making the final test consist of 25 items.

Equivalence of the Study Groups for the Geographic Models Test

The equivalence of the study groups (experimental and control) in their pre-test performance was tested using the independent samples t-test. Table (2) presents the results.

Table (2) : Results of the t-test for checking the equivalence of the study groups in pre-test performance on the geographic model’s test.

Dependent Variable	**Group**	**Mean**	**Standard Deviation**	**t-test**	**Degrees of Freedom**	**Statistical Significance**
Geographic Models Test	Experimental	6.20	1.37	0.770	58	0.444
	Control	6.47	1.31			

It can be observed from Table (2) that there is no statistically significant difference between the mean scores of both study groups on the geographic model’s test, indicating that the groups were statistically equivalent before the intervention.

Secondly: Geographic Prediction Scale:

To achieve the study's objectives, the researcher developed the Geographic Prediction Scale to provide a measurement tool with an acceptable level of validity and reliability, suitable for ninth-grade students.

Table (3): Correlation Coefficients between Each Item of the Geographic Prediction Scale and the Overall Scale.

Item	Correlation with Dimension	Correlation with Overall Scale	Item	Correlation with Dimension	Correlation with Overall Scale
1	.830**	.849**	14	.566**	.459*
2	.727**	.727**	15	.810**	.847**
3	.887**	.892**	16	.761**	.716**
4	.746**	.644**	17	.854**	.849**
5	.585**	.499*	18	.635**	.624**
6	.903**	.814**	19	.831**	.838**
7	.629**	.659**	20	.666**	.660**
8	.921**	.855**	21	.506*	.533*
9	.582**	.631**	22	.803**	.780**
10	.857**	.842**	23	.808**	.777**
11	.666**	.672**	24	.881**	.854**
12	.908**	.903**	25	.568**	.558*
13	.753**	.721**			

***Significant at α = 0.05 level   ** Significant at α = 0.01 level*

From Table (3), it can be observed that all correlation coefficients are statistically significant at the α = 0.05 level. Based on the correlation coefficient value of (0.2) as a criterion for accepting the items, as indicated by Auda (2010), no item was removed from the Geographic Prediction Scale. Therefore, the final version of the scale consists of 25 items.

To verify the reliability of the scale, it was applied to a pilot sample of 20 female students, both from within and outside the study sample. The Cronbach's alpha coefficients (internal consistency) were calculated. The scale was then re-applied to the same sample two weeks later to calculate the correlation coefficient between the two applications (test-retest reliability), as shown in Table (4).

Table (4): Reliability Indicators of the Geographic Prediction Scale.

Dimension	Internal Consistency (Cronbach's Alpha)	Test-Retest Reliability	Number of Items
Basic Understanding of Geographic Models	0.82	0.79	5
Predicting Environmental Changes	0.85	0.82	5
Using Digital Technologies and Models in Geographic Prediction	0.80	0.79	5
Analysis and Self-Evaluation	0.91	0.83	10

Overall Scale	0.97	0.83	25

It is clear from Table (4) that the internal consistency reliability coefficients for the sub-dimensions ranged from 0.80 to 0.91, and the overall scale had a coefficient of 0.97. The test-retest reliability coefficients for the sub-dimensions ranged from 0.79 to 0.83, and for the overall scale, it was 0.83. All values are higher than 0.70, indicating the scale's reliability (Cronbach, 1951).

Equivalence of Study Groups for the Geographic Prediction Scale

The equivalence of the study groups (experimental and control) in their pre-test performance was tested using an independent samples t-test, as shown in Table (5).

Table (5) : Results of the t-test for detecting the equivalence of the study groups in the pre-test for geographic prediction scale.

Dependent Variable	Group	Mean	Standard Deviation	t-test	Degrees of Freedom	Statistical Significance
Basic Understanding of Geographic Models	Experimental	1.60	0.32	-0.157	58	0.876
	Control	1.59	0.34			
Predicting Environmental Changes	Experimental	1.61	0.41	-0.147	58	0.883
	Control	1.59	0.29			
Using Digital Technologies and Models in Geographic Prediction	Experimental	1.54	0.52	-0.116	58	0.908
	Control	1.53	0.36			
Analysis and Self-Evaluation	Experimental	1.55	0.35	0.325	58	0.746
	Control	1.58	0.28			
Overall Geographic Prediction Scale	Experimental	1.56	0.34	0.033	58	0.974
	Control	1.57	0.27			

From Table (5), it is noticeable that there are no statistically significant differences between the mean scores of the experimental and control groups on the geographic prediction scale and its subscales. This indicates that the two groups were statistically equivalent before the intervention.

Statistical Treatment

The data were statistically processed using the following appropriate statistical methods:

1. **Descriptive Statistics**: This involved calculating the means and standard deviations for the students' scores on the geographical models test and the geographical prediction scale (pre-test and post-test).
2. **Inferential Statistics**: The following inferential methods were used:
   - **Independent Samples t-test**: This test was used to verify the equivalence of the two study groups on the pre-test.
   - **Analysis of Covariance (ANCOVA)**: This was used to analyze the results of students in both the experimental and control groups on the two study variables: the geographical models test and the geographical prediction scale.

Ethical Considerations

The study will adhere to ethical standards by:

- **Obtaining Informed Consent**: Students and their guardians will be informed about the study's objectives, and their consent will be obtained to participate.
- **Data Protection**: The confidentiality of the collected data will be maintained, and students' identities will not be revealed in any published results.

This methodology ensures that the research follows ethical practices and provides accurate and reliable findings regarding the impact of AhaSlides on students' geographical understanding and forecasting abilities.

Results

This section presents the results of the study aimed at investigating the effectiveness of the AhaSlides program in teaching geography and its impact on enhancing the understanding of geographical models and geographical forecasting among ninth-grade students. Below is a detailed presentation of the results obtained.

First: Results Related to the First Question:

The first question of the study is: "Are there statistically significant differences at the (α = 0.05) level between the average scores of the experimental group and the control group in the geographical models test attributed to the teaching method using the AhaSlides program versus the traditional method?"

To answer the first question, the first null hypothesis was tested, which states:

- **There is no statistically significant difference at the (α = 0.05) level between the average scores of the experimental group and the control group in the geographical models test attributed to the teaching method using the AhaSlides program and the traditional method.**

This question was answered and the hypothesis was tested by extracting the means and standard deviations of both the experimental and control groups on the geographical models test. Table (6) illustrates this:

Table (6): Mean, Standard Deviation, Standard Error, and Adjusted Mean Scores of Pre- and Post-Tests for the Experimental and Control Groups on the Geographical Models Test.

Group	Treatment Method	Pre-Test Mean (S)	Pre-Test SD (X)	Post-Test Mean (S)	Post-Test SD (X)	Adjusted Mean	Standard Error
Experimental	AhaSlides	6.20	1.37	21.10	2.64	21.29	0.33
Control	Traditional	6.47	1.31	17.23	2.60	17.04	0.33

S = Mean, X = Standard Deviation

Maximum score: 25

It is evident from Table (6) that there are noticeable differences between the mean scores of the experimental and control groups on the geographical models test. The pre-test mean for the experimental group was 6.20, and the post-test mean was 21.10, while the control group had a pre-test mean of 6.47 and a post-test mean of 17.23.

To examine whether these differences are statistically significant, Analysis of Covariance (ANCOVA) was used on the post-test scores for the geographical models test, after controlling for the pre-test score as a covariate. This was done to eliminate any pre-existing differences. The results of this analysis are presented in Table (7):

Table (7): ANCOVA Results for the Post-Test Scores of the Experimental and Control Groups on the Geographical Models Test.

Source of Variance	Sum of Squares	Degrees of Freedom	Mean Squares	F Value	Statistical Significance	Eta Square
Pre-Test (Covariate)	213.306	1	213.306	65.807	0.000	0.536
Teaching Method	267.952	1	267.952	82.665	0.000	0.592
Error	184.760	57	3.241			
Total Adjusted	622.333	59				

Statistically significant at the (α = 0.05) level.

From Table (7), it can be observed that the F-value for the geographical model's test was 82.665, which is statistically significant at the (α = 0.05) level, indicating that there are significant differences between the post-test scores of the two groups. The mean score for the experimental group (adjusted) was 21.29, while the mean score for the control group (adjusted) was 17.04. The Eta square value was 0.592, meaning that approximately 59.2% of the variance in the post-test scores of the students is attributable to the AhaSlides program. Thus, the effect size is large, as per Kilani and Sharifin (2016), where an effect size greater than 16% is considered large.

Based on this, the null hypothesis is rejected, and it is concluded that there is a statistically significant difference at the (α = 0.05) level between the average scores of the experimental and control groups on the geographical models test attributed to the teaching method using the AhaSlides program versus the traditional method.

Second: Results Related to the Second Question:

The second question of the study is: "Are there statistically significant differences at the (α = 0.05) level between the average scores of the experimental group and the control group on the geographical forecasting scale attributed to the teaching method using the AhaSlides program versus the traditional method?"

To answer this question, the second null hypothesis was tested, which states:

- **There is no statistically significant difference at the (α = 0.05) level between the average scores of the experimental group and the control group on the geographical forecasting scale attributed to the teaching method using the AhaSlides program and the traditional method.**

This question was answered and the hypothesis was tested by extracting the means and standard deviations for both the experimental and control groups on the geographical forecasting scale and its subdomains. Table (8) shows the results:

Table (8): Mean, Standard Deviation, Standard Error, and Adjusted Mean Scores of Pre- and Post-Tests for the Experimental and Control Groups on the Geographical Forecasting Scale and Subdomains.

Group	**Treatment Method**	**Dimension**	**Pre-Test Mean (S)**	**Pre-Test SD (X)**	**Post-Test Mean (S)**	**Post-Test SD (X)**	**Adjusted Mean**	**Standard Error**
Experimental	AhaSlides	Basic Understanding of Geographical Models	1.60	0.32	2.53	0.59	2.53	0.09
		Predicting Environmental Changes	1.61	0.41	2.23	0.47	2.22	0.07
		Using Digital Techniques and Models in Geographical Prediction	1.54	0.52	2.13	0.40	2.12	0.06
		Analysis and Self-Evaluation	1.55	0.35	2.16	0.40	2.15	0.06
		Total Scale	1.56	0.34	2.24	0.39	2.24	0.06
Control	Traditional	Basic Understanding of Geographical Models	1.59	0.34	1.85	0.45	1.85	0.09
		Predicting Environmental Changes	1.59	0.29	1.54	0.25	1.55	0.07
		Using Digital Techniques and Models in Geographical Prediction	1.53	0.36	1.56	0.24	1.57	0.06
		Analysis and Self-Evaluation	1.58	0.28	1.51	0.21	1.53	0.06
		Total Scale	1.57	0.27	1.59	0.20	1.60	0.06

S = Mean, X = Standard Deviation

From Table (8), it is evident that there are noticeable differences between the average scores of the experimental and control groups on the geographical forecasting scale dimensions.

The pre-test mean for the experimental group was 1.56, and the post-test mean was 2.24, while the control group had a pre-test mean of 1.57 and a post-test mean of 1.59.

To determine whether these differences are statistically significant, ANCOVA was used for the post-test scores of the geographical forecasting scale after controlling for the pre-test scores. The results are shown in Table (9):

Table (9): ANCOVA Results for the Post-Test Scores of the Experimental and Control Groups on the Geographical Forecasting Scale.

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F-Value	Significance	Eta Square
Pre-Test (Covariate)	0.283	1	0.283	3.024	.087	.050
Teaching Method	6.287	1	6.287	67.091	.000	.541
Error	5.341	57	0.094			
Total	11.923	59				

Statistically significant at the (α = 0.05) level.

From Table (9), it is observed that the F-value for the geographical forecasting scale was 67.091, which is statistically significant at the (α = 0.05) level, indicating significant differences between the post-test scores of the two groups. The adjusted mean score for the experimental group was 2.24, while the adjusted mean score for the control group was 1.60. The Eta square value was 0.541, meaning that approximately 54.1% of the variance in the post-test scores for geographical forecasting is attributed to the AhaSlides program. Therefore, the effect size is high, as per Kilani and Sharifin (2016), where an effect size greater than 16% is considered large.

Based on this, the second null hypothesis is rejected, and it is concluded that there is a statistically significant difference at the (α = 0.05) level between the average scores of the experimental and control groups on the geographical forecasting scale attributed to the teaching method using the AhaSlides program versus the traditional method.

Additionally, a multivariate analysis of covariance (MANCOVA) was performed on the post-test scores of the geographical forecasting scale's subdomains. The results are shown in Table (10).

Table (10): Multivariate ANCOVA Results for the Post-Test Scores on the Subdomains of the Geographical Forecasting Scale.

Source	Dimension	Sum of Squares	Degrees of Freedom	Mean Squares	F-Value	Significance	Eta Square
Pre-Test	Basic Understanding of Geographical Models	2.741	1	2.741	12.242	.001	.185
	Predicting Environmental Changes	0.004	1	0.004	0.029	.866	.001
	Using Digital Techniques and Models in Geographical Prediction	0.221	1	0.221	2.087	.154	.037
	Analysis and Self-Evaluation	0.218	1	0.218	2.274	.137	.040
Group	Basic Understanding of Geographical Models	6.434	1	6.434	28.741	.000	.347
	Predicting Environmental Changes	6.515	1	6.515	44.822	.000	.454
	Using Digital Techniques and Models in Geographical Prediction	4.368	1	4.368	41.303	.000	.433
	Analysis and Self-Evaluation	5.511	1	5.511	57.615	.000	.516
Error	Basic Understanding of Geographical Models	12.089	54	0.224			
	Predicting Environmental Changes	7.849	54	0.145			
	Using Digital Techniques and Models in Geographical Prediction	5.711	54	0.106			
	Analysis and Self-Evaluation	5.166	54	0.096			
Total	Basic Understanding of Geographical Models	23.074	59				
	Predicting Environmental Changes	15.383	59				
	Using Digital Techniques and Models in Geographical Prediction	11.309	59				
	Analysis and Self-Evaluation	12.159	59				

Statistically significant at the (α = 0.05) level.

From Table (10), there are statistically significant differences in the subdomains of the geographical forecasting scale, with the experimental group outperforming the control group in all dimensions. The effect size for each dimension is substantial, particularly in the "Self-Analysis and Evaluation" dimension, with an Eta square value of 0.516, indicating that 51.6% of the variance in the post-test scores is explained by the AhaSlides program.

Thus, the AhaSlides program demonstrated a high impact on enhancing geographical forecasting and understanding of geographical models among the experimental group.

Discussion of Results and Recommendations

First: Results Related to Question 1:

The first question of the study asked: "Are there statistically significant differences at the ($\alpha = 0.05$) level between the mean scores of the experimental group and the control group in the geographical models test, attributed to the teaching method using the AhaSlides program compared to the traditional method?"

There were apparent differences between the mean scores of the two groups (experimental and control) on the geographical models test. The mean score of the experimental group in the pre-test was 6.20, and in the post-test, it was 21.10. In contrast, the mean score of the control group in the pre-test was 6.47, and in the post-test, it was 17.23.

These apparent differences suggest an improvement in performance levels after the experiment, reflecting the impact of the educational intervention applied to the experimental group compared to the control group. Both the classes were equal at the start in as much as their prior knowledge of geospatial models, as can be seen by the pre-test results. The experimental class did make a difference as far as their scores on the post-test, meaning that the way they were taught, i.e., using the AhaSlides program, actually enhanced their performance.

Although the control group also scored better in the post-test, this was less significant than that of the experimental group, showing that the instructional strategy used in the experimental group was more effective in enhancing their understanding of geographical models. This is likely because instructional strategies used in the experimental group were more interactive and up-to-date in character, such as project-based learning or use of technology. These practices have also been proven to involve students more, developing a better grasp of the material.

Apart from psychological considerations, such as increased motivation through interactive pedagogy, explanations for the increased performance of the experimental group may also be offered. This is in agreement with previous research into the effectiveness of interactive and computer-based teaching methods in increasing students' academic performance.

This finding contradicts that of James Smith (2021), who concluded that traditional methods were better but concurs with the research of Al-Naania (2022), who observed the role played by cutting-edge technology in the improved comprehension of geographical models.

Second: Results Related to Question 2:

The second research question was: "Are there statistically significant at the ($\alpha = 0.05$) level differences between the mean scores of the experimental group and the control group on the geographical prediction scale, as a result of using the teaching method with the AhaSlides program or the traditional method?"

The experimental and control groups' differences in mean scores on the geographical prediction scale were significant. The mean score of the experimental group in the pre-test was 1.56, whereas in the post-test it was 2.24. The mean score of the control group in the pre-test was 1.57, whereas in the post-test it was 1.59.

Such differences suggest that an improvement in performance of the intervention group was notable after the intervention, compared to the control group with minimal or no change. The dramatic rise in experimental group post-test score indicates that intervention greatly enhanced their geographical predictive ability. The control group, to which intervention was not offered, remained unchanged.

This means that the improvement observed in the experimental group was not due to random chance or external influence but was specifically linked to the intervention they had undergone. Since no change was observed in the control group, this proves that the teaching method used on the experimental group was indeed effective in their predictive ability.

Experimental group shifts did not occur at once but trended cumulatively over time, and the evidence shows intervention helped in building a higher level of geographical prediction awareness among students. This result is an inference that the strategy used in the experiment can be an effective instrument in building geographical prediction skill and can be applied under future education packages.

These results are in agreement with Zaar's study (2014), which showed significant differences in favor of the experimental group. However, they contradict Harassi's study (2018), where no significant differences were found between the groups, attributing the results to the difficulty of the geography curriculum even with the use of modern technologies.

Recommendations

1. **Promote Teaching Methods Focused on Geographical Prediction**: Given the positive impact of geographical prediction on skill development, it is recommended to incorporate such methods into educational practices.
2. **Develop Training Programs for Teachers**: Teachers should be trained on how to integrate geographical prediction strategies into their teaching to improve student performance in these areas.
3. **Conduct Future Research**: Further studies should explore other factors that may influence the effectiveness of geographical prediction in enhancing learning, such as individual differences among students.
4. **Expand Geographical Prediction to Other Subjects**: It would be beneficial to explore the impact of geographical prediction in other subjects to measure its effectiveness across various educational fields.
5. **Provide Additional Support to Control Groups**: Future studies should provide additional support or alternative teaching tools to control groups to determine whether similar improvements can be achieved with different methods.
6. **Increase Use of Modern Technology and Interactive Software**: Schools should consider expanding the use of modern educational technologies and interactive software like AhaSlides to enhance the learning experience.
7. **Encourage the Adoption of Modern Curricula**: Educational institutions should be encouraged to adopt new curricula that integrate geographical prediction skills and other modern teaching methods to improve student outcomes in a variety of subjects.

References

- Abu Saud, T., & Hussein, R. (2014). Predicting the potential locations for random diversity using Geographic Information Systems: Application to Cairo Governorate. *Journal of Urban Research*, 12.
- Ismail, A. (2009). E-learning: From application to professionalism to quality. *Alam Al-Kutub*, Cairo.
- Ismail, S. (2022). A proposed program based on project-based learning strategy via Akadoks platform to develop technological requirements for teaching geography and social communication skills among geography students. *Fayoum University of Educational and Psychological Sciences*, 16(5).
- Harasi, S., Samtsami, R., Al-Kindi, M., & Al-Khrousi, H. (2018). The impact of using modern technologies and techniques in teaching geography on academic achievement. *Journal of Educational and Psychological Sciences*, 7(47), 47-70.
- Al-Hassnawi, H. (2019). Modern educational technologies in teaching (1st ed.). *Dar Ibn Al-Nafis*.
- Al-Zghoul, I. (2021). Modern trends in geographical scientific research. Retrieved from https://www.academia.edu/51001634
- Al-Sayed, M. M. (2011). Developing the geography curriculum for the first-year preparatory school in light of contemporary geographical issues and its impact on enhancing forecasting skills and problem-solving. Unpublished PhD thesis, *Faculty of Education, Ain Shams University*.
- Al-Dhufairi, F. (2004). Educational goals and ambitions in e-learning. *Educational Journal*, Oman, 4, 84-90.
- Al-Freijaat, G. (2014). Introduction to educational technology (2nd ed.). *Dar Knouz for Scientific Knowledge*.
- Al-Jabri, A., Al-Ma'adi, O., & Al-Jabri, M. (2019). Topographic modeling of Tharthar Lake from topographic maps in GIS. *Al-Mada Literary Journal*.
- Al-Turki, O. (2010). Requirements for the use of e-learning at King Saud University from the perspective of faculty members. *Journal of Educational and Psychological Sciences, University of Bahrain*, 11(1), 151-471.

- Al-Mamari, S., & Al-Masroori, F. (2013). The level of ICT competencies among social studies teachers for post-basic education in some Omani governorates. *International Journal of Educational Research*, 34.
- Al-Kilani, M. (2015). Articles in applied geography. Retrieved from https://www.muthar-alomar.com/wp-content/uploads/2015/05/مقالات-في-الجغرافيا-التطبيقية.
- Al-Kilani, M. (2020). Articles in contemporary geographic thought. Retrieved from https://www.muthar-alomar.com/wp-content/uploads/2020/02/الجزء-الاول-مقالات-في-الفكر-الجغرافي-المعاصر-1.
- Diab, A. (2010). The role of contemporary general scientific research methodologies in developing the theory of human geography. *Journal of Damascus University*, 26(1-2).
- Zaiton, H. H. (2005). A new vision in education: E-learning - Concept - Issues - Application - Evaluation. Riyadh, Saudi Arabia: *Dar Al-Sultiah for Education*.
- Abd Al-Shafi, I. (2023). A proposed unit based on crisis management to develop forecasting and problem-solving skills among first-year preparatory students. *Journal of Contemporary Curricula and Educational Technology*, 125-92.
- Ali, F. (2020). Geographic thinking skills to be developed in secondary school geography students. *Journal of the Faculty of Education, Mansoura University*, 109(6), 1715-1737.
- Qurieh, J. (2012). Simulation and experiments in Earth sciences. *Egyptian Journal of Environmental Change*, 4, 45-21.
- UNESCO Institute for Statistics. (2009). A guide to measuring information and communication technologies in education.
- Lahbad, F. (2008). The effect of using PowerPoint presentations in teaching geography on achievement and the retention of learning outcomes. *The First Educational Conference - Citizenship Education and Social Studies Curricula*, Cairo, Egypt, 242-275.
- Yusuf, Qutami, A., & Ammour, U. (2005). Habits of mind and thinking theory and practice. Amman: *Dar Al-Fikr for Publishing and Distribution*.
- Hamouda, S. (2023). The use of geospatial technologies and digital elevation models to study the natural geographic characteristics of the Dakhla Oasis, Egypt. *Journal of the Geographic and Cartographic Research Center, Faculty of Arts, University of Menoufia*.

- Al-Warfali, F. (2011). The importance of e-learning in achieving quality in higher education. *Proceedings of the First Arab International Conference on Quality Assurance in Higher Education*, Zarqa University, Jordan.
- AhaSlides. (2025). AhaSlides - Interactive Presentation Platform for Enhancing Engagement. Retrieved on March 20, 2025, from https://ahaslides.com/?utm_source=chatgpt.com
- Student-Centered World. (2024). Using AhaSlides to enhance engagement in free presentations. Retrieved on March 20, 2025, from https://www.studentcenteredworld.com/ahaslides/?utm_source=chatgpt.com
- Chowdhury, M. (2011). Ethical issues as competitive advantage in bank management. Department of Marketing, University of Chittagong, Bangladesh.
- Clarke, Alan. (2004). Much to learn about e-learning. *The National Institute of Adult Continuing Education, England* 10(2), 141-158.
- Flannigan, M., Krawchuk, M., de Groot, W., Wotton, M., & Gowman, L. (2023). The importance of geography in forecasting future fire patterns. *Proceedings of the National Academy of Sciences*, 120(35), e2310076121. https://doi.org/10.1073/pnas.2310076121
- Garrett, R., & Jokivirta, L. (2004). Online Learning in Commonwealth Universities: The Observatory on Borderless.
- Giusti, A. (2008). TICs, Educación a Distancia y Entornos Virtuales de EAD: El desafío de las asignaturas experimentales. *Trabajo Final para optar por el título de Especialista en Tecnología Informática aplicada en Educación*. CORE.
- Laura Monsalve Lorente & Sara Cebrián Cifuentes. (2014). Competencias tecnológicas en estudiantes de educación superior. *Revista científica electrónica de Educación y Comunicación en la Sociedad del Conocimiento Etic@net*, 14(II), July-December. Retrieved from https://www.eticanet.com
- Urdan, T., & Weggen, C. (2000). Corporate E-Learning: Exploring a New Frontier, WRHambrecht, San Francisco, CA.