Application of Information Systems Techniques in Geography Teaching from the Educational Staff Perspective

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Abstract

The use of modern educational methods is considered one of the foundations of quality education that works to supplement students' educational level. Where educational technology represents the ideal and modern method of education by linking the theoretical aspect of the curriculum with practical applications on geographical areas, so it has become imperative to use geographic information systems in the teaching of geography by educational staff. This study aims to review the extent of using geographic information systems in teaching geographic maps in the geographical classes of Iraqi schools. This study relied on using a questionnaire to collect data from the target sample and then conducting a descriptive analysis method to analyze data through the Social Sciences Program (SPSS). The results of the study showed that educational staff in Iraq do not use geographic information systems in teaching geography in schools. Where the study recommended the necessity of training educational personnel specialized in geography to work on geographical information systems for use in education.

1   Introduction

1.1 Background

Many countries are witnessing a revolution in information and knowledge as a result of scientific developments, and technology has led to a review of the educational process in terms of curricula and methods, teaching technology and employing it in teaching to increase the motivation of students and provide them with educational experiences, which in turn develops innovation and scientific thinking, which helps in the educational process [1]. Therefore, educational institutions must make great efforts to introduce modern technologies in their facilities to keep pace with the rapid developments in technology and take advantage of the great uses in the educational process.

The modest use of educational technology by education personnel has several reasons, the most important of which are:

1- The traditional educational method, which is considered the first obstacle to limit the use of technology [2].

2- Weak computer experience of educational staff.

3- Absence or lack of logistical technical needs for computer laboratories.

4- Poor advance planning that leads to the difficulty of taking decisions by the responsible authorities.

The process of transforming the use of maps in geography lessons from the traditional static visualization to providing an interesting and innovative interactive presentation using the educational technology of tablets and computers, in integration with what is contained in the distinct program in terms of accuracy and clarity in geographic information systems (GIS), because it contains maps Digital with high color accuracy and interactive animations that increase students' interaction and excitement [3].

1.2 The study problem

The difficulty of the geography subject for students and the low levels of distinction they have are among the most important reasons for the emergence of the study problem, which in turn takes students in a negative direction for their desire to learn geography, as well as the obstacle of the traditional method used in teaching by the educational staff, which is difficult to communicate information to students, especially when drawing maps And use it in annotation and geographical illustration [4]. Therefore, the use of geographic information systems (GIS) techniques has become an urgent need to increase the quality of geographical education in Iraqi schools [5].

The lack of research studies concerned with the extent to which educational cadres use educational technology to teach geography curriculum skills, as well as the importance of using educational technology techniques as a modern and distinctive educational method are the two reasons that prompted researchers to intend to pay attention to the research problem and answer the following questions:

1- What is the percentage of educational cadres that use educational technology represented by geographic information systems (GIS) to teach geographical skills to students?

2- Is the difference in gender, academic qualification and years of service a criterion for the difference in the percentage of education workers who use educational technology?

1.3 The importance of the study

The importance of the study is evident in two main axes, one of which is the decision-making support to create a modern scientific curriculum commensurate with the use of educational technology in the subject of geography, in addition to building a new vision for the geography subject by using the method of modern training by the educational staff in the field of geography for educational technology techniques.

1.4 The aims of the study

The study aims to find the percentage of use of educational technology represented by geographic information systems (GIS) programs by educational personnel in the field of geography.

2 Literature Review and Educational Technology Background

2.1 Related works

Ali Demirci. In 2009, he pointed to the need to know the prevalence of GIS technology in secondary schools in Turkey to teach geography. The researcher used a questionnaire method to collect data and learn the opinions of teachers for the purpose of analyzing them. This questionnaire was sent to (200) secondary schools for the purpose of filling it out by geography teachers. The results showed that teachers 'knowledge of information systems was low, as (82%) did not know how to use geographic information systems in teaching geography. (76%) of teachers believe it is an effective tool to be applied in education [6].

Cheryl Frazier and Richard Boehm. In 2012, they worked on an online evaluation of modern methods of professional training for teachers of geography and environmental sciences. They used the qualitative inductive research method after collecting data and analyzing it based on the perspectives of the trained teachers. The results showed that the impression of the geography teachers was satisfied with the online training program to allow them to see the typical educational method as well as to gain knowledge and science distinctively [7].

Steffen Höhnle et al. In 2015, this study aims to know the needs to be met to improve training on information systems applications for use in teaching geography. The researcher used the content analysis methodology that was based

on group discussions that included six groups of students, teachers and trainers. The results showed that the researcher reached eight basic criteria to improve the quality of training. The results also showed that the most important of these criteria is the integration of information systems applications into the training program for geography teachers. In addition, the results showed poor application of information systems in classrooms in Germany [8].

Lisa Tabora and John Harringtonb. In 2015, They learned the degree of skills acquired from training workshops for geography teachers on the application of geographic information systems in teaching. The researchers conducted two training workshops for teachers to enhance the concepts of blurred coding and how to integrate topics. A questionnaire was also presented to the trainees to obtain their reactions and opinions on the application of educational technology. The results showed that the researcher reached eight basic criteria to improve the quality of training. The results also showed that the trainees did not have previous experience in using geographic information systems. Moreover, the results showed that teachers' acquisition of basic skills to use information systems through workshops to apply them in the classroom [9].

Sarah Peirce. In 2016, Researcher aim to make GIS techniques in mobile devices an active training tool in lectures. The researcher made a training workshop that included the Google Earth program and some technical tools that are easy to integrate with the educational curricula. Moreover, the results showed that researcher concluded that training workshops for geographical education technology enabled participants to use applications for education, data collection and analysis. Also, it enhances the educational motivation of the students and stimulates their activities [10].

2.2 Educational technology development

The use of information technology in education has become a necessary need, as scientific studies have made clear

The use of different types of audiovisual media (such as pictures, presentations, and audio and video equipment) enhances students' educational desire Also, interest in educational technology has increased recently due to the increase in knowledge, as well as the increase in the number of learners.

Given the role that information technology plays in improving and developing the educational process by facilitating and obtaining education with the least possible time and effort, which prompted educational institutions to pay attention to training teachers and students on how to use and apply educational technology effectively in the education process. Moreover, education technologies add fun to education by providing visual information such as graphics, movements, simulated sound and modeling [11]. Also, it encourages self-learning and interactive learning through dialogue and direct contact with the program in use. Also, it arouses the interest, interest and motivation of students. Finally, it helps with clarity and understanding, especially in young age groups because it depends on more than one feeling of learning.

2.3 Educational technology and its reasons for using it in teaching geography

Geography-related educational technology has developed such as Gps and GIS, and geography has become one of the educational materials that use modern computer technology, so it is considered a distinct alternative to paper maps, shapes, manuscripts and historical texts that require time and material cost, as educational technology simplifies scientific concepts And simulate reality with knowledge and information [12]. Also, it provides positive interaction between the student and the programmed educational materials [13]. In addition, GIS techniques simulate geographical phenomena such as the rotation of the earth, the movement of the sun, the alternation of night and day, simulation of earthquakes, and the formation of waves and ocean currents.

3   Data Question

The research community consists of more than 250 members of the educational staff in the field of geography and sociology, where the electronic questionnaire was sent to the target party (geography teachers) through official applications and electronic means of communication due to the current global outbreak Coronavirus (COVID 19), where the answers were collected and prepared for the analysis process.

4   Methodology

4.1 Research tool

The research tool (a questionnaire) was prepared, and the paragraphs of the questionnaire were organized into two parts, the first part concerned the information of the sample members (gender, qualification, years of experience) and the second part included the items distributed into several axes, namely (availability of educational technology in schools, use of educational technology And a systems program Geographic information (GIS) in teaching geography, barriers to the use of technology and teachers' attitudes towards its use).

4.2 Validate the tool

The validity of the tool was verified by presenting it to a group of referees, including faculty members in universities and educational supervisors, and in light of the referees 'observations, some paragraphs were amended and some of them deleted, and new paragraphs were added, and the questionnaire included (19) paragraphs.

4.3 Stability of the tool

   The stability of the tool was checked distributed on (10) parameters from outside the study sample, where the stability factor was calculated for each axis of the resolution, using the Cronbach Alpha equation.

   The reliability of the technology availability axis reached (0.8) for the usage axis (0.95), the trends axis (0.9), for the difficulty axis (0.78), and for all axes as a whole (0.858), as shown in Table (1), Which indicates an ideal degree of stability. In addition, the acceptance of the stability parameter values of the instrument was verified for the purposes of the study and to achieve the objectives of the study.

Cronbach's Alpha	N of Items
58.80	19

Table 1 Reliability Statistics

5   Result

   To answer the first question that stated:
"What is the percentage of educational cadres that use educational technology represented by geographic information systems (GIS) to teach geographical skills to students?"

   The researcher extracted the arithmetic averages and standard deviations of the axes' paragraphs using the (SPSS) program, as they were arranged in descending order, as shown in Table (2):

   The first level: a high degree of use, the arithmetic average is between (3.5 - 5), the second level is a medium degree of use, the average is between (2.5 - 3.49), and the third level is a weak degree of use, and the arithmetic average falls between (1 - 2.5)

Range	Degree
2.49	Weak
2.5 - 3.49	Medium
3.5 - 5	High

Table 2 Arithmetic averages for the response of the study sample

   Table (3) shows that the arithmetic averages of the respondents of the study sample ranged between (2.22 - 3.53), and Paragraph (14), which states: "Provides logistical supplies in the school for application of educational technology" in the first place, With an arithmetic average of (3.53), followed in

second place by Paragraph (18), which states: "Skills of educational personnel in the use of computer devices," with an arithmetic average of (3.47), followed in third place by two paragraphs (17 and 11), and both texts respectively: "The time allocated for one class is sufficient to implement educational technology "," Training and educational programs for the application of educational technology" with an arithmetic average of (3.36), while paragraphs (4 and 5) in the ranked last and both texts respectively:" Does the school have geographic information systems applications? ", "Does a geography teacher own electronic geography books?" with an arithmetic average of (2.22), while the arithmetic average of the degree of general use was (3.00).

SQ.	Parag. number	The paragraphs	Arith-metic average	standard deviation	Degree of use
1	14	Provides logistical supplies in the school for application of educational technology	3.53	1.138	big
2	18	Skills of educational personnel in the use of computer devices	3.47	1.165	Medium
3	17	The time allocated for one class is sufficient to implement educational technology	3.36	1.124	Medium
4	11	Training and educational programs for the application of educational technology	3.36	1.251	Medium
5	15	The need to master the English language to apply educational technology	3.32	1.130	Medium
6	20	What is the extent of knowledge of the importance of educational technology represented by geographic information systems for teaching geography?	3.31	1.099	Medium
7	1	Is there a computer lab in the school?	3.29	1.056	Medium
8	16	Students' skills in using computers	3.28	1.110	Medium
9	19	The opinion of the school administration in the application of educational technology	3.21	1.107	Medium
10	2	Is there internet service at the school?	3.16	.964	Medium

11	6	The extent to which educational technology is used in the school	3.10	1.156	Medium
12	7	Follow up and keep up with educational personnel for educational technology	3.08	1.127	Medium
13	8	Is the electronic atlas used in geographical shares?	3.07	1.100	Medium
14	9	The extent of using geographical information systems (GIS) in teaching the geography curriculum.	3.01	1.127	Medium
15	4	Does the school have geographic information systems applications?	2.22	1.084	Medium
16	5	Does a geography teacher own electronic geography books?	2.22	1.084	Medium

Table 3 The descending order of the degree of using educational technology (GIS) in teaching geography in Iraqi schools, according to arithmetic averages.

In light of the results related to this axis, which were reached by answering this question, it can be said that geography teachers believe that the degree of use of educational technology and the Geographical Information Systems (GIS) program in teaching geography is moderate.

This degree of use (medium degree) is considered low when compared to the tremendous progress that is taking place in the world in the field of technology, and this result does not keep pace with what is happening to scientific development in this era, despite the continuous development attempts in the Ministry of Education to keep pace with global developments.

To answer the second question, which stated:
"Is the difference in gender, academic qualification and years of service a criterion for the difference in the percentage of education workers who use educational technology? "

The researcher extracted the arithmetic averages and standard deviations of the responses of the study sample members from geography teachers, on the reality of their use of educational technology and the GIS program in Iraq, according to variables (gender, academic qualification, and educational experience) and Table (4) shows that.

Variables	Level of variables	SMA	Standard Deviation	The number
Sex	Male	3.08	0.707	41
	female	2.94	0.725	25
Qualification	M.A.	3.39	0.690	5
	Education diploma	3.17	0.414	7
	Bachelor of	2.90	7.12	23
	Ph.D.	0.73	8.43	3
	Other than that	0.23	0.674	1
Years of Experience	Less than five years old	2.89	0.854	12
	Less than ten years	3.03	0.674	17
	Less than fifteen years old	3.04	0.679	10

Table 4 Arithmetic means and standard deviations for the study sample according to the variables of sex, academic qualification, and educational experience.

Table (4) shows an apparent variation in the arithmetic averages and standard deviations of the responses of the study sample individuals from geography teachers to education technology and GIS program in Iraqi schools due to the different categories of gender variables (males, females), academic qualification (PhD, Master, Higher Diploma, Bachelor, Etc.), educational experience (less than five years, less than ten years, less than fifteen years, etc.). So, to illustrate the importance of statistical differences between the arithmetic averages use the quadruple analysis of variance, and Table (5) illustrates that.

The source of the contrast	Sum of squares	Degrees of freedom	Average of squares	F value	Statistical significance
Sex	0.161	1	0.161	0.337	0.562
Qualification	3.950	2	1.975	4.143	0.018
Years of Experience	0.318	2	0.159	0.333	0.717
The error	72.445	152	0.477		
Quantitative	81.952	159			

Table 5 The quadruple variance of the effect of gender, educational qualification, and years of experience according to the opinion of the sample

1. There were no statistically significant differences at (0.05) due to the effect of gender. This is because both genders view the use of technology in education with the same vision, and both genders are subject to the same psychological conditions in school. Likewise, both sexes have a common interest, which is education. Global technological advances have changed the concept of using technology in education.

2 - The existence of statistically significant differences at the significance level (0.05) due to the effect of scientific qualification. - In order to clarify the statistically significant marital differences between the arithmetic mean, the dimensional comparisons were used using the Scheffe method as shown in Table (6).

3- There are no statistically significant differences at the significance level (0.05) due to the impact of years of experience, due to the subjection of all educational staff to the same psychological conditions and requirements.

Qualification	SMA
Ph.D.	3.55
M.A.	3.39
Education diploma	3.17
Bachelor of	2.90
Other than that	

Table 6 Dimensional comparisons of the Scheffe method for the effect of scientific qualification

Table (5) shows The existence of statistical differences at the significance level (0.05). between holders of a doctorate, master's degrees, and bachelor's holders, and the differences came in favor of holders of a higher academic degree. This result can be attributed to the fact that teachers with higher educational qualifications possess advanced skills that enable them to use technology in education, in addition to that they tend to deal with the Internet more than others because of the study requirements. This includes more searches for modern information that is better available on the Internet. Moreover, they roam through the Internet pages and websites easily and easily, and this may be because they have been exposed to the necessary preparation and training for the use of technology, in the university and during the teaching profession. They accept to learn and use it in education.

6 Conclusions

In this study, the researcher worked on knowing the extent to which educational personnel in the field of geography used educational technology represented by geographical information systems to teach geography in Iraqi schools. Where it was found that the arithmetic averages of the opinions of the study sample ranged between (2.22 - 3.53), and the arithmetic mean of the degree of general use (3.00). Therefore, it was concluded that the degree of use of educational technology and the GIS program in teaching geography is (medium), and this degree of use (medium degree) is considered low.

In addition, the researcher indicated in Table (3) that there is a clear discrepancy in the arithmetic means and standard deviations of the responses of the study sample individuals due to the different categories of gender variables (males, females), academic qualification (PhD, Master, Higher Diploma, Bachelor, etc.), educational experience (Less than five years, less than ten years, less than fifteen years, etc.). Where the researcher concluded that there are no statistically significant differences for the effect of sex. However, there are statistically significant differences for the effect of academic qualification, especially for holders of higher degrees. Moreover, there were no significant differences for the effect of years of experience.

7 Recommendations

In light of the findings of this study, the researcher recommends the following:
1. The use of technology in education in general, awareness of the difference and diversity of subjects, and that its use is not limited to a specific subject, and to allow all teachers to use computers and the Internet to implement their educational tasks.

2. Considering the use of the Geographical Information Systems (GIS) program in teaching geography as one of the basic competencies of the geography teacher, in order to invest this technique and facilitate its use in teaching the subject.

3. Geography curriculum planners make use of the sites of teaching this subject and other websites, in planning and designing geography curriculum courses in the various academic stages.

4. Establishing electronic training sites to inform teachers about the most important developments in the field of using the Geographical Information Systems (GIS) program in teaching geography and educational research, to keep pace with the rapid developments in this field.

8 The Proposals

In light of the findings of this study, the researcher suggests the following:

1. Conducting studies similar to the current study in other subjects, and at different stages, to find out the extent of the use of technology in education in different subjects and stages.

2. Conducting studies investigating the difficulties that teachers and students face during teaching and learning using technology in different stages of education.

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