The Role of Information and Communication Technology in Mathematics Education

(Case Study: Ardebil Municipality applied –Sciences and technology education Center)

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Abstract

The purpose of this study was to investigate the role of information and communication technology in the quality of mathematics education at Ardebil Municipality Applied Science Education Center in (2018-19). The statistical population consisted of 62 students who had taken a mathematics course in the mentioned academic year. A random sample of 31 students was selected from among these students. And the next 31 were considered as the control group. General mathematics instruction was provided for the first group using the IT tool and the second group was traditionally provided The raw data obtained from the individuals' responses to the assessment test in two attributes of creativity and content sustainability and the questionnaire was analyzed in three attributes of increasing motivation, quality of learning and active learning, using t-test The results showed the positive and direct impact of applying information technology in mathematics education on students' motivation, learning quality, creativity promotion, sustainability of learning materials and active learning of students.

Keywords: Mathematics, Information and Communication Technology, Education.

Introduction

The tendency of today's world to maximize the use of information technology in education illustrates that the advantages of this approach have outweighed its disadvantages, and these advantages have forced today's societies to build information technology infrastructure in education. Applying ICT not only saves communities time and money but also increases the quality of education, not only as a provider of infrastructure for learning but also in the context of education and learning also evolve. This is the technology behind which terms such as virtual education, e-learning, online learning, technology education, etc. have been defined and introduced into the educational spaces of communities and created new educational systems that create a clear horizon in education. They provide education. Information and communication technology (ICT) has made many changes to teaching since its inception, especially in learning such as new attitudes, problem solving, application of reasoning, thinking, and so on [7].In the traditional way of learning, one had to read, write, and communication was almost one-way, but with the use of information and

communication technology in one's education, one would need to be skilled in using the technology in addition to basic skills [8]. Information technology-based learning has eliminated many of the inefficiencies of the education system and brought about major changes in education by making fundamental changes to previous educational concepts [1]. Experience has shown that teachers who have used information technology in their teaching have not only become more proficient at expressing themselves, but have also found deeply that using them can enhance learning effects and enhance thinking ability as well as information technology and communication makes teachers and educators design different lessons in a lesson-packed lesson in which new technologies are clearly visible. Information technology education will be the key to the success of technical education in the future. The use of information technology in teaching improves and enhances the capabilities of teachers and teaches them how to enhance students' learning through question and answer and search effectively and incorporate computer use into the curriculum. As students can enhance their learning and knowledge as much as possible, information technology can also help teachers in topics such as science and practice activities, teaching lectures, providing teaching aids, providing written and non-written media, classifying activities. Teaching in curriculum planning such as educational theories, search for information Hours of work and help.One of the reasons for the need for ICT in education is to help improve the quality of education by enhancing learners' motivation to learn using multimedia software that includes text, audio, and animated images. Be able to create themes that involve learners in the process of

learning that lead to the acquisition of basic skills and concepts that underpin higher-level intellectual skills and creativity, the most basic use of computers for education, mastering skills through quality enhancement and Duplicate is content, ICT There has not been culture in the educational community of the country. Integration of information and communication technology in the curriculum, especially mathematics curriculum, has always been one of the professors' concerns, and it may be hard to argue that the use of an active ICT method in mathematics teaching has yet to be generalized and that behaviorism and Traditional teaching is still commonplace.

Research History

The following are some of the histories associated with this study:

Harrison et al. (2002) study the impact of the application of information and communication technology on education which, as a result of this research, deepened and influenced the information and communication technology of education and promoted creativity.A study by Yang Jie (2002), quoted by Sharifi (2007) on the impact of information and communication technology on learning, found that information and communication technology increased learning because of Learner Focus.Hiroshato and Tinney (2001) conducted research on the role of information and communication technology in flexible learning programs and found that information and communication technology could be resources for teachers to teach flexible learning.The Haj Frosh conducted a study on the implications of ICT application in high schools in Tehran, which aimed to investigate the role of ICT application in mathematics, physics, chemistry, biology

and English language courses. The results showed that the use of information technology And communication plays an important role in deepening the educational content and learning of these courses.

According to Haji Ketabi (2002), information and communication technology enhances learning motivation and makes the learning process easier and more creative, thereby proposing information and communication technology as a supportive tool in the learning process to meet challenges. Take serious training.

research method

This research method using questionnaire and final test is to measure variables in two groups of 62students of Ardebil Municipality applied –Sciences and technology education Center in 2018-19 was chosen as general mathematics course. The first sample was selected from among this population of 31 people using simple randomized method for teaching with information technology tools (group 1). The remaining 31 people were considered as the control group for traditional teaching (Group 2), To gather the information required from the evaluation tests for the two variables of creativity and content sustainability that the creativity variable through the test of questions with higher degree of difficulty and the need for creativity to solve and variable the content sustainability through the evaluation of the content learned in the last three sessions of each Class, And the researcher-made questionnaire was used to investigate three other variables that included 24 questions on motivation, quality of learning (each with 10 questions) and active learning with 4 questions on a five-point Likert scale with response levels (very high , high , medium, low, very low) Was designed . The data

obtained from students' responses to assessment tests and questionnaires were analyzed using t-student test. Literature, theoretical basics and numerous internal and external studies related to ICT have been used in the design of the questionnaire. Face and content validity approved by the number of professors and specialists and to determine the reliability of the questionnaire for preliminary sample of 20 students was conducted based on Cronbach's alpha test, $\alpha = 0.84$ was obtained. Descriptive statistics methods including mean and standard deviation were used in the analysis of the present study. In this study, to evaluate the impact of information technology on mathematical education, 5 independent variables (1- Motivational variable 2- Learning quality variable 3- Active learning variable 4- Creativity variable 5- Content sustainability variable) were considered, and the variables were independently measured in both groups. Questions for the researcher in this study include:

1- Does the use of information and communication technology in mathematics teaching increase students' motivation to learn?
2- Does the use of information and communication technology in teaching mathematics improve students' learning quality?
3- . Does the use of information and communication technology in mathematics teaching improve students' active learning?
4- Does the use of information and communication technology in mathematics teaching enhance students' creativity in solving mathematical problems?
5- Does the use of information and communication technology in mathematics

teaching increase the sustainability of what is learned?

Test hypotheses

To answer the research questions, the following hypotheses were considered for the 5 variables in two groups of students:

Hypothesis 1:

null hypothesis: Applying information and communication technology in teaching mathematics has no effect on students' motivation.

Alternative-hypothesis: Applying information and communication technology in teaching mathematics will increase students' motivation.

Hypothesis 2:

null hypothesis: Applying information and communication technology in teaching mathematics has no effect on student's learning quality.

Alternative-hypothesis: Applying information and communication technology in teaching mathematics will enhance student's learning quality.

hypothesis: Applying information and communication technology to teach math lessons increases Sustainability of what is learned.

Calculations

We examine one of the variables for the calculation method as an example. For this purpose, Given the uncertainty of the variance of population (students taking general math 1), the distribution of **t** was used. in the three variables measured by

Hypothesis 3:

null hypothesis: Applying information and communication technology to teaching mathematics has no effect on student's active learning.

Alternative-hypothesis: Applying information and communication technology to teach mathematics lesson improves student's active learning.

Hypothesis 4:

null hypothesis: Applying information and communication technology in teaching mathematics has no effect on student's creativity in solving math problems.

Alternative-hypothesis: Applying information and communication technology in teaching mathematics will increase student's creativity in solving math problems.

Hypothesis 5:

null hypothesis: Applying information and communication technology to teaching mathematics has no effect on Sustainability of what is learned.Alternative-

the questionnaire, Scores ranged from 1 to 5 for 5 levels of very low, low, medium, high, very high, and in two variables measured by the students' scores test have been used for calculate the mean.Assuming that if the mean score of students in Group 1 is higher than Group 2, the assumption

$\mu_1 - \mu_2 > 0$ or $\mu_1 > \mu_2$ will be accepted, Assume that the variance of the two groups is normal and equal, then the pivotal variable is:

$$Q = \frac{(\bar{x}_1 - \bar{x}_2) - (\bar{\mu}_1 - \bar{\mu}_2)}{s_p\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$$

Q has a t-student distribution with $(n_1 + n_2 - 2)$ degree of freedom. The confidence intervals$(1 - \alpha)$ for the two groups are as follows:

$$(\bar{x}_1 - \bar{x}_2) \mp t_{\alpha/2}(n_1 + n_2 - 2) \cdot s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

Where:

$$s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{(n_1+n_2-2)}$$

The **t** value for each of the variables is calculated from the following equation:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{s_p\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$$

Explain test hypotheses:

The test hypotheses for the 5 research variables are examined as follows:

null hypothesis: The mean of the first group in the attribute is equal to the mean of the second group.

Alternative-hypothesis: The mean of the first group in the attribute is higher than the mean of the second group.

Numerical results

Deciding on Hypothesis 1:

Calculated t	$t : (D_f = 60. \alpha = 0.01)$	$t : (D_f = 60. \alpha = 0.05)$	عنوان
2.85	2.39	1.67	مقدار

Table 1: The numerical result of Hypothesis 1

As for Feature 1 (increasing student's motivation) the t-test output of SPSS was obtained 2.85, Therefore at the 95% and 99% confidence levels, we conclude that using information and communication technology increases student's motivation.

Deciding on Hypothesis 2:

Calculated t	$t : (D_f = 60. \alpha = 0.01)$	$t : (D_f = 60. \alpha = 0.05)$	عنوان
2.91	2.39	1.67	مقدار

Table 2: The numerical result of Hypothesis 2

As for Feature 2 (increasing the learning quality) the t-test output of SPSS software was obtained 2.91, Therefore at the 95% and 99% confidence levels, we conclude that using information and communication technology increases learning quality.

Deciding on Hypothesis 3:

Calculated t	$t : (D_f = 60. \alpha = 0.01)$	$t : (D_f = 60. \alpha = 0.05)$	عنوان
3.45	2.39	1.67	مقدار

Table 3: The numerical result of Hypothesis 3

As for Feature 3 (Active learning) the t-test output of SPSS software was obtained 3.45, Therefore at the 95% and 99% confidence levels, we conclude that using information and communication technology improves student's active learning.

Deciding on Hypothesis 4:

Calculated t	$t : (D_f = 60. \alpha = 0.01)$	$t : (D_f = 60. \alpha = 0.05)$	عنوان
3.21	2.39	1.67	مقدار

Table 4: The numerical result of Hypothesis 4

As for Feature 3 (Promote creativity) the t-test output of SPSS was obtained 3.21, Therefore at the 95% and 99% confidence levels, we conclude that using information and communication technology Promote student's creativity in solving mathematical problems.

Deciding on Hypothesis 5:

Calculated t	$t : (D_f = 60. \alpha = 0.01)$	$t : (D_f = 60. \alpha = 0.05)$	عنوان
2.79	2.39	1.67	مقدار

Table 5: The numerical result of Hypothesis 5

As for Feature 5 (Sustainability) the t-test output of SPSS was obtained 2.79, Therefore at the 95% and 99% confidence levels, we conclude that using information and communication technology increases the Sustainability of what is learned**.**

Deciding on Hypothesis 5:

Calculated t	$t : (D_f = 60. \alpha = 0.01)$	$t : (D_f = 60. \alpha = 0.05)$	عنوان
3.45	2.39	1.67	مقدار

Table 5: The numerical result of Hypothesis 5

As for Feature 4 (Active learning) the t-test output of SPSS software was obtained 3.45, Therefore at the 95% and 99% confidence levels, we conclude that using information and communication technology improves learners' active learning

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