The Relationship between Using Information Technology and Increasing Motivation of Elementary Students in Empirical Science Courses

Mohammad Hasan Nazari[1], Ali Reza Araghieh[2] and Nabi Aslani[3]*

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Mohammad Hasan Nazari
M.Sc. Student of Curriculum Educational of E-Campus Branch, Islamic Azad University,Tehran, Iran.
Ali Reza Araghieh
Associate Professor, Department of Education, Islamshahr Branch, Islamic Azad University, Islamshahr, Iran.
Nabi Aslani
Ph.D. in Philosophy of Education, Department of Education, Science and Research Branch, Islamic Azad university, Tehran, Iran.
*- Correspond Author: araghieh@iiau.ac.ir

Abstract

The purpose of this study was to investigate the relationship between using information technology and increasing motivation of elementary school students in empirical science. The research method is descriptive-correlation. The statistical population of the study was 10000 elementary students in Qom. According to Morgan table, 373 people were selected by random cluster sampling as sample. Data were collected using the Zamani and Azimi (2008) information technology questionnaire and Vallerend academic motivation questionnaire (1992). The validity of the questionnaires was calculated from the content validity method and their reliability was determined through Cronbach's alpha coefficient to be 0.84 and 0.82, respectively. Descriptive statistics including mean and standard deviation and inferential statistics including Pearson's correlation coefficient were used for analyzing. The results demonstrated that there is a significant relationship between using information technology with increasing academic motivation. Also, based on the results, there is a relationship between using technology with academic motivation components including knowing, moving forward to successfulness, motive experience, matching, introspecting, extrinsic adjustment and lack of motivation.

Key Words: Information Technology, Academic Motivation, Students.

[1] -M.Sc. Student of Curriculum Educational of E-Campus Branch, Islamic Azad University,Tehran, Iran.
[2]- Associate Professor, Department of Education, Islamshahr Branch, Islamic Azad University, Islamshahr, Iran.
[3]- Ph.D. in Philosophy of Education, Department of Education, Science and Research Branch, Islamic Azad university, Tehran, Iran.
*- Correspond Author: araghieh@iiau.ac.ir

Introduction

The present era has been termed as the era of information in which individuals can freely transmit information and have instant access to science that has never been possible before (Mashinchi, Ghasemi & Rezeghi, 2019). It also doubles or even multiples the volume of information in a very short period of time, and is distributed all over the world in a second (Hassanzadeh & Ghasemi, 2018). Given that the impact of human life on this phenomenon, it can be said that many comprehensive information scholars consider information society as the multi-faceted and multi-construction society that requires all levels of information (Drobetenko, Soloveva & Soloveva, 2019). In such societies, access to or lack of access to information plays an essential and decisive role in all areas (Sanchez, Salinas & Harris, 2011) .The emergence of information technology has opened a new window on human beings and has affected various aspects of his personal and social life. Humans have tried to use it in various ways by increasing their knowledge in this field, including its role in education (Moghli, Talebi & Saif, 2011) .Nowadays, the importance of education which is corresponded to the needs of the individual and society is felt more than ever, because the world of interconnected information networks requires the workforce to understand how to use technology as a tool to increase productivity and creativity (Urez, Volman & Kral, 2018). Such a skill is the ability to reason on the basis of a process in which credible information sources are identified and transmitted to others, in addition employers expect cooperation skills and teamwork and exchange information in global network, namely problem analysis from a multidisciplinary perspective (Ghafourian & Mohammad Taheri, 2018). Since these networks are international, employers are looking for people who have the capacity to interact effectively with people who have a different culture and language and, on the other hand, need to be flexible and could adapt themselves as quickly as dynamic work environments change and also learn and apply information technology goals most effectively (Movahedi, Motamedi & Katal, 2011). In other words, education is the engine of development and has been responsible for training the human resources and the requirements of human evolution. Mastering the communication and information technology and utilizing it in the strategic and important issues of education is one of the most important components of power in the present age. Information and communication technology is expanding at a rapid pace, and the phenomenon of education based on information and communication technology has now become the focus of increasing competition among educational institutions and societies worldwide (Thomas & Oladejo, 2018); The world is witnessing the use of information

technology in its education, and the use of these attributes has unique benefits and benefits for teaching and learning. The characteristics of information technology affect not only teaching and learning, but also the identity of learners. Information technology is not just about providing opportunities for learning; it is about changing the meaning of the role of teaching and learning (Alipour & Jahanara, 2010). The use of information technology in a variety of areas, including education, can be useful. This has led to some efforts to understand the role of information technology in different areas, including students' academic motivation, but the need for more comprehensive studies, especially in Iran, is well understood.

Motivation is actually the driving force behind a person's behavior and actions, so if one is not motivated enough to do the activity, he or she will quit. Generally speaking, long-term plans of applying the principles of creation are generally more effective in internal motivation making system when we seek to make lasting and continuous changes and have enough time to implement programs (Zheng, 2015). They use intrinsic motivation, but in exchange for rapid and drastic changes, external motivational factors can be utilized, which are in fact the same external incentives as the use of what one likes and enjoys (Majidi, Hamidizadeh, & Azami Tabar, 2011). Motivation among students is one of the most important and essential issues in many aspects of education. This has led to one of the important efforts of researchers in this field to improve motivation among students (Raees Saeedi, 2015). One of the most effective ways to improve students' motivation is to use information technology in teaching. Education experts believe that the traditional and old method of teaching, based on teacher-centered and subject-oriented, aimed at memorizing and filling the mind and relying on reservations, can no longer develop learners' skills and meet the educational need of present era. On the other hand, the poor quality of education has always been all parents' concern; this is because education has so far failed to succeed in social restructuring and to overcome the constraints and bottlenecks facing current developments (Vanderlinde, Aesaert). & VanBraak, 2014).

Studies have shown that in the traditional way of teaching, thirty percent of learners' learning disappears upon completion of the course, eighty percent is forgotten after one year and almost forgotten after two years (Sansanwal, 2009). That said, moving towards knowledge-based societies is a topic that is being discussed everywhere today. The advent of information and communication technology and its influence on all aspects of human life have brought new paradigms to life and transformed human life. The application of information technology increases the scope and speed of knowledge acquisition and reduces the cost of knowledge acquisition. The superiority of

information technologies in storage, knowledge retrieval, not only provides a quantitative description of knowledge security but is also essential in the application and exchange of knowledge and other areas and is used as a source and tool for knowledge advancement (Darabi, Godarzi, Kazemnejad & Hamidi, 2010).Rajabandeh, Bigdeli and Bigdeli (2016) in their research aimed at examining the role of information technology in smart schools showed that information technology in the field of education is rapidly expanding and creating Smart schools follow. Studies of Mansouri, Salari, Dehghanzadeh and Golshanabadi (2015), Iranmanesh, Taj-al-Din, Ganjikhan Hakimi (2015) and Mohammadi, Ashraf Ganjavi & Yousefi (2015) have analyzed the impact of smart technologies on motivation and academic achievement in different models and by prioritizing the effective factors. Also in foreign studies, Soomro, Kale, Curtis, Akcaoglu & Bernstein (2018), Collins(2011) and Papastergiou (2010) shown that the functions of information technology in the field of education have led to efforts in this area to influence the impact of this technology on students.

The goal of experiential science education in elementary education is to prepare students for lifelong learning; in other words, the general purpose of experiential science education is to develop students' science-technology literacy skills and abilities. Therefore, considering the importance of teaching science in elementary school based on three domains of knowledge, skill and attitude, it is necessary to motivate students (Aji, Hudha, Huda & Gufran, 2018) and (Alhassan, 2016) have acknowledged in their research the effective role of using information technology in teaching empirical science lessons including Newton's law. However, there has not been sufficient and comprehensive evidence in the internal studies on the relationship between using information technology with increasing elementary students' motivation and designed programs to improve students' motivation in various courses, including successful empirical science lessons. Accordingly, the present study aimed to investigate the relationship between utilization of information technology and increasing motivation of elementary school students in experimental science lesson to answer the question whether there is a meaningful relationship between utilization of information technology and increasing motivation of elementary students in science lesson? The main hypotheses of this study are to investigate the relationship between utilization of information technology and academic motivation and presenting user suggestions to the planners and educational authorities of Qom based on the results of the research. The research main and subsidiary hypotheses are as follows.

- There is a relationship between the use of information technology and

the motivation of elementary school students in the science course.

- There is a relationship between using information technology and knowing in the science course.
- There is a relationship between utilizing information technology and moving forward in the science course.
- There is a relationship between using information technology and driving experience in science.
- There is a relationship between using information technology and matching in a science course.
- There is a relationship between the use of information technology and introspection in science.
- There is a relationship between the use of information technology and external regulation in science.
- There is a relationship between using information technology and motivationlessens in science lessons.

Method

This research is applied in terms of purpose and it has correlation method which examined the relationship between the use of information technology and the motivation of elementary school students in an experimental science course. The method of this study was fieldwork. The statistical population of the present study was all elementary students in the 4th district of Qom city. The statistical population of the present study included all primary school students in the 4th district of Qom city, whose number is 10,000 according to the reports obtained. According to Morgan's table, 373 people were identified as the research sample. The sampling method in the present study was random clustering, in which the selected target area was selected from each district based on random selection of one or more selected schools and the questionnaires were randomly distributed among the students of these schools. To eliminate the effects of incomplete and missing questionnaires, at least 20% was added to the sample size; additionally 440 questionnaires were completed and among them 373 complete questionnaires were selected. Descriptive and inferential statistics were used for data analysis. In descriptive statistics part mean and standard deviation were used. Also in inferential statistics part, Kolmogorov-Smirnov tests were used to determine the normality of data and to determine the relationship between variables of Pearson correlation coefficient. All data analysis was done in SPSS software.

Tool

Information Technology Use Questionnaire

The scale used to measure information technology utilization was designed by Zamani and Azimi (2008). The questionnaire consists of 10 questions that

examine the types of information technology utilization including internet (2 questions), word processor (2 questions), electronic content (2 questions), educational software (2 questions), and smart boards (2 questions). This questionnaire scoring method is based on a five-point Likert scale ranging from very low to very high, and all questions were scored directly. Azimi and Zamani (2008) confirmed the validity of the tool with the help of content validity index based on the opinion of ICT experts and lecturers of Isfahan University of Educational Sciences. In this study, reliability was determined by William Scott's formula and the obtained coefficient was 0.86. In this study, the validity of the questionnaire was evaluated by professors and Cronbach's alpha coefficient was used to assess its reliability. The value of this coefficient was 0.82 for IT questionnaire, given that this coefficient was more than 0.7 so it indicates acceptable reliability.

Academic Motivation Questionnaire (AMS)

The Academic Motivation Scale was translated from French to identify the type of academic motivation of students. The Scale of Academic Motivation for the Recognition of the Type of Academic Motivation of Students and Learners by Vallerend et al (1992) has been translated from French into English. The scale of academic motivation is based on self-regulatory theory and examines the three main dimensions of motivation: internal motivation, external motivation and non- motivation. The Academic Motivation Scale has 28 terms. The Academic Motivation Scale has seven sub-scales, three of which are related to the dimension of internal motivation (knowing, moving in the direction of progress and experiencing stimuli), three related to the dimension of external motivation (matching, introspection and external regulation) and one it is uninspiring. The test is a self-report tool and the tester must determine on a four-point Likert scale how much of each of the above statements is why he or she is going to school or university. This questionnaire has one form, one of which is for school students and the other for university students. Surveys conducted by Robert Waller et al. Show that the validity and reliability of the english sample of the AMS Academic Motivation Scale have been validated on high school students as well as Canadian students. The Cronbach's alpha coefficient calculated for the whole 28 question questionnaire was 0.88. In addition, the analysis of academic motivation scale factors made the three dimensions of "intrinsic motivation" "extrinsic motivation" "motivational" with higher eigenvalues higher than one graph. Its validity and reliability were confirmed. The reliability of this questionnaire was reported 0.88. Validity was confirmed by ten university professors. The reliability of these questionnaires was calculated by Cronbach's alpha of 0.84.

Research findings

Table 1 shows the mean and standard deviation of academic motivation and its components as well as the use of information and communication technology.

Kolmogorov-Smirnov test was used to check the normality of the data distribution. According to this test, when the distribution of data is normal, the value or level of significance is greater than the critical number at the 30.3 level. According to Table 1, the test results show that the data distribution of the variables is normal. As a result, it is possible to use parametric tests, so Pearson correlation test was used to investigate the correlation between variables.

Table 1. Descriptive statistics of research

Questionnaire type	Mean± STD	K-S Statistics	Sig	Result
Students' motivation		1.536	0.85	Normal
Motivational components of students	Knowing	0.267	0.268	Normal
	Improving	0.97	0.97	Normal
	Motivational experience	0.897	0.125	Normal
	equalization	0.362	0.205	Normal
	Intra-nociceptive	1.265	0.102	Normal
	Exterior adjustment	1.427	0.71	Normal
	Lack of motivational	1.215	0.85	Normal
information technology utilization	information technology utilization	1.512	0.67	Normal

Main hypothesis: There is a relationship between the use of information technology and the motivation of elementary school students in the science lessons.

The results of the Pearson correlation test for measuring the main hypothesis are reported in Table 2.

Table 2. Pearson correlation coefficient results

	information technology utilization			
Variable	Correlation coefficient (r)	Coefficient of determination (R^2)	Sig	Numbers
Increasing motivation	0.512	26.2	0.001	340

According to the Pearson correlation coefficient test and the results presented in Table (2) it can be seen that there is a direct and significant relationship between the use of information technology and increasing motivation($r=0.512$, $P=0.001\leq0.05$). As the use of information technology in elementary students increases in the science curriculum, the motivation increases, so the null

hypothesis and research hypothesis are accepted. In this way, as the use of information technology in elementary school students increases in the course of experimental sciences, the motivation in them also increases, so the null hypothesis is rejected and the research hypothesis is accepted.

Pearson correlation test was used to test the research subsidiary hypotheses. The results are reported in Table 3.

Table 3. Pearson correlation coefficients between academic motivation components and IT utilization

	information technology utilization			
Variable	Correlation coefficient (r)	Coefficient of determination (R^2)	Sig	Numbers
Knowing	0.498	24.8	0.001	340
Improving	0.612	37.4	0.001	340
Motivational experience	0.551	30.3	0.001	340
Equalization	0.46	21.1	0.001	340
Intra-nociceptive	0.389	15.1	0.001	340
Exterior adjustment	0.617	38.0	0.001	340
Lack of motivational	0.508	25.8	0.001	340

According to the Pearson correlation coefficient test and the results presented in the Table (3) it could be considered that there is a significant and direct relationship between using information technology by knowing in the empirical science course the coefficient (r=0.498, P=0.001≤0.05), use of information technology with moving toward advancing empirical science lesson coefficient (r=0.612, P=0.001≤0.05), between utilizing information technology with stimulating experience in empirical science lesson (r=0.551, P=0.001≤0.05), between utilizing intrinsic information technology in empirical science lessons (r=0.46, P=0.001≤0.05), between utilizing information technology with external regulation in science lessons Experimental (r=0.389, P=0.001≤0.05). Therefore increase use of information technology in elementary school students in the course of experimental sciences lead to increase in knowledge, moving in the direction of progress, stimulating experience, matching the lesson, introspection and external regulation in the course of experimental sciences. On the other hand, according to the results presented in Table (3), it can be considered that there is a no significant and direct relationship between the use of information technology and non-motivation in the experimental sciences course (r=0.508, P=0.001≤0.05) In other words, as the use of information technology in elementary school students in the experimental science course increases, the lack of motivation in the experimental science course

decreases, so the null hypothesis is rejected and the research sub-hypotheses are accepted.

Discussion and Conclusion

The purpose of this study was to investigate the relationship between utilization of information technology and increasing motivation of elementary students in experimental science courses. Findings showed that there is a significant relationship between academic motivation and using information technology. The findings of this study were consistent with the results of previous studies, in that Majidi & et al (2011), Thomas & Oladejo (2018) and Sari & Nurcayho (2018) who in their research aimed to investigate the role of information and communication technology on students found that ICTs improve students' motivational status through diversity, which is consistent with the findings of this study. In interpreting this finding, it should be noted that information technology through its abilities and potentials facilitates education as well as through the power to create educational dynamics in schools, improve the diversity of the methods of teaching in schools, thus reducing problems and challenges in learning courses including Experimental Science and help to Improve Students' Motivation; In other words, the use of information technology improves the scope of student and teacher activities in some courses, including empirical sciences.

In the second part of the study, the research hypotheses were examined. In the results of the first sub-hypothesis, there is a statistically significant relationship between using information technology in an empirical science course. As the use of information technology in elementary students increased in the science lessons, so did the knowledge in the experimental lessons, so the null hypothesis and the research hypothesis were accepted. The results are consistent with research results of Majidi & et al (2011) as well as research results of Lauri, Heidmets & Virkus (2016) that examine the impact of using information technology on enhancing information literacy, knowledge, and awareness. In interpreting this hypothesis, it should be noted that the use of information technology improves the scope of students' and teachers' activities in some courses, including empirical sciences, which increases the knowledge and awareness of elementary students in the contents of empirical science lessons. . Therefore, the use of information technology creates a special knowledge among students. Such information technology enhances the knowledge among students by enhancing the quality of education. This is due to the potential and functions of information technology in conveying concepts among elementary students in an empirical science course. The result of the second sub-hypothesis showed that there is a significant relationship between the utilization of

information technology and the movement towards the development of empirical science lessons. In interpreting this hypothesis, it should be noted that the use of information technology will improve the transfer of concepts to elementary students. Due to the empirical and observational experience of the elementary science course, the use of information technology provides the opportunity for observation and objectification of education to move toward the development of the empirical science lesson, that is to say the achievement of the goals in the empirical science lesson. To improve. The result of the third sub-hypothesis showed that there is a statistically significant relationship between the use of information technology and the driving experience in the science lessons. Or the research was in line with the results (Mattoni & Trere, 2014) who found, after their research, that information technology improved the driving experience among students and teachers. In interpreting this hypothesis, it should be noted that information technology and its potential use improve students' motivation to attend schools and classrooms. On the other hand, information technology, through its ability to guide and teach students step by step, makes them objectively articulate what is happening. This has led to the use of information technology and its application in empirical science education to improve the motivational experience among elementary students in the empirical science course.

The results of the fourth sub-hypothesis showed that there is a significant relationship between using information technology and matching in the empirical science course. Based on the findings of Kimani, 2014, the use of information and communication technology will improve the consistency of information among students and is consistent with the findings of the present study, interpreting this hypothesis to note that information technology has created an appropriate information bank among Students make extensive information available to them on a regular basis, making it possible for students to appropriately match information, concepts, and expressions in the science lessons using information technology. Intermediate their functions to enhance the same level of SA Students in the Experimental Science Lesson 5. In examining the fifth hypothesis, there is a significant relationship between the use of information technology and introspection in the Experimental Science lesson. In interpreting this hypothesis, it should be noted that information technology leads to visual patterns. Make it easy for students to access it, which has led to information technology by creating images, videos, and different forms to improve imitation among students in the science lesson and to facilitate easy replication. This has led to the use of information technology functions in creating contexts for imitation, simulation, and

replication leading to introspective promotion among students in the empirical science course. The results showed that there is a significant relationship between the use of information technology and external regulation in experimental science lessons. Studies (Noroozi, Zamani, & Sharafzadeh, 2014) showed that the use of educational software was effective on academic achievement and increased intrinsic motivation for students' active learning in mathematics lesson, which emphasized on the results of this study. In interpreting this hypothesis, it should be noted that information technology influences students' classroom activities through their power of influence at all stages and times. This causes some of the behaviors of the school's out-of-school and out-of-school students to be exposed to the information technology radius, which may cause some external adjustments among students. Therefore, due to the information technology functions in different fields, the external regulation of students in the experimental science course is increased and improved. In the final sub-hypothesis, there was a significant relationship between the use of information technology and motivation. By increasing the use of information technology in elementary school students in the science lesson, the motivation for the science lesson decreases. This finding is in line with the results of studies (Momeni Mahmouei, Pakdaman & Dadmehr, 2014). In interpreting this hypothesis, it should be noted that the use of information technology leads to diversity in educational settings and to a more dynamic atmosphere and atmosphere in schools. This makes the students more willing to attend schools, which improves their motivation. Therefore, the use of information technology enhances students' motivational quality in empirical science lessons.

This study, like any other study, had some limitations; the present study was conducted on elementary students in Qom city and has some limitations in generalization to other students and other cities. The present study uses cross-sectional research instead of longitudinal research. A longitudinal study, as it investigates variables over several time periods, leads to a deeper understanding of the relationships among research variables. In other words, it cannot provide precise information about the relationship between the components of academic motivation and the use of explanatory information technology. In addition, this study did not control for all the unwanted variables in the research position such as intelligence, aptitude, personality traits, and family problems. Due to the limitations of data collection, a closed questionnaire was used in this study; therefore, it was not possible to prioritize and influence academic motivation factors and utilize information technology. According to the findings of the research on the relationship between the use of information

technology and increasing the motivation of elementary school students in the experimental sciences course, it is recommended to strengthen the necessary infrastructure in schools, to strengthen the use of information technology. Help improve students 'motivation by increasing teachers' technical knowledge in the use of information technology in experimental science. According to the findings of the research on the relationship between the use of information technology and motivational components including knowing, improving, motivational experience, equalization, exterior adjustment and lack of motivation, it is suggested that; 1) make the educational space dynamic and thus increase the level of knowledge in the experimental sciences course by diversifying the existing programs and tools related to information technology, 2) Use valuable experiences and successful programs of different countries in using teaching aids to increase the level of knowledge. 3) Supervise and pay more attention to the work of teachers who need to use information technology tools in teaching their content. 4) Appreciate and support managers who provide the necessary context for teachers to make more use of teaching aids during teaching. 5) In schools, organize computer site and computer workshop using information technology during training. 6) In the field of how to use information technology in education, introduction of software and introduction of educational capabilities of the Internet and information technology for teachers of continuous in-service courses should be held. 7) Increase the motivation of elementary school students in the experimental science course by harmonizing the contents of the experimental science course with the potentials and applications of information technology, 8) Provide students with access to learning content at any time and any place. 9) Identify the skill level and type of student behavior in areas such as interest, self-motivation, and self-regulation. 10) Provide the possibility of spiritual support for teachers' technological works and ideas. 11) Use flexible curriculum structure to enable teachers to use technology to improve the learning process to suit their situation. 12) Create a huge change in the education system. 13) Change the process of teaching and learning process from the traditional method to the new and technological method by creating positive perceptions about the use of educational technology among teachers.

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