Investigating the relationship between the use of information and communication technology and cognitive empowerment and the efficiency of educators' teaching performance in Zahedan University of Medical Sciences

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ABSTRACT

Introduction: Higher education in medical sciences is very important in any society. Universities have faced many changes in this regard. Higher education in any country can be leading when using new technologies. Given high emphasis of the universities on the cognitive empowerment of the employees, the objective of this study was to investigate the relationship between the use of information and communication technology and cognitive empowerment and the efficiency of educator' teaching performance in Zahedan University of Medical Sciences. Methodology: The research method was descriptive-survey method. The research population included all the teachers of Zahedan University of Medical Sciences in the academic year of 2018-2019 and the sample of the research was determined to be 120 people using randomized sampling method and Morgan table as well as Cochran formula. The measurement tool was a questionnaire derived from Edmund model. Data were analyzed using SPSS, version 25, software. Results: In this research, demographic status of the samples including age, level of education, employment history and gender was examined. Based on the descriptive statistics, providing training and feedback had the highest mean among other variables. The results of the Kolmogorov-Smirnov test showed that all the hypotheses were normal and the results of the data analysis confirmed all four existing hypotheses. The results showed that the application of technology in this sample resulted in cognitive empowerment and improvement in the performance of the professors of the medical sciences of Zahedan.

Keywords: Information and Communication Technology, Cognitive Empowerment, Performance Efficiency, Edmund Model, Zahedan University of Medical Sciences.

Introduction

In the current era, the rapid growth of the ICT (Information and Communication Technology) and its impact on all aspects of human life has led to a great revolution in its educational systems and its mission in learning environments so that it can educate efficient and capable people and strengthen the high level skills of learning in them and keep a pace with the rapid technological, industrial and social changes [1]. Along with rapid changes in techniques and skills and the emergence of new phenomena in information technology and their impact on the life practices and methods, the process of education has undergone great developments [2]. The development of information technology in educational systems is not only an option but an inevitable necessity, considered as an effective factor in reforming the educational systems [3]. The developments caused by the electronic revolution and the information age and the emergence of the network of virtual

organizations and the high structural developments and changes in the social conditions brought new experiences for universities, which are currently facing various challenges at the global scale [4].

Third Millennium education is facing many challenges, such as globalization, entry into the information society and the expansion of global media networks that are considered as a kind of development and transformation. Given the rapid growth of knowledge generation and the development of global ICT networks and given the many positive aspects of the use of Internet and the global communication media, it is essential for educators and employees to adapt themsleves to the speed and complexity of changes to use the technology properly [5]. When entering the core areas of information and communication technology, we realize that the education is the first and most critical part of the affected technology [6]. Empowerment of human resources as a new approach to the intrinsic motivation of the job means liberalizing the inner forces of the employees and providing the conditions and opportunities for the flourishing of talents, abilities and competencies of individuals [7]. There are many models for assessing the efficiency of using technology in education, regarding which Edmond et al., model was translated and standardized by Javad Noghabi in 2005. The model includes different items, including the transfer of lesson efficiency goals, regularly provision of the information, avoidance of ambiguity, perception of control, and provision of training and feedback. The transfer of goals dimension measures the general goals or efficiency goals. Regularly provision of information evaluates the sequence of the lesson and the complex information. Avoidance of ambiguity dimension evaluates the clarity and manner of the presentation of the lessons. The control of understanding dimension evaluates the readiness of the learners and provision of training and feedback dimension evaluates the strengthening of the skills and the control of the concepts [8].

Transformation of education and learning through information and communication technology is something more than placing computers in the classroom. Real changes occur when the information and communication technology broadens the thinking horizons of learners and educators by developing new skills, ideas and learning resources [9]. Information and communication technology includes technologies such as tape recorder, radio, television, computer facilities and the Internet, which is an important tool for collecting information and providing it [10]. Information and communication technology is considered as one of the main infrastructure of knowledge communities [11]. As a result, it creates new opportunities for the coherence of education and technology resources making the learning process more flexible and improving the relationship between the professors and students [12]. The introduction of new technologies into the education area has changed the nature of the teaching and learning process at the university. These technologies have not only changed the in-person teaching, but also extended its boundaries out of the physical classroom and created new learning environments .In this environment, the educator and the student are separated from each other in terms of time and place, and the educational content is provided to the students through software, the Internet, video conference, virtual classroom, and so on, and the student communicates with the educator and other people for performing individual and group tasks through computer technology [13, 14].

The issue of improving the quality of learning in the medical education and cognitive empowerment of the employees has been always considered, whose importance increases every day. The nature and type of learning content in various courses of medical sciences has made it necessary to use multimedia facilities to facilitate learning of learners. Although the professor`s method of teaching in the class has been always the dominant method of teaching so far, some believe that with emergence of modern educational technologies, professors and students can distance themselves from traditional approaches and take steps towards new methods. Information and communication technology not only improves data storage and learning methods, but also acts as a catalyst to cope with flexible organizational barriers [15]. Performance evaluation will not be the only useful tool in the optimally use of human resource capacities unless the performance of individuals be managed and guided consistently through plans for improvement and development of human resource skills and through the use of planning, organizing, motivating and controlling tools in close relation with the current culture and value system [16]. One of the important points leading to the improvement in the performance of the educator and learner in the teaching and learning process is their ability to learn. Given the role of an educator in the education, determining the level of ability of this group is a good point for the beginning of the education [17]. Several studies have been conducted so far in the area of information and communication technology, which we refer to some of them below.

Beighi Nia et al. [7] evaluated the effect of cognitive empowerment of employees on the factors improving the productivity of human resources. The results revealed a strong correlation between cognitive empowerment and factors enhancing the human resource productivity. Haghani and Masoumi [18] in a study entitled "A review of learning theories and their application in medical education" examined learning theories including behaviorism, cognitivism, and constructivism. None of the learning theories is complete and emphasizes a particular type of learning, so it is better for professors to gain knowledge on this set of these theories. Generally, behaviorism is suitable for teaching new skills, cognitivism is suitable for teaching critical thinking, clinical thinking, self-oriented learning and lifelong learning, and finally, constructivism is suitable for teaching problem solving skills, clinical decision making, and communication skills. The results of the research conducted by Khorasani et al. [3] under the title of the "factors influencing e-learning acceptance in Tehran University of Medical Sciences students based on the technology adoption model" showed that individual factors such as the variable of mental perception of the ease of using technology, the variable of mental perception of usefulness of

technology are the variables of deciding to use useful infrastructure technology to apply e-learning in teaching medical students. Zamani et al [19] evaluated the factors associated with the attitude of Isfahan University of medical students for acceptance of mobile learning using the technology adoption model. Data analysis showed that the technical capabilities of the mobile phone, its accessibility and portability encouraged learners to use this tool for learning.

Rezaei Rad [20] identified and prioritized the factors influencing the use of mobile learning in higher education. He concluded that the technical and technological factors, attitude factors, individual, knowledge, skills facilities and self- discipline were influential in the implementation of mobile learning in higher education. Ardalan et al. [21] investigated the impact of mobile technology development strategies on the effective use of mobile learning in medical education based on technology adoption model. Educational, administrative-structural, managerial, and motivational-recreational strategies had the most significant effect on the professors' perceptions of the usefulness of mobile learning as well as their mental perception of the ease of mobile learning. Mansouri and Zolghadri [22] evaluated "the attitude of educators on the application of information and communication technology in the education process". According to the results, teachers' attitude toward using information and communication technology in the education process was positive. Additionally, inferential statistics analysis of data showed that there was no significant difference between gender of the subjects and their attitude toward the use of information and communication technology in education. However, a significant difference was found between the variables of teaching history, age, level of education and their attitude toward the use of information and communication technology in education. In another study conducted by Ghanbari and Karimi [2] under the title of "the effect of information and communication technology education on the adoption of information technology efficiency based on the technology adoption model", the results showed that there was a significant difference between the trained and non-trained staffs in the five variables of technology adoption model. According to the data analysis, all the relationships between the variables of the structured model of the trained group were obtained positive and significant with regard to the effect of training. Scal et al [6] introduced a "research-based approach before teachers' training" for the first time. In this research, the approach of using technology in schools and universities was tested and the advantages of learning with technology in recognizing and motivating individuals were shown. Javerskare et al [23] evaluated the need for technology in education from the point of view of teachers and concluded that the use of information technology depended on age and past experience. The lack of support of teachers and educators has caused them not to have adequate motivation to use technology. The increasing developments in technology and the great attractiveness of modern technologies have drawn the attention of many educators. It has caused to the fact that a great number of professors use modern technologies in teaching and learning.

As improving the quality of teaching and learning and changing the thoughts and beliefs and productivity of higher education employees, especially medical science employees, has always drawn the attention of people. Moreover, information and communication technology has provided the conditions to achieve this ideal, the need for education through technology and its impact on cognitive empowerment and improving the performance of professors and employees in various disciplines of medical science is an essential. Given the objectives of this research, four research questions of this research are as the following:

1. Does the use of information and communication technology (ICT) transfer the goals of teaching efficiency?
2. Does the use of ICT provide information regularly?
3. Does the use of ICT provide training and feedback?
4. Is the use of ICT effective in improving the teaching performance of educators?

Methodology

The present research was a descriptive-survey type of study. This research was considered as an applied research. The research population included all teachers of Zahedan University of Medical Sciences. Among the research population, 120 people were randomly selected using the Morgan table and Cochran formula. The most common tool used to collect data in descriptive-survey research is questionnaire and interview. Therefore, to collect the data in this research, a 100-item researcher-made questionnaire taken from a questionnaire designed by Jawad Tavassoli Noghabi that was adapted from the Edmund et al. was used. Therefore, given the simplicity and applicability of this model in the area of assessing the performance of educators and teachers, this model was selected for collecting data in the present study. After preparing the questionnaire and organizing the content, it was tested on 35 people experimentally in a pilot study. After reviewing all the levels and content, its various sections were revised and the validity of the questionnaire was confirmed by experts, professors and designers. The reliability of the questionnaire was obtained more than 0.7 with Cronbach's alpha coefficient test. The scores of questionnaire questions were evaluated based on the 5-point Likert scale ranging from a very high level (score 5) to a very low level (score 1).

The used questionnaire consists of two sections, including general information and specialized information. The general information section includes gender, age, level of education, field of study, type of teaching activity and employment history. The second section includes 4 cognitive empowerment, teaching efficiency, and providing information regularly, ICT efficiency. Each of the items in this section contains various questions (10 open-ended questions). In the second section, it was tried to design the dimensions and number of questions in a way not to waste the time of the professors. In general, with a small number of questions, the quality of work was increased. After designing the tool, the obtained standard questionnaire

was distributed randomly among 135 faculty members of the medical university. Out of the collected questionnaires, 15 questionnaires were reported invalid and 120 questionnaires were used for statistical analysis. The results derived from sample observations were generalized to the community. The results of the data analysis have been described in detail below.

Descriptive statistics of research hypotheses

In this section, descriptive statistics of each questionnaire questions including mean, standard deviation, minimum, maximum, skewness, and kurtosis have been examined.

Table 1: Descriptive statistics of the research questionnaire

Questionnaire questions	SD	mean	max	min	n
ICT tells students what they should know and do.	1.14786	3.0417	5.00	1.00	120
Using the ICT, the medical science laboratory courses are presented in a completely real environment.	1.14051	3.0417	5.00	1.00	120
Review of key points or efficiency goals at the end of the course.	1.03682	3.2750	5.00	1.00	120
The use of ICT leads to the right of choice in individuals	1.06481	3.2250	6.00	1.00	120
Controls the complex content of medical courses before students go ahead	1.09032	3.4333	5.00	1.00	120
To reassure, it review all the medical skills and concepts	1.15761	3.2667	5.00	1.00	120
Using ICT leads to a sense of competence in individuals	1.13608	3.1083	5.00	1.00	120
The use of ICT provides the condition for the flourishing of talent.	1.09157	3.2083	5.00	1.00	120
The use of ICT leads to training medical courses with accurate simulations.	1.02213	3.0750	5.00	1.00	120
The use of ICT increases the educational capacities in teaching.	.94913	4.3000	5.00	1.00	120

Table 2- Descriptive statistic of research variables

Research variables	SD	mean	n
Transferring the goals of the efficiency of course	.76672	3.1194	120
Regularly providing of information	.75860	3.3083	120
Providing training and feedback	.62996	3.4229	120

According to the above table, providing training and feedback had the highest mean among other variables. Kolmogorov-Smirnov test was used to examine the normality of the variables. As the significance level for all hypotheses was greater than 0.05, it was concluded that all hypotheses were normal, so parametric tests could be used to examine the research

hypotheses. The t-test results for each of the research questions are as follows:

Table below suggested that the significance level for the first hypothesis was smaller than 0.05 and the mean was greater than 3. Therefore, it is concluded that the use of information and communication technology transfered the teaching goals, provided appropriate use of information technology and ICT and the use of ICT provided training and feedback. Finally, the results of the analysis of data showed that the use of ICT was effective in teaching and motivation of educators of the University of Medical Sciences.

Table 3: T-test results of research questions

First hypothesis indicators	Confidence level of 95%		Mean difference	Significance level	df	t	mean
	upper	lower					
Question 1	1.3665	1.2254	0.11	.000	119	36.355	3.11
Question 2	1.3409	1.2087	0.30	.000	119	38.154	3.30
Question 3	1.2801	1.1232	0.42	.000	119	30.326	3.42
Question 4	1.2801	1.1232	0.20	.000	119	30.326	3.2016

Discussion and conclusion

The objective of this study was to investigate the relationship between the use of information and communication technology and the efficiency of educators' teaching performance in Zahedan University of Medical Sciences based on Edmund model in the academic year of 2018-2019. Analyzing of the data indicated that there was a significant and positive relationship between this structural model for using information technology and communication and its efficiency on the performance of professors with regard to the indicators of empowerment, transfer of the goals of the course efficacy, regularly providing of information and providing training and feedback. Many studies have been conducted in the information and communication technology area, but with the introduction of new technologies in the academic community of the medical sciences, the investigating the efficiency of new technologies in changing and improving the performance of university educators is an essential.

The present study was a new activity whose results can be generalized to other medical sciences universities of Iran. The results of the present study were compared with those of the research conducted by Beighi Nia et al [7], Khorasani et al [3], Zamani et al [19], Ardalan et al [21], Mansouri and Zolghadri [22], Ganbari and Karimi [24], Jaweskare et al. [23]. Descriptive and inferential statistics were used in the present study. In this section, in order to describe the characteristics of the samples, the collected data were first summarized and concluded using descriptive statistics indicators. Then, inferential statistics was used to confirm or reject the hypotheses, and according to data analysis, 27.6% had master and 72.4% had PhD degree. Investigating the respondents' age showed that 21.4% of the samples aged less than 35 years, 42.7% were between 35 and

45 years of old, 31.1% were between 45 and 55 years of old and 4.9% aged more than 55 years. Investigating the gender status of different respondents showed that 68% of them were male and 32% were female. 5.8% of them had employment history under 5 years, 13.6% of them had employment history between 5 and 10 years, 20.4% of them had employment history between 10 and 15 years, 24.3% of them had employment history between 15 and 20 years, 19.4% of them had employment history 20 and 25 years, 12.6% of them had employment history between 25 and 30 years, and 3.9% them had employment history more than 30 years. The results of this study showed that there was a positive and significant relationship between the use of information and communication technology (ICT) and educators' teaching performance of Zahedan University of Medical Sciences.

The use of information and communication technology transfered the teaching goals, provided information appropriately, provided appropriate training and feedback, and was effective in improving the educators' teaching performance of Zahedan University of Medical Sciences. Generally, due to the increasing growth of ICT in medical sciences and based on the results of the present study, for more effective use of technology in the teaching of medical science educators, it is recommended for professors to have sufficient knowledge and training to apply the technology and change their thinking and motivation to use new technologies to improve their performance in line with this tool and receive lifelong and effective training. One of the limitations of the present study was that the results of this research were valid to the present time given the rapid changes in technology they will lose their validity if communication protocols change significantly or new mobile learning technologies are introduced to the market.

Acknowledgment

Ethical considerations: In the present study, all ethical rules governing a research, including informed consent and confidentiality, were fully observed.

Conflict of Interest: Thereby, the authors declare that the present study has no conflict of interest.

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