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Effect of self-directed learning process on multimedia competencies of educational technology students

Mohsen Bagheri *, Department of Educational Technology, Arak University, Arak, Iran
Mohammad Hashemi Gheshlaghi, Department of Educational Technology, Arak University, Arak, Iran
Fatemeh Joshaghan Nezhad, Department of Educational Technology, Arak University, Arak, Iran

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Abstract

The current study aimed to investigate the effectiveness of the Self-directed Learning (SDL) process on multimedia competencies of educational technology students at Arak university in Iran. The sample of the study consisted of all educational technology students studying at Arak university. The sample included students who were selected for project courses in the second semester of academic year 2014-2015. The quasi-experimental research, pre-test, post-test design was used for the study. Before the treatment, the pretest of multimedia competencies was employed, then students in the project course received education through the SDL process. The period lasted for 13 weeks, then the post-test was conducted. For data collection, the researchers prepared a questionnaire of multimedia competencies with three subscales (multimedia instructional design, multimedia production skills, and multimedia production tools). The validity of the questionnaire was confirmed by experts in the field of Educational Technology, and Cronbach's alpha coefficient was obtained as a reliability of 0.90. The data were analyzed with independent and paired-samples t-test. The results showed that there was a significant difference between students' scores in pre-test and post-test; and there was no significant difference between male and female students' scores on multimedia competencies.

Keywords: educational technology, self-directed learning process, multimedia competencies.

*ADDRESS FOR CORRESPONDENCE: **Mohsen Bagheri,** Department of Educational Technology, Arak University, Arak, Iran.
E-mail address: m-bageri@araku.ac.ir

1. Introduction

According to the fundamental precepts elucidated in the Fifth Nationwide Development Plan (NDP) of the Islamic Republic of Iran, the most notable challenges in higher education are: a) ignorance of educational quality, b) inflexibility in educational programs, c) lack of adaptability between course content and society's requirements, d) impracticality of output in the system of higher education. This plan puts forward certain remedial solutions for dealing with the aforementioned problems, some of which include: a) an increased emphasis on the principles which underlie educational quality, b) improvement upon students' preliminary skills, c) the use of appropriate technologies in education and reinforcing students' technological capabilities, d) the implementation of theories into practice by establishing a connection between the declarative knowledge the students acquire in universities and practical knowledge, such as pragmatic applications of knowledge under real-life circumstances (Salehi & Rostami, 2008).

Higher education in Iran has been reported as insufficient when it comes to fulfilling the needs and demands of the workplace (Akbaripur, 2007). There is a growing concern among employers and government bodies alike over the deteriorating quality of university graduates. Upon graduation and entry into the workplace, many graduates are found by employers to possess specific deficits in terms of skills. Such deficits include but are not limited to the following: lack of teamwork skills, substandard problem-solving abilities, and inadequate self-directed learning (Tavakoli, 1999).

The report of the Committee of the Job and Entrepreneurship Center of Iran (CJECI) indicates several areas of competency required by employees in every profession. These areas are the ability to manage resources, work productively with others, acquire and use information, understand complex systems, and work comfortably with newly-introduced technologies (Maleki, 2007). Hence, it is recommended that Iranian universities adhere to the above principles in the process of equipping students with the necessary skills and knowledge to cope with the rigors and challenges of modern life.

In 1993, the field of Educational Technology (ET) was firstly established in Allameh Tabatabaee University (ATU), which essentially enrolled students at B.A. level with the intention of providing expert human resources to manage audio-visual centers, libraries, and effective utilization of equipment in Iranian educational system. Then other teacher training centers and universities (e.g. Tehran, Arak, Tabriz, Esfahan, Ahwaz, Malayer, and Hamadan Universities as well as Tarbiat Moalem University) included this field among their other programs (Fardanesh, 2009). ET graduates in Iran are generally employed in educational centers, where they take on various responsibilities. Bagheri (2007) described these responsibilities in the following terms:

- Utilizing instructional media in educational centers
- Managing libraries and learning centers
- Preparing, compiling, extending and improving educational programs
- Recognizing and detecting educational issues
- Designing and implementing educational system evaluation
- Assessing and selecting which instructional materials and equipment to purchase
- Contributing to the arrangement and preparation of content for instructional media
- Collaborating in curriculum development

Due to the emergence of new technologies in the areas of information and communication and their relations to the educational development, educational technologists in Iran have begun to realize the innovation through alternating their own duties (Armand, 2008; Gharaebi, Amirteymouri & Maghami, 2011). In this respect, managing a computer laboratory, designing and manufacturing educational software, helping the experts out with designing learning environments supported by

Web, assisting teachers to integrate technology with their own courses in the classroom, and establishing workshops and on-the-job training courses to acquaint teachers with new technologies are among remarkable duties which Iranian educational technologists have carried out in recent years (Taghipur & Dehghanzadeh, 2012).

Educational technologists do not only deal with universities and other state educational organizations such as high schools, but they also produce jobs for other sectors such as industry and economy (Gharaebi et al., 2011; Taghipur & Dehghanzadeh, 2012). To be successful, experts in this field must be equipped with a large body of knowledge such as learning approaches, educational strategies, instructional design and so on. They must also be equipped with basic skills such as technology competency, problem solving, self-directed learning, social and commutative skills (Campbell, Kenny, Schwier & Zhang, 2005; Chen, 2012; Liu, Gibby, Quiros & Demps, 2002; Ritzhaupt, Martin & Daniels 2010; Taghipur & Dehghanzadeh, 2012; Tennyson, 2001).

One of the essential skills which enable ET specialists to perform the tasks mentioned above is multimedia skill. The term multimedia defines applications and technologies that include text, data, image, voice, and full motion video object. Instructional technologists develop a variety of multimedia products such as print base material, job aids and electronics support systems, websites, games and simulations. It is essential for instructional technologists to develop high quality multimedia products (Ritzhaupt et al., 2010).

As set forth earlier, alterations that have affected the specialists' perspectives are largely the result of the penetration of new technologies such as computers, the Internet, electronic tools, multimedia and so on into education. In ET, while there has been a gradual decline in employers' demands for basic knowledge and skills, the demand for computer knowledge and skills (software, hardware) has increased as well (Izmirli & Kurt, 2009). Consequently, an educational technologist is expected to concentrate on technology competencies, especially multimedia competency, with respect to integrating technology into education, provide educational software, give consultation to teachers and students, and help them to use different technologies effectively (Sugar, 2005; Ritzhaupt et al., 2010).

As per the current state of affairs of Iran's ET training, the main focus of almost all universities for ET education is on the traditional teacher-based approach (Khosravi, 2006; Salari, 2010). Although some ET courses are practical, and students do some assignments either individually or in groups, most ET courses in Iran are teacher-centered. Although ET can be in close relationship, it is not very noticeable. Often students are impelled to complete their projects by the sheer desire to obtain a score that will allow them to pass the course. This does very little in the way of preparing students for future employment and virtually ignores their creative developmental needs. They are not sufficiently capable of practically applying what they have learned in the classes mainly because such learning has not been in depth (Armand, 2008). The students also appeared not to have essential skills such as technology competency, self-directed learning, problem solving and so on, required by the demands of the work place in the future (Fardanesh, 2009; Taghipur & Dehghanzadeh, 2012). The educational centers and universities need to consider the approaches which empower student skills and knowledge to encounter future world challenges. One of these approaches, which is emphasized by the instructional specialists, is the Self-directed Learning (SDL) approach (Fisher, King & Tague, 2001).

Some researchers have defined self-directed learning as a teaching and learning process (Brookfield, 1988; Hammond & Collins, 1991; Knowles, 1975; Mezirow, 1985). They consider self-directed learning as a kind of self-planned learning, where the learners are responsible for planning and directing the learning process. After studying adults' learning projects (an analysis of 200 individuals and interviews with 66 of the sample), Tough (1981) suggested a model consisting of 13 steps for self-planned learning projects. This model presented the significant decision-making points regarding the what, where and how of learning. Knowles (1975) defined self-directed learning as one of the underlying principles of andragogy. He described self-directed learning as a process in which the learners take initiative on their own or with the help of others to find out their learning objectives, to

determine the available human and material resources for learning, to select and implement suitable learning strategies and to evaluate the learning outcomes.

According to Knowles (1975), the self-directed process consists of six steps. These steps are 1) climate setting; (2) diagnosing learners' needs; (3) formulating learning goals; (4) identifying human and material resources for learning; (5) choosing and implementing appropriate learning strategies; and (6) evaluating learning outcomes.

According to Brookfield (1988) and Hammond and Collins (1991), self-directed learning is a transformational process, which creates a kind of critical awareness and social action among the learners. Brookfield (1988) criticized the earlier versions of self-directed learning and provided a more comprehensive definition of the self-directed concept including critical thinking, alternative meaning systems and perspectives, and the alternation of individual and social conditions. Brookfield (1988) distinguished two versions of self-directed learning. The first version applies a variety of self-directed techniques including resources identification, strategies implementation and process evaluation. The second form of self-directed learning refers to a situation in which the learners look upon the knowledge as relative and context-based and regard the values and moral codes as cultural constructs to change their individual and social world knowledge. In line with the above arguments, this study aims to investigate the effect of the self-directed learning process on ET students' multimedia competencies. The hypotheses of the study are:

1. SDL process effectively enhances the multimedia competencies of ET students.
2. There is a significant difference between multimedia competencies' scores of males and females who received education through theSDL process.

2. Methodology

The current study used a quasi-experimental and a pre-posttest design. The study group was all ET students of Arak University in Iran. The sample included students in the project course of the second semester of 2014-2015 academic year. Before beginning the period, the pretest of multimedia competence among the students was applied. The period lasted for 13 weeks, then the post-test of multimedia competencies was conducted.

The process was that in this lesson, students did not attend classes, but received education through a self-directed learning process. At first, the students were divided into small groups of 5-4 people and chose a subject as the topic for their projects. The subjects of projects were selected based on the needs of the actual situation. For example, students might communicate with other training centers based on the need analysis for them to choose their subject. All the steps that the students would complete were autonomous and self-directed. Learners identified what subject they could choose and what format would be used to present the media.

The role of the teacher was guidance and students could refer to him when they needed to, reporting stages of progress when dealing with probable problems. He provided help and support. Each project was based on the media that had been chosen to present their work (such as print based materials, videos, animation, multimedia, and so on). In this lesson, students developed their skills in producing educational multimedia according to their needs in relation to the project. At the end of their project, students were able to produce media deliveries.

To collect data in this study, the researchers used questions that were prepared based on the previous experiences of the researcher. This questionnaire had three subscales of educational multimedia instructional design, multimedia production skills and multimedia production tools, which were adjusted in the Likert scale. The validity of the questionnaire was confirmed by experts in the field of ET and for calculating reliability the Cronbach's alpha coefficient rate was 0.90. To analyze the data, independent and paired-samples t-tests were used.

3. Findings

In this study, participants were 20 undergraduate students from the educational technology department of Arak University. Descriptive statistics of the study results are presented in Table 1.

Table 1. Mean and standard deviation of multimedia production competencies

variable	time	M	SD
Multimedia production competencies	Pre-test	50.16	1.29
	Post- test	69.54	1.16
• Instructional design of Multimedia	Pre-test	16	4
	Post- test	22.25	2.65
• Multimedia production skills	Pre-test	15.50	5
	Post- test	21.55	4.77
• Multimedia production tools	Pre-test	17.94	5.56
	Post- test	26.55	6.27

As Table 1 shows, in all items the scores of students increased from pre-test to post-test. Descriptive data of males and females in terms of multimedia competencies and it elements are reported in Table 2.

Table 2. Descriptive data of males and females scores in pre-test and post-test

variable	gender	time	M	SD
Multimedia production competencies	male	Pre-test	50.20	1.31
		Post- test	72.60	7.50
	female	Pre-test	49.35	1.33
		Post- test	68.92	1.29
• Instructional design of Multimedia	male	Pre-test	16.33	1.50
		Post- test	21.50	2.07
	female	Pre-test	15.88	4.73
		Post- test	22.57	2.84
• Multimedia production skills	male	Pre-test	14.50	5.24
		Post- test	22	2.75
	female	Pre-test	15.92	5.03
		Post- test	21.35	5.49
• Multimedia production tools	male	Pre-test	16	7.3
		Post- test	29.40	2.88
	female	Pre-test	17.57	5.49
		Post- test	25.46	4.94

As can be seen in the above table, the scores of both males and females from pre-test to post-are increased. To compare the score of the students between pre-test and post-test a paired sample t-test was applied. The results are reported in Table 3.

Table 3. Paired sample t-test analysis of students scores in pre-test and post-test

variable	Time	M	SD	df	t	sig
Multimedia production competencies	Pre-test	50.66	13.8	19	9.25	0.000
	Post- test	69.54	11.61			
• Instructional design of Multimedia	Pre-test	16	4	19	8.98	0.000
	Post- test	22.25	2.65			
• Multimedia production skills	Pre-test	15.50	5	19	6.5	0.000
	Post- test	21.55	4.77			
• Multimedia production tools	Pre-test	18.27	5.52	19	6.2	0.000
	Post- test	26.55	6.27			

As can be seen in Table 3, there is a significant difference between pre-test and post-test scores of all variables. Multimedia competencies (t(19)=9.25, p>0,000), instructional design of multimedia ((t(19)=8.98, p>0,000), multimedia production skills (t(19)=6.5, p>0,000), and multimedia production tools (t(19)=6.5, p>0,000). As can be seen from the table, all values are significant at the 0.05 level.

In addition, in this study the data was also analyzed based on the gender. Scores of the male students in pre-test and post-test are provided in Table 4.

Table 4. Paired sample t-test analysis of male students scores in pre-test and post-test

variable	time	M	SD	df	t	sig
Multimedia production competencies	Pre-test	15.50	5	5	6.05	0.000
	Post- test	21.5	4.77			
• Instructional design of Multimedia	Pre-test	16.33	1.50	5	6.20	0.002
	Post- test	21.50	2.07			
• Multimedia production skills	Pre-test	14.50	5.24	5	3.75	0.013
	Post- test	22	2.75			
• multimedia production tools	Pre-test	19	7.03	5	4.22	0.013
	Post- test	29.40	2.88			

According to Table 4, there was significant difference between pre-test and post-test scores of the male students in the multimedia competencies, t(19)=6.05, p<0.05, instructional design of multimedia, t(19)=6.20, p<0.05, multimedia production skills, t(19)=3.75, p<0.05, and multimedia production tools, t(19)=4.22, p<0. As can be seen, all variables are significant at the 0.05 level. In addition, a paired sample t-test was applied to analyze the scores of the female students.

Table 5. Paired sample t-test analysis of female students scores in pre-test and post-test

variable	time	M	SD	df	t	sig
Multimedia production competencies	Pre-test	50.15	13.57	12	8.27	0.000
	Post- test	68.92	12.99			
• Instructional design of Multimedia	Pre-test	15.85	4.73	13	7.32	0.000
	Post- test	22.57	.768			
• Multimedia production skills	Pre-test	15.92	5.03	13	4.17	0.000
	Post- test	21.35	5.49			
• Multimedia production tools	Pre-test	18	5.14	13	6.60	0.000
	Post- test	24.46	6.94			

Based on Table 5, it can be said that there was a significant difference between pre-test and post-test scores of the female students in the multimedia competencies, t(19)=8.27, p<0.05, instructional

design of multimedia, t(19)=7.32, p<0.05, multimedia production skills, t(19)=4.17, p<0.05, and multimedia production tools, t(19)=6.60, p<0. As can be seen, all variables are significant at the 0.05 level.

To analyze the difference between male and female's scores in terms of multimedia competencies and it component, an independent-t-test was applied.

Table 6. independent t-test analysis of students scores in post-test

variable	gender	M	SD	df	t	sig
Multimedia production competencies	male	72.60	7.40	18	.590	.564
	female	68.92	12.99			
• Instructional design of Multimedia	male	21.50	2.07	18	.820	..423
	female	22.57	2.87			
• Multimedia production skills	male	22	2.75	18	.269	.791
	female	21.35	5.49			
• Multimedia production tools	male	29.40	2.88	18	1.21	.244
	female	25.46	6.49			

As Table 6 shows, there is no significant difference between male and female scores of multimedia competencies and their components (p>0,05)

4. Discussion and Conclusion

The current study aimed to investigate the effectiveness of the SDL method on multimedia qualification of the students of educational technology. The results show that using SDL was effective over all of multimedia components students. The results of the experimental research on both men and women showed that there is no significant difference between these two groups based on the use of this method.

At the present time, scientific discovery in science teaching and learning designers understand that creating flexible environments of teaching and learning is the key to success in achieving educational goals and purposes (Seradgi & Attaran, 2012); and this has directed them to design educational programs with constructivism. The most important characteristics are self-management, self-control, motivation to learn, problem-solving to achieve learning objectives, making the learners aware of the purposes of education, increased choice, and stepwise development of learning skills. Gharaebi et al. (2011) believe that one of the requirements for effective training is making a free environment learning space and encouraging learners to comment and express their ideas and thoughts. Self-direction in learning environments is one of the necessary conditions for teaching and learning tailored for the needs and challenges of the present world. However, we found that where the world is increasing its complexity, in learning environments that underlie changes, being responsive to human's social and individual needs, and the traditional way of dealing with challenges and helping learners to achieve the desired skills are ineffective. Thus, scientific and educational activities should seek creative methods of their implementation in educational settings, so that the education system is in line with other institutions and can also be placed in the path of change. This study shows that providing training methods based on self-directed learning can enhance Multimedia competence. The learners selected their project based on their needs and then they developed their multimedia competence. Self-directed learning can provide learners with the skills that will be useful in their future employment opportunities based on their knowledge and skills to solve these kinds of problems.

4.1. Recommendations

1. Students can be made familiar with new methods of teaching such as self-directed learning by employing educational classes and workshops.
2. Resources required for the implementation and realization of ideas and new methods of teaching and training are provided.
3. Teachers and students have received the necessary training and skills that are very effective in the field of multimedia software and tools.
4. Other researches on the effectiveness of this method on learning the skills and concepts and also on different groups are made available, so that the results can be further generalised.

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