Information Sciences Letters
An International Journal

http://dx.doi.org/10.18576/isl/121008

The Effectiveness of WebQuest Strategy in Developing the Academic Achievement and E-Communication of Students in the Education College

Majed Ali Al Sharidah[1,*] *and Abouelftouh M. Alkramiti*[1,2]

[1]Department of Educational Sciences, College of Education in Wadi Al-Dawasir, Prince Sattam bin Abdulaziz University, Al-Kharj, Saudi Arabia
[2]Department of Curriculum and Instruction, Faculty of Education, Damietta University, New Damietta, Egypt

Received: 6 Sep. 2023, Revised: 28 Sep. 2023, Accepted: 29 Sep. 2023.
Published online: 1 Oct. 2023.

Abstract: This study aimed to reveal the effectiveness of using the WebQuest Strategy in developing academic achievement of the mathematical concepts and the impact of this on developing electronic communication skills among female kindergarten students at the College of Education. Experimental methodology was used with a quasi-experimental design due to its suitability with the nature of the study. The study tools included an academic achievement test on specific topics to measure academic achievement in the mathematics concepts development course, and an observation tool to measure electronic communication skills (ECO). The study tools were applied to a random sample of female kindergarten students at the College of Education (60) female students, were divided into two groups: an experimental group (32) female students studied topics according to the WebQuest Strategy, and a control group (28) female students studied the specific topics according to the traditional method. The results showed that using the WebQuest Strategy has an impact on developing both academic achievement for the course "developing mathematical concepts" and electronic communication skills. The study presented a set of recommendations, the most important of which is the necessity of employing the WebQuest Strategy in teaching other courses in university education through a reliable education platform, such as Blackboard. The study presented a set of future research proposals.

Keywords: WebQuest Strategy, Academic Achievement, Electronic Communication, Mathematical Concepts.

1. Introduction

Mathematics is a part of everyday life and necessary for being an autonomous citizen; it helps people organize their insights and discoveries about the world in systematic ways, such as when they need to represent quantities and spatial relationships [1]. The course of "developing mathematical concepts" is one of the courses offered within the study plan for female students at the College of Education in the sixth level of the kindergarten program, and it includes many important topics that aims to provide pre-service kindergarten teachers with in-depth knowledge about the mathematical concepts that should be built in kindergarten children. Examples of these topics include: An introduction to learning mathematics concepts in kindergarten, objectives of learning mathematics concepts in kindergarten, topological concepts, geometrical concepts, numerical concepts, numerical sense, spatial concepts and relationships, and the development of spatial sense.

Related studies indicated the importance of learning mathematics in kindergarten. These studies have revealed that understanding complex mathematics and abstract thinking develop earlier than previously thought [2], [3]. Studies have advanced our understanding by showing that children are born with a numerical sense (meaning knowledge of quantity and numbers) and a spatial sense [3] and that the development of mathematics skills begins at a very early age. Studies also show that early understanding of mathematics is positively associated with children's future success in mathematics [4], [5] and their achievement growth [2], [3], [5], [6]. Furthermore, quality mathematics education is fundamental to the development of mathematical skills [7-10].

Accordingly, it is clear the importance of preparing kindergarten female teachers so that they are sufficiently aware of mathematical knowledge, by employing the best teaching and learning strategies that develop in them the tendency

*Corresponding author e-mail: m.alsharidah@psau.edu.sa

towards building their mathematics skills.

E-learning strategies have proven its effectiveness during the last ten years, especially the era of Covid-19 pandemic [11-13]. The Blackboard platform is one of the most important educational sites and platforms that has proven its high reliability as learning management system (LMS) during this time, especially in terms of academic achievement [14-16], and in Developing electronic communication skills [17-19], and other aspects of learning.

The roles of the faculty member in the traditional classroom can be expressed through some words, such as: lecturer, transmitter of knowledge, source of knowledge, teacher, source of authority, verbal interactions prevail over non-verbal interactions, direct teaching, commitment to synchronous education, discipline. Therefore, the main role of the faculty member in traditional teaching was to impart the knowledge he possesses to his students through lecturing. Accordingly, the role of the faculty member is active, while the role of the student is passive.

On the other hand, modern teaching is based on different ideologies and concepts about the relationships between a faculty member and his students in the teaching and learning processes. And the faculty member is not the only source of knowledge anymore. Where other sources of knowledge appeared, namely: students, the global environment, and the local environment, in addition to the faculty member who determines the nature of harmony between these sources.

Related studies [20] indicated the low level of online research skills among college students and their reliance on random methods of searching, as well as their reliance on sometimes unreliable sources to collect and refine information. In addition, studies [21-24] have indicated the importance of university students possessing electronic communication skills, to benefit from participatory learning, and to exchange information among them; Moreover, developing their problem-solving and decision-making ability, as well as critical thinking skills.

1.1 The study Problem

By reviewing related studies, the researchers found that the focus is still on the cognitive aspect in teaching information that depends on memorization without taking advantage of the students' mental capabilities in employing that knowledge. Recent studies have found that there must be modern teaching methods that suit the current era of knowledge. It contributes to raising the efficiency of students to raise their educational level.

Through the researchers' work as faculty members at the university, they have a sense of the problem of the current study, which is the lack of a codified strategy among female university students majoring in kindergarten in searching the Internet for information and knowledge, as well as the weakness of participation in completing individual and group assignments.

Previous studies [25-32] emphasized the effectiveness of WebQuest in teaching different academic subjects because of the different mental activities it contains with the connection to the outside world and the current developments that the world is going through around us and the acceleration of science and knowledge.

The WebQuest strategy is a model that combines precise educational planning and the correct use of computers and educational technology, to raise the level of female students who will become teachers soon and overcome the difficulties they face in teaching kindergarten, and by using a modern educational strategy that helps them learn according to their desires without being restricted by spatial distance. For the educational institution and trying to benefit from the capabilities offered by educational technology in facing many challenges in the educational field, which prompted researchers to try to identify the effectiveness of the WebQuest strategy in developing the academic achievement of female kindergarten students at the College of Education in Wadi Al-Dawasir. Moreover, to the best of the researcher's knowledge, it was found that there are no previous studies that used the WebQuest strategy in teaching mathematics concepts to pre-service kindergarten teachers.

1.2 The Study questions

Thus, the problem of the study lies in the following questions:

1. What is the effectiveness of teaching the course "developing mathematical concepts" according to the WebQuest strategy in developing the academic achievement of kindergarten students?
2. What is the effectiveness of teaching the course "developing mathematical concepts" according to the WebQuest strategy in developing electronic communication skills among kindergarten students at the College of Education?
3. To what extent does the level of academic achievement differ among kindergarten students at the College of Education, according to the level of their computer skills?
4. To what extent does the level of electronic communication skills differ among kindergarten students at the College

of Education, according to the level of their computer skills?

1.3 Hypotheses

H_a1: There is a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group and the control group students in the post-measurement of the academic achievement test.

H_a2: There is a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group and the control group students in the post-measurement of the (ECO) tool.

H_o3: There is not a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group students in the achievement test according to the level of computer skills.

H_o4: There is not a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group students in the (ECO) tool according to the level of their computer skills.

1.4 The study objectives

The study aimed to reveal the effectiveness of teaching according to the WebQuest strategy in developing academic achievement for the course "Developing Mathematics Concepts" and the impact of this on developing electronic communication skills among female kindergarten students at the College of Education.

1.5 The importance of the study

The WebQuest strategy is one of the teaching methods that is based on the constructivist theories used by the teacher, through which students perform activities based on research and investigation by organizing the knowledge they get from the Internet, and by interacting with others they can think about the topic under discussion critically, which leads to the growth of It enhances the ability to manage information and develop research skills, and also encourages critical thinking and analysis. There is no doubt that the transmission of the impact of learning from these practices in teaching courses in the College of Education to female students who will study for the kindergarten stage will have a significant impact on the development of many technical and educational skills, such as: electronic communication skills.

1.6 The Study Terminologies

WebQuest strategy: This strategy is considered among the modern learning strategies that aim to change the traditional approach to educational and educational action, and which is based on constructivist learning theory in encouraging the student to build his learning on his own, going beyond the limits of the university textbook thanks to the means of interaction, participation and cooperation provided by modern technologies in academic achievement. This strategy is implemented in the current study by creating links to WebQuest elements on the Blackboard platform that Sattam Bin Abdulaziz University uses to manage university courses. This strategy goes through six stages or steps: introduction, tasks, procedures, sources, evaluation, conclusion, and the faculty member's page.

Academic achievement: In the current study, what is meant is the extent to which female students in the kindergarten program at the College of Education comprehend the experiences they have learned in the topics selected from the course on developing mathematical concepts, measured by the grades they obtain in the achievement test prepared for that purpose.

Electronic communication: In the current study, it is the process of transferring and exchanging information and ideas via the Internet through available applications. This study is limited to the following skills: the searching skills for information via the Internet, the skill of communicating with the course professor and colleagues through the applications available in Blackboard (such as: the course forum, e-mail), and the skill of evaluating the student's learning (by viewing the grades center and my grades link...).

2. Theoretical Framework

The Ministry of Education in the Kingdom of Saudi Arabia emphasized the rapid adoption of digital transformation in the educational system to achieve the Kingdom's Vision 2030 AD, including relying on teaching strategies that are compatible with the style of learning through the web, the importance of which has clearly emerged after the Corona pandemic (Covid-19). Over the past decades, educational research has witnessed a major shift in the vision of both teaching and learning. This is due to the shift in focus on the student's prior knowledge, mental ability, how to process information, and thinking styles [33]. This is what is called real learning, rather than the external environment that affects Direct learning from a teacher, curriculum, and other learning outcomes [29].

2.1 What is the WebQuest strategy?

The WebQuest strategy is considered among the modern learning strategies that aim to change the traditional approach to pedagogical and learning practices and encourage the student to build his knowledge on his own, going beyond the limits of the textbook to the means of interaction, participation and cooperation provided by modern technologies in academic achievement [34] .The WebQuest strategy aims to directly access information with the least possible effort. This method works to transform the learning process into an enjoyable process and makes students more involved as it relies on investigation, questioning, research, and discovery. It also aims to develop the various mental abilities of students and relies partially or completely on electronic sources. Existing on the web and pre-selected, with the possibility of integrating a group of other sources such as journals, books, and any other sources of knowledge [30].

Modern strategies in teaching also work to integrate technology into the curriculum and help develop students' higher-order thinking skills and combine precise educational planning with rational use of the computer, which is WebQuest. It also follows the constructivist theory in which the goal of education changes from transmitting knowledge by rebuilding it from It contributes to the process of mental development of the student and the building of activity-based experience, and here comes the role of learning based on the international information network in applying the principles of constructivist theory because of its characteristics that are consistent with those principles [29].

The idea of WebQuest was invented by Bernie Dodge, a research professor at the University of San Diego in California, who sought to make positive use of technological development in improving the methods of the educational learning process, which relies mainly on integrating the Internet in providing information to students by employing enjoyable journeys of knowledge and educational activities [31]. Students work on online research collectively with the aim of obtaining correct and direct access to information from reliable sources prepared in advance by the teacher. At the same time, WebQuest aims to develop some of the mental and intellectual abilities and skills of learners, such as analysis, synthesis, and evaluation, in addition to instilling the spirit of critical and creative thinking in them [35], [36].

2.2 Rational of The WebQuest Strategy

Vygotsky created the concept of the zone of proximal development, often abbreviated ZPD, which became a fundamental part of his theory. Language is the way a baby communicates with others after birth and continues to learn by interacting with those around him. Based on his idea of social interaction as the basis of learning, he touched on the value of a mentor or teacher in a student's life. Figure 1 shows the relationship of the term ZPT and the term ZAT, which is the area that includes the knowledge and skill that the student has mastered. Therefore, it becomes clear that Bernie Dodge started from this concept of Lev Vygotsky's Sociocultural Theory of Cognitive Development to build a WebQuest strategy that relies on educational scaffolding.

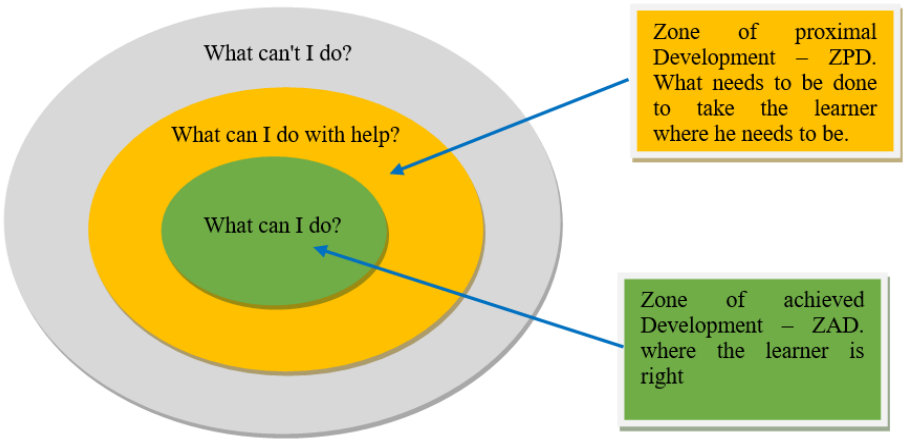

Fig. 1: The zone of proximal development in Vygotsky theory

Vygotsky consistently defines the zone of proximal development as the difference between the current level of cognitive development and the potential level of cognitive development. He maintains that a student can reach their learning goal by completing problem-solving tasks with their teacher or engaging with more competent peers. Vygotsky believed that a student would not be able to reach the same level of learning by working alone. As a student leaves his zone of current development, he travels through the zone of proximal development towards his learning goal [37].

The zone of proximal development consists of two important components: the student's potential development and the role of interaction with others. Learning occurs in the zone of proximal development after the identification of current knowledge. The potential development is simply what the student is capable of learning.

2.3 The Components of a WebQuest strategy

Bernie Dodge believed that students would need to follow six steps for this technological application to be successful: Introduction, Task, Resources, Process, Evaluation, and Conclusion [38-40]. The instructor will first present the topic (Introduction) while providing details of the activities to be completed by the students (Task). Then, web links will be provided to ensure that all information is accurate and reliable (Resources), and the instructor will list the steps to complete the task successfully (Process). Finally, instructors provide a rubric to evaluate a student's performance on the task (Evaluation), and the outcomes are summarized after everyone reflects on their learning journey (Conclusion). As shown in figure 2.

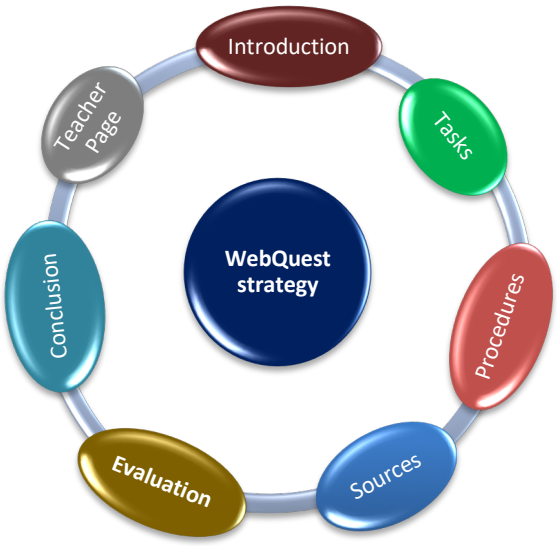

Fig. 2: The Components of a WebQuest strategy

A WebQuest is a scaffolded learning structure that uses links to essential resources on the World Wide Web and an authentic task to motivate students' investigation of a central, open-ended question, development of individual expertise and participation in a final group process that attempts to transform newly acquired information into a more sophisticated understanding. The best WebQuests do this in a way that inspires students to see richer thematic relationships, facilitate a contribution to the real world of learning and reflect on their own metacognitive processes [41],[42]. WebQuest is treated as "an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet, optionally supplemented with videoconferencing" [43]. These steps are explained as follow:

First Step: Introduction: At this stage, regardless of the level of the students, the general context of the task is presented by presenting simple questions related to the WebQuest topic to motivate the students and excite them to research and discover.

Second Step: Task: The content of the lecture is transformed into a set of progressive questions, which students must answer in a short time through collaborative group work and within a specific time frame, with the provision of digital tools, interactive programs, and links to appropriate websites.

Third Step: Resources: At this stage, the faculty member selects the appropriate websites for the topic related to mathematical concepts to guide the student in his research, if they are appropriate for the age group of university students, safe, and contain reliable information. The Web Quest designer can use books or encyclopedias to enrich the research.

Forth Step: Process: In this step, the practical steps of the knowledge journey are detailed, the rules of work are defined, the methodological method for accomplishing the task, and the teaching strategies that the faculty member will follow with the Web Quest team of female students.

Fifth Step: Evaluation: The faculty member determines the criteria to be adopted in the evaluation process, clarifying what is required of the students. Evaluation requires new methods that are determined by the multiplicity of cognitive, mental, and technological skills used in research, which enable learners to self-evaluate their achievements. The

achievements of student groups are then evaluated so that they meet these standards.

Sixth Step: Conclusion: It is a summary of the content of the research through which the faculty member reminds students of the skills and knowledge that will be acquired at the end of the task while motivating them to complete the task and benefit from its results.

Seventh Step: Teacher Page: This stage is optional and includes everything related to the faculty member and instructions for making the WebQuest.

2.4 Faculty member roles in implementing the WebQuest strategy.

Lipscomb emphasized several roles for the faculty member when employing the WebQuest strategy in teaching, including the following: carefully selecting the WebQuest topic, measuring the student's proficiency in the ability to research, determining the learner's previous experiences and content understanding, assessing the availability of computers and internet services, developing back-up plan for work, maximizing time working on the computer, defining student roles precisely, continuing work even after computer time ends, Providing clear evaluation of students, enthusiasm for working on WebQuest [44].

2.5 Advantages of the WebQuest strategy

Related studies have emphasized the importance of the WebQuest strategy [20], [29], [38], [45], [46], such as:

- WebQuest strategy provides systematic, thoughtful, and precise lesson planning.
- Using modern technologies such as the World Wide Web to serve educational goals.
- Building the student's knowledge in a smooth way to absorb a greater amount of information.
- Turn the classroom into fun exploratory practices.
- Enhancing the way of dealing with information sources and selecting those characterized by quality and accuracy.
- Encouraging teamwork and spreading the spirit of cooperation and creative competition among students without eliminating individual effort.
- Providing students with the skills of effective research, critical thinking, self-learning, and the ability to evaluate.
- Safe use of the Internet through the guidance of the teacher.
- Technology skill building.
- Link analysis and reflection.
- To introduce a new topic.
- To explore a new idea.
- Review of anterior knowledge.
- Review for an evaluation.

2.6 The types of a WebQuest strategy

Studies [26], [28], [35] have confirmed that there are two types of cognitive journeys (WebQuest), namely:

Short term WebQuest :

It may be used as an initial preparatory stage for long-term WebQuest, and it can also be adopted in dealing with beginners in their relationship with search engine use techniques, so that its time frame is from one to four sessions, most of which are limited to one study subject, the educational goal of which is accessing and understanding information. And scrutinize it.

Long term WebQuest:

Its duration ranges from a week to a full month and is presented in the form of oral presentations or in the form of research... and is sometimes published on the Internet through blogs or special platforms. Answering the central questions guiding the task requires advanced mental processes such as analysis, synthesis, and evaluation, as well as a fair amount of knowledge in using appropriate information programs and tools, which helps enrich the theoretical cognitive side of the student without neglecting the applied technological side.

2.7 Types of Tasks in the WebQuest

There are many ways of posing questions and types of tasks that can be employed when WebQuests are being used. Dodge (2002) identifies several types of tasks: retelling, compilation tasks, mystery, journalistic, design, creative product tasks, consensus building, persuasion tasks, self-knowledge, analytical, judgments and scientific tasks. We will make free interpretation of the tasks in continuation [47].

Retelling tasks

Retelling is a teaching strategy that helps student develop his/her own culture of speech and a tool for the teacher to recognize whether the student has understood previously read text. The retelling may be conducted orally, but it can also take written form by using Word or Power Point Presentation.

Compilation tasks

This is a type of WebQuest that asks the students to create a bigger picture of a topic that is under study. For example, the teacher can ask students to identify important music events during some classes, to make a list of Macedonian poets after the Second World War, or to compile recipes of Macedonian dishes. This activity also includes retelling, but it also includes making a compilation of something.

Mystery tasks

These are very interesting tasks for the students, because the assignment starts with a mystery that they would like to solve. Who made the pyramids? Is there extraterrestrial life? What is in the center of the Earth? These are only a few examples of questions that the teacher can give to the students as part of mystery tasks when preparing the WebQuest. This type of tasks is more difficult to be managed as part in the WebQuest because the teacher has to thing very wisely to identify the specific steps and web pages that will give the students unrepeatable experience to find out information step by step, and not everything at once.

2.8 Electronic communication skills through WebQuest strategy

Electronic communication is the process of transferring and exchanging information and ideas over the Internet through available applications, or as communication that uses electronic media to transmit information or messages using computers, email, telephone, video calls, fax machine, etc. This type of communication can be developed by sharing data such as pictures, graphics, audio, photos, maps, software, and many things[48]. Studies [22-24] indicated that electronic communication skills are diverse, including oral communication, written communication, discussions through forums, comments on students' work, expressing opinions supported by arguments, skills of searching for information via websites and classifying it, etc.

Related studies have confirmed that there is a relationship between web-based strategies and the development of communication skills, [49] showed that the WebQuest strategy has an effective role in developing social responsibility among students. The online educational tools addressed some of the communication problems associated with face-to-face lectures, providing a forum for addressing issues through dialectical and collaborative discourse [50]. The students who participated in an online discussion forum had better performance than others who did not participate in the forum [51]. Online learning had a positive impact on increasing interaction among students and that the asynchronous online environment is effective in supporting the online learning community [52]. Accordingly, the WebQuest strategy has a significant impact on the development of many electronic communication skills among students, as they are divided into cooperative groups, so that the student becomes productive learner.

3. Method

3.1 Participants

A random sample of kindergarten (60) female students at the sixth-level of the kindergarten program at the College of Education in Prince Sattam bin Abdulaziz University, who study in the first semester of the academic year 2021/2022 AD College of Education, were divided into two groups: an experimental group (32) female students studied topics according to the WebQuest Strategy, and a control group (28) female students studied the specific topics according to the traditional method.

3.2 Variables

The current study includes two types of variables: an independent variable, which is teaching according to the WebQuest strategy, and two dependent variables, which are academic achievement in mathematics concepts and electronic communication skills.

3.3 Instruments

Academic Achievement Test (AAT)

The test aimed to measure the achievement of students of both research groups in some selected topics from the "Developing Mathematical Concepts" course. The test measures the levels of (remembering - understanding - application). The questions were formulated into multiple choice questions. A table of specifications was designed to distribute the test items among the prescribed topics considering the procedural objectives for each topic. The number of test questions reached (40) questions distributed among the topics specified considering the levels of objectives as shown in Table 1, after ensuring the validity and reliability of the test.

Table 1: specification of Academic Achievement Test (AAT)

Topics	The levels of Objectives						Total of questions	
	Remember		Understanding		Application			
	N	%	N	%	N	%	N	%
An introduction to learning mathematics concepts in kindergarten.	2	5.0%	2	5.0%	1	2.5%	5	12.5%
The objectives of learning mathematics concepts in kindergarten.	3	7.5%	2	5.0%	1	2.5%	6	15.0%
Topological concepts.	3	7.5%	2	5.0%	2	5.0%	7	17.5%
Geometrical concepts.	4	10.0%	3	7.5%	2	5.0%	9	22.5%
Numerical concepts and numerical sense.	3	7.5%	2	5.0%	1	2.5%	6	15.0%
Spatial concepts and relationships and the development of spatial sense	3	7.5%	2	5.0%	2	5.0%	7	17.5%
Total	18	45.0%	13	32.5%	9	22.5%	40	100%

Electronic Communication Observation (ECO) tool

The observation tool aimed to measure the electronic communication skills of students in both research groups. It was designed in the form of a five-point Likert scale, graduated (from 1 to 5), where (1) means that the skill is achieved very weakly, and (5) means that the skill is achieved very highly. The number of items on the tool reached (20), distributed over four axes shown in Table 2, after ensuring the validity and reliability of the tool.

Table 2: Description of the E-Communication Observation tool

Electronic Communication skills	No. of Items	%
Browsing the web	7	35%
Communicate with a faculty member	5	25%
Communicate with the colleagues	5	25%
Evaluating the students work	3	15%
Total Items	20	100%

3.4 Procedures

The current study relied on an experimental method with a quasi-experimental design for its suitability to the research and its objectives. Figure 3 illustrates the study methodology design.

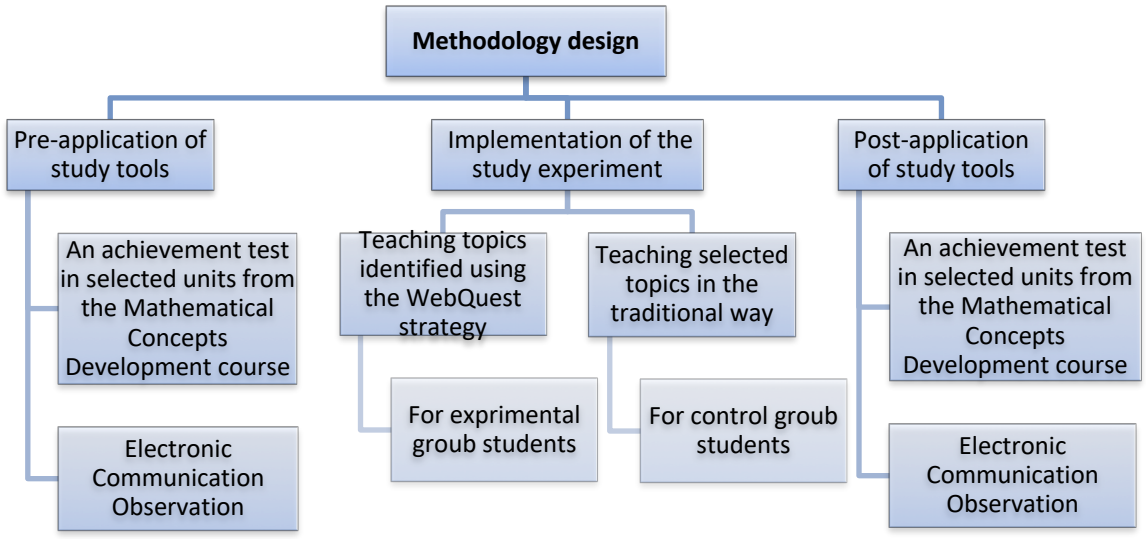

Fig. 3: Methodology design of the study

Preparing the educational material: The educational material processed according to WebQuest strategy:

The purpose of preparing the educational material: The selected scientific subject aimed at developing academic achievement in "developing mathematical concepts" course and electronic communication for kindergarten students at the College of Education.

Content of the educational material: The educational material was selected from the mathematical concepts' development course for the sixth-level students of the kindergarten program at the College of Education in Prince Sattam bin Abdulaziz University, it has been modified according to WebQuest strategy, in the first semester of the academic year 2021/2022 AD, according to the time plan for teaching the course approved by the Kindergarten Department in the college. The number of selected topics was (6) topics out of (12) topics related to the development of mathematics concepts in the kindergarten stage, these topics are:

- An introduction to learning mathematics concepts in kindergarten.
- The objectives of learning mathematics concepts in kindergarten.
- Topological concepts.
- Geometrical concepts.
- Numerical concepts and numerical sense.
- Spatial concepts and relationships and the development of spatial sense.

Design content according to WebQuest strategy: To prepare the content according to the WebQuest strategy, the following steps were followed:

- Determine procedural objectives for these topics.
- Collecting scientific material from the main reference and supporting references for teaching the course, in addition to relevant websites and YouTube clips.
- Designing a template on the course page on the Blackboard platform according to the WebQuest strategy.
- The steps of the WebQuest strategy shown in Table 3.

Table 3: Teaching mathematical concepts to the experimental group according to the WebQuest strategy.

Steps	Descriptive
Section 1 – Introduction	Set previous background about math concepts in kindergarten
Section 2 – Task	Divide the tasks and distribute them to the female students
Section 3 – Sources	Providing students with links to the most important sources that are concerned with building mathematics concepts at the kindergarten stage
Section 4 – Procedures	Explain each of the tasks assigned to the students
Section 5 – Evaluation	Evaluation of female students' achievement in the light of a specific rubric
Section 6 – Conclusion	Summarize the students' achievements and encourage them to complete tasks
Section 7 – Teacher Page	This section is optional, but necessary to remind the teacher of the basics of learning through WebQuest strategy

4. Results

Q1: What is the effectiveness of teaching the course "developing mathematical concepts" according to the WebQuest strategy in developing the academic achievement of kindergarten students at the College of Education?

To answer the first question, Independent-Samples T-Test were calculated to find the significance of the difference between the mean scores of the students of the experimental group (who studied according to the Web Quest strategy) and the control group (who studied according to the traditional method) in the post-measurement of the academic achievement test in the course "developing mathematical concepts". as shown in Table 4.

Table 4: Independent-Samples T-Test results in the post-measurement of the academic achievement test. (N= 60)

Group	N	Mean	SD	t-test value	P value	η2
Experimental	32	17.59	1.88	14.854	0.000	0.792
Control	28	9.64	2.26			

Note. SD: Standard deviation

Table 4 indicates that there is a statistically significant difference at the level (p = 0.000) between the mean scores of the experimental group and the control group in the academic achievement test in the "mathematical concepts' development" course in favor of the students of the experimental group (Mean = 17.59), while the control group (Mean = 9.64), and the value of (t value = 14.854), which is statistically significant at the level of $\alpha \leq 0.05$. Table 2 also indicates a large effect size ($\eta 2 = 0.821$) (Cohen (1988) has provided benchmarks to define small ($\eta 2 = 0.01$), medium ($\eta 2 = 0.06$), and large ($\eta 2 = 0.14$) effects.) [53], and this value indicates that there is a significant impact of teaching according to the WebQuest strategy on the student's achievement of the course "developing mathematical concepts". Accordingly, we must accept the alternative hypothesis "H_a1: There is a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group and the control group students in the post-measurement of the academic achievement test".

Q2: What is the effectiveness of teaching the course "developing mathematical concepts" according to the WebQuest strategy in developing electronic communication skills among kindergarten students at the College of Education?

To answer the second question, Independent-Samples T-Test were calculated to find the significance of the difference between the mean scores of the students of the experimental group (who studied according to the WebQuest strategy) and the control group (who studied according to the traditional method) in the post-measurement of the Electronic Communication Observation (ECO) tool. as shown in Table 5.

Table 5: Independent-Samples T-Test results in the post-measurement of (ECO) tool. (N= 60)

Group	N	Mean	SD	t-test value	P value	η2
Experimental	32	4.29	0.584	2.588	0.012	0.104
Control	28	3.89	0.597			

Table 5 indicates that there is a statistically significant difference at the level (p = 0.012) between the mean scores of the experimental group and the control group in (ECO) tool in favor of the students of the experimental group (Mean =4.29), while the control group (Mean = 3.89), and the value of (t value = 2.588), which is statistically significant at the level of $\alpha \leq 0.05$. Table 2 also indicates a medium effect size ($\eta 2 = 0.104$), and this value indicates that there is a significant impact of teaching the course "developing mathematical concepts" according to the WebQuest strategy in developing electronic communication skills among kindergarten students at the College of Education. Accordingly, we must accept the alternative hypothesis " H_a2: There is a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group and the control group students in the post-measurement of the (ECO) tool".

Q3: To what extent does the level of academic achievement differ among kindergarten students at the College of Education, according to the level of their computer skills?

To answer the third question, One Way ANOVA test was calculated to find the significance of the difference between the mean scores of the students of the experimental group in academic achievement test (AAT) according to the level of their computer skills as in table 6.

Table 6: One Way ANOVA test results in the post-measurement of the (AAT) for experimental group. (N= 32)

	Sum of Squares	df	Mean Square	F value	P value
Between Groups	0.582	2	0.291	0.077	0.926
Within Groups	109.137	29	3.763		
Total	109.719	31			

Table 6 indicates that there is not a statistically significant difference between the mean scores of the experimental group students in the post academic achievement test according to the level of computer skills, as the value of (F = 0.077, p = 0.926). Accordingly, we must accept the null hypothesis "H_o3: There is not a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group students in the post achievement test according to the level of computer skills".

Q4: To what extent does the level of electronic communication skills differ among kindergarten students at the College of Education, according to the level of their computer skills?

To answer the fourth question, One Way ANOVA test was calculated to find the significance of the difference between the mean scores of the students of the experimental group in electronic communication observation (ECO) tool according to the level of their computer skills as in table 7.

Table 7: One Way ANOVA test results in the post-measurement of the (ECO) tool for experimental group. (N= 32)

	Sum of Squares	df	Mean Square	F value	P value

Between Groups	1.079	2	0.539	1.570	0.225
Within Groups	9.959	29	0.343		
Total	11.038	31			

Table 7 indicates that there is not a statistically significant difference between the mean scores of the experimental group students in the post (ECO) tool according to the level of computer skills, as the value of (F = 1.570, p = 0.225). Accordingly, we must accept the null hypothesis "Ho4: There is not a statistically significant difference at the level of $\alpha \leq 0.05$ between the mean scores of the experimental group students in the (ECO) tool according to the level of their computer skills".

5. Discussion

The current era is witnessing a scientific civilized shift in various knowledge and information in general and in the field of education in particular, after the outbreak of the new Corona virus (COVID 19), which imposed on researchers and scholars to consider e-learning and use teaching and learning technology. The development of modern technology means to keep pace with this. Accelerated development, and because of what educators called for benefiting from technological innovations in developing the student in terms of his achievement and intellectual abilities, especially with the emergence of virtual educational platforms.

The first result indicates that there is a significant impact of teaching according to the WebQuest strategy on the student's academic achievement of the course "developing mathematical concepts". This result is consistent with the findings of [37], [54-59] which emphasizes the positive role for the WebQuest strategy in developing aspects of academic achievement in many academic subjects at different levels of study, whether in general education or university education. This result calls on those interested in the educational process to employ this strategy in education. This result is explained considering the active state that the WebQuest strategy creates in the students' hearts, which makes them approach education in a more positive and interactive way.

The second result illustrates that there is a significant impact of teaching the course "developing mathematical concepts" according to the WebQuest strategy in developing electronic communication skills among kindergarten students at the College of Education. This result is consistent with the findings of [41], [43], [60], [61] which indicated the positive role of the WebQuest strategy in developing many communication skills among students, such as: exchanging information and opinions, writing reports, taking responsibility, and employing techniques in written and oral communication. This result is explained considering the electronic communication skills that the WebQuest strategy imparts to students through the stages it consists of, such as: dividing them into productive cooperative groups and assigning specific tasks to each group, and each group bears responsibility for the information and knowledge it has achieved. In addition to a very important skill, which is the skill of evaluating students' work.

While the third and fourth results indicated that there were no differences between the students of the experimental group in academic achievement and electronic communication skills due to the variable of mastery of computer skills. These two results are explained by the fact that the steps of the WebQuest strategy do not require a high level of computer skills, but rather require the basics of dealing with the Internet, sorting, and arranging data, and formulating it in a consistent form.

6. Limitations and Conclusion

One of the main limitations of the current study is that the data collection was done considering the perceptions of (60) female students in kindergarten program at the College of Education. This calls us to apply the study to a sample that is more representative of society.

WebQuest is a powerful instructional strategy that motivates and guides students through the Internet research process. According to the steps of this strategy, the students are aware of the search for specific knowledge by defining the objectives, the tasks that they must do, the process, the way to present the acquired knowledge and finally the way in which their achievements will be evaluated. Accordingly, students take responsibility for their own learning. One of the success factors of this strategy is that the faculty member pre-identifies appropriate web pages that he can later provide to students as part of the WebQuest steps.

WebQuest is also an excellent strategy for developing collaborative learning skills in students, because during the process of achieving the tasks the students can be organized into different groups according to their needs and the specifics of the goals. Accordingly, there are many opportunities to apply WebQuest in the university teaching process, where the faculty member can choose from a variety of tasks to develop students' different cognitive abilities, such as: knowledge, understanding, application, analysis, and decision-making.

7. Recommendations

Considering the study findings, the researchers recommend the following:

- Using the WebQuest strategy in teaching all courses in university education.
- Training faculty members to use the WebQuest strategy and other constructivist learning strategies.
- Equipping classrooms with strong Internet networks.
- Educational institutions should adopt highly efficient e-learning platforms.
- Providing technical support to faculty members and students immediately.
- Employing the WebQuest strategy within a remedial program for students with learning difficulties and introverted students.

8. Suggestions for Future Studies

- Conducting studies to reveal the impact of the WebQuest strategy on the achievement of students with hyperactivity.
- Further studies should be conducted to pilot the WebQuest strategy with other dependent variables, such as reduced anxiety and reduced cognitive load.
- Conducting studies to compare WebQuest's employment across various educational platforms.

Funding: This project was supported by the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University, Saudi Arabia under the research project No. 2022/02/22927

Acknowledgements: The authors would like to thank the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University for their continuous support.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the authors.

Conflict of interest: The authors declare that there is no conflict regarding the publication of this paper.

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