Effect of Information and Communication Technologies on Academic Achievement of High School Students in Neyriz

Davod Eslamian and Behbod Khademi

Department of Social Sciences, Islamic Azad University, Neyriz, Iran

The objective of this study is to determine the effects of information and communication technology (ICT) on high school student academic achievement. The main hypothesis is postulated and tested in the study is: ICTs has no statistically significant effect on students' achievement. The research is conducted in public high schools in the city of Neyriz, Iran in 2016. A total of 346 participants were employed for the study. The self-administrated survey questionnaire based on 5-point Likert scale was used to collect the data. The data were analyzed using descriptive and inferential statistics. The results of this study show that information technology communication has a significant effect on student achievement. The results are expected to highlight significant effects of ICT on students' academic performance and issues related to further improvement in teacher education programs.

Key Words: Information and communication technology, academic achievement, learning

Introduction

Information and Communication Technology (ICT) is the application of computers to retrieve, transmit and manipulate data, in education or other systems. One of the most vital contributions of ICT in education is easy access to learning and teaching process (Idris, 2016; Sharma, Gandhar, & Sharma, 2009).

ICT is an umbrella concept that include any communication device, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems as well as the various and application associated them, such as video conferencing and learning. ICT are often used in education, healthcare, libraries, security etc. The positive effect of ICT on learning, education and libraries has been highlighted (Falobi, 2014; Ubulom & KAYII, 2016).

There is widespread belief that ICT increase quality of education, and transforming teaching and learning processes from being highly teacher-dominated to student-centered, and this transformation will result in increased learning for students, creating and allowing for opportunities for learners to develop their creativity, problem-solving abilities, informational reasoning skills and communication skills (Khan et al., 2015). ICTs are generally accepted as a modern tool that enables the teachers to modify the teaching methods to increase students' learning and achievements. From general perspective, ICT covers any product that store, retrieve, manipulate, transmit or receive information electronically in a digital format. It consists of hardware, software, social networks, media, processing, and presentation of information (Mbaeze, Ukwandu, & Anudu, 2010).

According to UNESCO, ICT is a scientific technological and engineering discipline and management technique used in handling information in application and association with social, educational and cultural aspects. Therefore the integration of information and communication technologies can help teachers and students toward educational planning and development (Manichander, 2016).

This study attempted to determine the effect of information and communication technologies on the academic achievement of high students in the city of Neyriz, Iran.

Corresponding author. Davod Eslamian, Department of Social Sciences, Islamic Azad University, Neyriz, Iran

Literature Review

The direct connection between ICT and students' academic achievement has been the focus of extensive literature during the last two decades. Several studies have tried to explain the role and value of technologies on student's academic performances.

The first body of literature explored the impact of computer uses. Since the internet revolution, there has been a shift in the literature that focuses more on the impact of online activities such as internet, educative online platforms, digital devices, blogs and Wikis, etc (Youssef & Dahmani, 2008).

Some studies demonstrates that there is no evidence of a key role for ICT in higher education (Angrist & lavy, 2002; Banerjee, Cole, Duflo, & Linden, 2004). For instance, Leuven, Lindahl, Oosterbeek, and Webbink (2004) concluded that there is no evidence that ICT would increase students' performance. Even in some cases, they found a consistently negative and marginally significant relationship between ICT use and student achievement. In addition, Trucano (2005) reviews a series of studies on ICT effect on schools and concludes that the effect of ICT on learning outcomes is unclear.

In contrast, some studies refer to the positive effect of ICT on students' achievement (Castillo-Merino & Sjoberg, 2008; Sosin, Blecha, Agawal, Bartlett, & Daniel, 2004). The use of technology in education to improve classroom efficiency have been supported by several researchers (Chickering & Erhmann, 1996; Freeman, 1997; Leat & McAlleavy, 1998). According to Kozma (2004) those advocating for the use of technology, describe a range of potential impacts that new technologies have when applied to education. Leuhrman (1971) and Bull et al (2002) indicated that technology application in classroom may use for word processing, grading, record keeping, web page production and presentation.

According to the Swedish National Agency for School Improvement (2008), ICT provide a positive impact on learning and student performance when it becomes an integrated element in the classroom and teaching. ICT use also encourages development from a teacher-focused or teacher-led model to a more student-focused model in which students work together, make their own decisions and take an active role in learning (Swedish National Agency for School Improvement, 2008). Davis (2000) asserts that increased availability of ICT is especially useful for students who suffer from learning disabilities since ICT use allows teachers to prepare suitable tasks for individual needs and everyone more effectively.

Carlson, Philip, McNeill, Powell, and Witt (2012) conducted a study focusing on the use of technology with online instruction. Carlson et al. (2012) explained that when using technology in an online classroom, teachers must determine the effectiveness of the technology, the ease of each technology, how each technology has been used to date, and how each technology might be used in the future. Teacher can apply those thoughts to the type of technology they use to communicate with students.

As Bagwell (2008) described students who are not proficient with using technology will be at a severe disadvantage in our highly technological society. Therefore, schools need to assist students in preparing for the future and develop skills that make them competitive in the workforce. If schools do not guarantee access to technology, which may include ICTs, or provide training to learn each form of technology the students' chances of learning these skills will be harmed (Bagwell, 2008). Chisalita (2013) agreed, mentioning schools need to prepare students for a society that requires everyone to think, act, adapt, and communicate creatively with technology. When schools promote technology and the use of ICTs students will gain the skills needed to be productive in a highly technological society.

However the studies showed that ICTs could improve the situation, reinforcing positive effects in the environment, or they could worsen the situation (Khan et al., 2015). Despite these studies, the impact of ICT on student achievement remains difficult to measure and open to much reasonable debate (Khan et al., 2015).

Research Method

This study utilized quantitative design to measure the effects of ICT on student achievements. A total number of high students were 3370. Among them 346 students were selected according to the Morgan formula and then the simple random sampling technique was used to identify participants.

The survey questionnaire was used to collect the data. The questionnaire was developed based on 5-point Likert Scale from strongly agree to strongly disagree. The instrument was pilot tested on a convenience samples 30 students. 30 questionnaires, a 100% response rate, indicated that the results were sufficiently comprehensive and verified the value of the instrument. However, the final survey questionnaire was edited to reflect the modification after the pilot test.

The final survey instrument consisted of two sections: The first section focused on respondents' demographic characteristics. The second section measured the dimension of students' achievements. Respondents were asked to rate the statements on a 5-point Likert scale where 1 means strongly disagree

and 5 strongly agree. In this study, the measurement of academic achievement was a composite variable, consisting of seven variables.

Descriptive statistics such as frequency, percentages, means, standard deviation were used to present and describe the data. Inferential statistics such as multiple regression analyses employed to predict the factors that effect on students' academic achievement.

Results

Table 1 shows the profile information of respondents included gender. The Table shows that of 42.2% respondents, were males and 57.8% were females. Among them, 78.6% used computer for their homework and 76.03 were used smartphone. Other information such as using computer and smartphone for educational purpose and grade illustrated in the table 1.

Table 1. Demographic information of respondents.

Variable	Category	F	%
Gender	Male	146	42.2
	Female	200	57.8
Grade	10th	1.5	30.3
	11th	115	33.2
	12th	126	36.4
Computer	Yes	303	78.6
	No	46	12.4
Smartphone	Yes	264	76.3
	No	82	23.7

The study also sought to establish student's academic components. As shown in Table 2, majority of teachers' perceived effects of ICT in students' motivation (M=10.19, SD =2.07) and effect on students' hope (M=9.56, SD 1.46). The respondents also agreed that ICT can effect on students' resistance, retry, time perception, function, competency and foresight.

Table 2. The effect of ICT on students' academic achievements

Variables	M	SD
High level of hope	9.56	1.46
Motivation	10.19	2.07
Resistance	8.78	1.58
Retry	8.94	1.59
Time Perception	7.45	1.41
Foresight	6.22	1.47
Competency	6.57	1.17
Good function	7.09	1.36

Main Hypothesis: The ICT has positive effects on student achievement. As result indicated in Table 3 the ICT effect on academic achievement this result could be predicted by 0.14%.

Table 3: The overall effects of ICT on student achievement.

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.45	6.59	0.001	0.31	27.64	0.001

Hypothesis 1: ICT has no effect on the level of students' hope. To answer to this hypothesis, we used regression analysis. As result indicated in Table 4, ICT increase the level of students' hope and the result could be predicted by 0.14%.

Table 4. The effect of ICT on students' hope

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.37	7.59	0.001	0.14	57.67	0.001

Hypothesis 2. ICT has effect on the level of students' motivation. The result indicated in Table 5 shows that ICT increase the level of students' motivation and this result could be predicted by 0.10%

Table 5: ICT and the level of students' motivation.

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.32	6.35	0.001	0.10	40.32	0.001

Hypothesis 3. ICT effect on students' homework. As result indicated the ICT increase the level of students' motivation and this result could be predicted by 0.14%

Table 6. ICT effect on students' homework.

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.37	7.59	0.001	0.14	57.67	0.001

Hypothesis 4. ICT effect on students retry on their homework. As result indicated the ICT increase the level of students' motivation and this result could be predicted by 0.22%

Table 7: ICT effect on students retry on their homework.

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.47	9.91	0.001	0.22	98.31	0.001

Hypothesis 5. ICT effect on students' time perception. The indicated in Table 7 shows that ICT increase the level of students' motivation and this result could be predicted by 0.06%

Table 8. ICT effect on students' time perception.

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.24	4.68	0.001	0.06	21.90	0.001

Hypothesis 6. ICT has effect on students' Students' foresight. As indicated in Table 9, ICT increase the level of students' motivation and this result could be predicted by 0.10

Table 9. ICT effect on students' Students' forecast.

Predict variable	beta	T	P<	R^2	F	P<
ICT	0.32	6.41	0.001	0.10	41.10	0.001

Conclusion

The main objective of this study was to investigate the effect of information and communication technologies on the academic achievement of high school students. The survey questionnaire was used to collect the data. The main hypothesis was tested, and related literatures were reviewed. The results showed that ICT has a significant effect on student academic achievement. The study also has demonstrated that ICT can be used to predict student's academic components.

Recommendation

From the results of the study, the following recommendations are made:

Ministry of Education should embark on fostering innovative networking and partnership arrangements with the computer companies. This could enable schools to acquire the educational equipment with cheaper costs.

More ICT teachers should be employed in high schools and trained in ICT skills to make them effectively deliver ICT based curriculum. It is crucial that Neyriz has well-trained teachers, able to implement ICT in schools.

Students and teachers should be given sufficient training on using ICT in classroom.

ICT skills for teachers and students should be provided which offers strategies for planning training needs and staff development programs to equip them with essential skills important in classroom.

Government should mobilize educational resources for equipping schools with ICT infrastructure. Schools should acquire up to date ICT infrastructure that teachers and students could learn.

High school leaders need to be updated themselves with educational technologies, because they should be able to encourage teachers who may have unwilling attitude towards the technology.

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