The Characteristics of an Effective Teacher in a Higher Education Based on Information and Communication Technology

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Abstract: *Background*: Considering the power of information technology, higher education is on the verge of an immense revolution. I aimed to determine the characteristics of an effective teacher in a higher education based on information and communication technology (ICT)[1] from the students' point of view in virtual universities of Shiraz, southern Iran. *Materials and Methods*: This study was a descriptive applicable study. Data were collected using a researcher-made questionnaire whose validity and reliability were determined using expert opinion and Cronbach's alpha, respectively. The study sample was selected using the stratified random sampling method and consisted of 351 students studying at virtual universities of Shiraz. *Results*: The results showed that according to the views of students (351 people), course management, interaction and cooperation improvement, student support and commitment and electronic skill are effective in defining the successful teacher in ICT-based education. Moreover, improving interaction and cooperation is the main priority in determining an effective teacher in ICT-based course. *Discussions*: Universities in developing ICT-based courses need to prepare teachers with competencies of Class management, interaction with students and course planning through technology.

Key words: Effective Faculty ⋅ Education, distance ⋅ Higher Education ⋅ Information and Communication Technology ⋅ E-learning ⋅ Distance Learning

INTRODUCTION

The process of higher education is highly significant in any society. These days, universities have come across a main transformation. Lack of budget, an increase in the number of university students, a change in the student population, up-to-date and various educational needs of each society require fundamental changes that are coordinated with recent needs [1]. Through ICT base education, the feasibility of "learning with no time and place limitation" proportionate to the students' requirements has been brought about [2]. The historical evolution of academic education illustrates the incorporation of technology in higher education. The application of information and communication technology (ICT) for learning dates back to more than 5000 years. The invention of writing with the help of sharp pointed objects was the first informational revolution that made the creation, data accumulation and communication

with following generations possible. The second information revolution began after the invention of printing in 1459. The third information revolution started only about 50-60 years ago with the invention of computers, which enabled the transformation of raw data to organized information. The transformation of data to knowledge and knowledge to practice was provided by intelligent software and robots [3-5].

The application of modern communication technologies in education has changed the nature of the academic teaching/learning process. These technologies have not only created variety in face-to-face academic education methods, but have also expanded its borders to create new learning environments other than physical classes [6]. In such an environment, the teacher and the learner are separated in time and place and the educational content is presented in the form of educational management software, modern media resources, the internet, video conference, virtual

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[1] ICT: Information and Communication Technology

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classrooms, etc. Moreover, students communicate with teachers, classmates and other individuals by computerized communication facilities for performing individual and group activities [7]. The principle aim of this university is developing problem solving skills, critical thinking, information management skills and communication and negotiation skills in students.

ICT not only enhance and improve knowledge maintenance methods and learning strategies, but also challenge the restrictions of inflexible organizational structure. In such conditions, the views of policymakers and educational experts have also changed. For instance, the governmental report for higher education in Norway states that ICT-based academic education is a key factor for future higher education policies. The research and industrial development commission of the United Nations also reports that Europe is in need of a vast and flexible structure for ICT-based education. Since ICT-based education is rapidly growing in higher education, the teacher's role needs to be clearly defined. We aimed to define the characteristics of an effective teacher in an ICT-based environment in the virtual university of Shiraz, southern Iran. The following specific aims were assessed in this study:

- Determining the characteristics of an effective teacher in ICT-based higher education.
- Determining the effect of the defined characteristics in evaluating a successful in ICT-based teacher from the students' point of views.
- Prioritization of the determined characteristics from the students' point of view.
- Determining Relationship between students' demographic data's and defining the characteristics of a successful teacher.

MATERIALS AND METHODS

This quantitative descriptive study is non-experimental considering the level of control over variables and applicable with respect to its aim. The study had several stages; each of which had its specific tools and methods. Initially, a library study was done on published and online sources in a descriptive-analytical manner. Then the related theoretical principles were collected and the characteristics and criteria of teachers in ICT-based education were identified accordingly. In the next stage, these features were assessed based on the effect and priority according to the viewpoints of students studying at the virtual university of Shiraz, southern Iran during 2012-2013.

The statistical population of this study consisted of 1270 virtual students who had studied at the university for at least two semesters. The sample size was calculated to be 351 students using the Cochrane formula. After obtaining approval from the Institution's Ethics Committee, the samples were selected using the stratified random sampling method. Participants gave informed consent. Data were collected using a researcher-made questionnaire based on a 5-point Likert scale from 1 (unimportant) to 5 (very important). The validity of the questionnaire was confirmed by related experts after obtaining and incorporating their comments. To assess the reliability of the questionnaire, Cronbach' alpha was used and estimated to be 93% (ranging from 87 to 95% for the different sections).

Since confidence about the normal distribution of data is a prerequisite for using parametric tests, we initially used the Kolmogorov-Smirnov test. Afterwards, for data analyses SPSS software, version *15* was used. Single-variable t independent t, ANOVA and Scheffe tests were used as appropriated.

RESULTS

In this study, 351 students consisting of 211 women and 140 men participated. There were 160 Bachelor and 191 Master's students. In order to determine the characteristics of an effective teacher in an ICT-based educational environment, first the characteristics and capabilities of ICT-based education were assessed through review of literature and then the teacher was evaluated within this environment.

The teacher roles and responsibilities in an ICT-based education: Using the information and communication technology is a symbol of a new period for distance education [8]. The reports of the eighteenth, nineteenth and twentieth Global Commission of International Distance education Society and most of the written articles by the pioneer researchers like Michael Moore, Holmberg, Garrison & Anderson and Peters show that the development and an interest in distance education is increasing. All of these pioneers emphasized that using information and communication technology transforms distance education. Traditionally, distance education was provided for those who were not able to register in normal classes, but through progresses in information and communication technology everyone can be a distance learner. The progressive technology is learning and its facilities should be adapted to the nature of learning in human beings [9-13]. Education which is

based on information and communication technology contains 6 following features: Telepresence, flexibility, communication, active learning, Collaboration and motivation. Thus, using information and communication technology transforms and changes mental models of distance education, enriches the present educational models more than before and makes new models. Consequently, new models with different pedagogies and features are presenting. These models share the features of education that is based on technology and suggest modern educational and learning approaches in which the learner plays an important role and emphasizes on Self-directed learning, independent, flexibility and communication.

About the specified features, one of the matters which have been emphasized very much is the learner base approach. The learner is one part of education process. Most educational plans fail just for the reason that the authors and planners make it according to their personal idea and do not consider the learner. For making a deep and successful learning which is of the priorities of the higher education in present age and also professors and experts should be responsible on the success of each learner. Therefore, the learner based environment should be formed and increase taking the responsibility in the learner toward his learning. In this approach, the learners use education proportionate to the learning approach and their individual needs and situations.

Education should be higher than just to access the data and content. Interaction with others plays an important role in the gradual development of the learner's understanding. Communicating through human being and non human being factors of the environment is one of the inseparable parts of a learning experience with quality. This reveals the importance of forming learning societies and group learning in the world of information technology and it is an approval on selected theoretical basics in distance education environment.

One of the characteristics that great emphasis is put on is the development of a relationship between the student and teacher. In order for learning to be effective a strong relationship between the student and teacher is required. The teacher is also expected to encourage student collaborations. The research shows that the stronger the connection between the learner and teacher the percentage of college drop-outs decreases significantly. Therefore the teacher must have the ability to work with the required technologies. The results of this subject are coordinated with the findings of other present researches on this ground [14-17].

Another feature required in an effective teacher is the ability and willingness to initiate individual and group active learning sessions.ICT - based education paradigm changes learning environment. In this environment, the learner reacts differently rather than in the traditional classes. Regarding effective education features, an environment should be planned in such a way that students take much more responsibility for their learning. If the learner doesn't do something, the learning won't take place. Therefore, with regarding the object of higher education in this decade, it is suggested to use active learning-teaching strategies in the planning of a course. In a successful process, the learners more need to do something rather than to read something. They need to write, discuss, solve the problem and get involved in the high level cognitive activities such as analyzing, combining, early evaluating and on time feedback. Online and offline communication provides feedback chances in which the student reacts with others, professors and experts. Most of the planned researches and models on the ground of distance education also emphasize much on the successful learning procedures [18].

In conclusion, ICT-based education shows the change of educational processes and resources and the development of faculty members; the future educational framework would include even bigger changes one of the presumptions of ICT-based education is designing active programs for learners. Supporting students for active involvement in learning depends on teachers that facilitate learning. Therefore, a teacher must encourage learners to accept and take responsibility for learning and search for required information. Moreover, he/she should plan for and manage the learning community and reduce his/her control over the learning process to empower learners as well as create learning groups. Studies have shown that as the teacher-student interaction increases, academic failure and dropout rates decline. Emotional involvement and interpersonal communication between the teacher and student plays a key role in creating satisfaction of the learning experience which in turn motivates students and facilitates learning. The teacher must have the ability to work with modern technology alongside his/her teacher role. Combining the teaching method with technology can help students reach higher levels of cognition. Therefore, an effective teacher must facilitate learning by benefiting from facilities provided by ICT-based education rather than being a learning instructor. Moreover, an effective teacher must have suitable relationships with students and encourage student-student interactions, facilitate student-content

interaction and time and place flexibility by correct program planning as well as pay attention to individual differences among learners. An effective teacher can encourage active learning among students through individual and group activities that involve higher cognitive levels such as discussion, seminar and project, role playing and exchanging problem solving strategies.

In order to determine the required characteristics for teachers in virtual courses and reduce the number of these characteristics to several key factors, factor analysis was used. Here, the Kaiser-Meyer-Olkin (KMO) measure was 85%, showing the suitability of existing correlations within the data for factor analysis. On the other hand, Bertlett's test statistics was 3072 which was meaningful at the 1% level. Using the factor analysis method, four factors were extracted with specific amounts of higher than one and necessary variables for teachers were categorized in these factors based on their factor loading. After assessing the related variables for each factor and their loading, the factors were named as follows: course management, improving interaction and cooperation, commitment and electronic skills and supporting students. Table 1 show the variables related to each factor along with their loading (Table).

In line with the second aim of the study, Table 2 shows the effect of the mentioned factors in defining a successful ICT- based teacher in Shiraz virtual university. As shown, we found that the amount of t is higher than the critical amount based on an error of 0.05 and is significant (P≤0.05). Therefore, the students at the virtual university of Shiraz believed that the determined factors were effective in defining a successful virtual teacher (Table 2).

The third aim of the study was prioritizing the characteristics of a successful teacher from the students' point of view (Table 3). As shown in Table 3 improving interaction and cooperation had the highest priority and commitment and electronic skills had the lowest priority from the students' point of view. The relationship between sex and academic degree with the research variables was also assessed and the results are shown in (Table 4).

As shown in table 5 variances are not *equal* with respect to improving interaction and cooperation and commitment and electronic skills. Therefore, in testing the equality of means the data of the second line have been written. In the other two fields (course management and supporting the students) the assumption of variance equality is confirmed. Moreover, in the fields of commitment and electronic skills and supporting the students a significant difference was seen between the men and women. The mean scores of the women were high than the men in this regard and the women believed that the items of the two factors defined the characteristics of a successful teacher more than the men. I did not find a significant difference in the other questions (Table 6).

Table 1: Variables Related to each factor along with their loading, obtained from the teacher characteristics matrix in ICT-based education

Factor	Variables	Factor loading
Course management	Time management	0.852
	Having sufficient knowledge in the field	0.876
	Encouraging students to do research	0.684
	Explaining learning objectives and expectations clearly at the beginning of the course,	0.701
	Evaluating the students' educational improvement during and at the end of the course	0.697
	Provide learning activities along with the self-assessment and feedback	0.628
Interaction and cooperation improvement	Communication with students Online and offline	0.765
	write clear and purposeful massages to students 0.749	
	Encouraging students in participation in discussion	0.684
	Use discussion forum and Virtual Classroom as an inseparable part of the Course	0.786
	Provide Opportunities for students to work in groups	0.688
Student support	Refer students to appropriate resources	0.662
	Design individual learning activates 0.753	
	Provision of prompt and appropriate feedback to the student	0.735
Commitment and electronic skill	Responding to emails at the appropriate time	0.697
	Ability to investigate student activities via technology 0.789	
	Ability to work with the required technologies	0.576
	Positive views towards education and learning using technology	0.627

Table 2: the effect of the mentioned fields in defining a successful virtual teacher from the students' point of view (*t* test)

Fields	Mean	Standard deviation	Standard error	T	Sig
Course management	37.4	0.43	0.026	53.443	0.000
Interaction and cooperation improvement	4.46	0.392	0.023	63.328	0.000
Student support	3.94	0.627	0.037	25.658	0.000
Commitment and electronic skill	4.21	0.515	0.030	40.134	0.000

Table 3: Mean scores of the fields related to the characteristics of a successful virtual teacher

	Shiraz virtual university	
Fields	Mean	Standard deviation
Course management	4.37	0.436
Interaction and cooperation improvement	4.46	0.392
Student support	3.94	0.627
Commitment and electronic skill	4.21	0.514

Table 4: Relationship between sex and defining the characteristics of a successful teacher

Fields	Sex	Frequency	Mean	Standard deviation
Course management	male	140	4.36	0.410
	female	211	4.40	0.439
Interaction and cooperation improvement	male	140	4.42	0.420
	female	211	4.47	0.344
Student support	male	140	3.91	0.540
	female	211	4.03	0.634
Commitment and electronic skill	male	140	4.16	0.477
	female	211	4.27	0.509

Table 5: The results of the independent t test for the sex variable

Test	The field	Levin test(equal variance)		t- test(equal means)		
		F	Sig	T	Df	Sig (2-taild)
Course management	Assuming that the variances are equal	.0689	0.407	-0.776	349	0.438
	Assuming that the variances are not equal					
Interaction and cooperation improvement	Assuming that the variances are equal	7.210	0.008	-1.254	258.400	0.211
	Assuming that the variances are not equal					
Commitment and electronic skill	Assuming that the variances are equal	2.294	0.039	-1.979	328.128	0.049
	Assuming that the variances are not equal					
Student support	Assuming that the variances are equal	1.504	0.221	-2.163	0.349	0.031
	Assuming that the variances are not equal					

Table 6: ANOVA results for the academic degree variable

Academic degree

The field		Sum Square	Df	Mean square	F	Sig
Effect of course management in defining a successful teacher	Between group	1.901	2	0.951	5.332	0.005
	intergroup	62.037	348	0.178		
	Total	63.939	350			
Effect of interaction and cooperation improvement in defining a successful teacher	Between group	0.408	2	0.204	1.4444	0.237
	intergroup	49.141	348	0.141		
	Total	49.549	350			
Effect of commitment and electronic skills in defining a successful teacher	Between group	5.0803	2	2.541	7.295	0.001
	intergroup	121.236	348	0.348		
	Total	126.419	350			
Effect of student support in defining a successful teacher	Between group	0.090	2	0.045	0.180	0.836
	intergroup	87.051	348	0.250		
	Total	87.141	350			

Table 7: The coupled comparison of mean differences of scores related to course management and commitment and electronic skills in defining a successful teacher from the students' point of view

Mean differences of scores	Academic degree	Mean difference	Sig
Course management in defining a successful teacher	Master's students Bachelor's students	0.152	0.029
	Master's students Bachelor's students	0.144	0.037
Commitment and electronic skills in defining a successful teacher	Master's students Bachelor's students	0.256	0.006
	Master's students Bachelor's students	0.227	0.015

With respect to academic degree and its relationship with defining the characteristics of a successful teacher, we found a significant difference in the first and third factors (fields). This means that Bachelor and Master's students did not have similar opinions in the items related to the first and third factors. We did not find a significant difference between Bachelor and Master's students in the second and fourth factors. Since the mean differences were significant, we used Sheffe's test for determining the source of difference (Table 7).

According to Table 7 we found a significant difference between the view points of Bachelor and Master's students in the two factors of course management and commitment and electronic skills. In other words Master's students believed that the items of these two factors defined the characteristics of a successful teacher more than Bachelor's students.

DISCUSSION

Information and communication technology transforms and changes mental models of education, enriches the present educational models more than before and makes new models. An educational pedagogy based on ICT is defined as distant presence, interaction, flexibility along with active learning strategies and suitable presentation method and increases motivation and cooperation among learners. The success of such educational courses depends to a great extent on the teacher. One of the most common methods for defining the competency of a good teacher is using student surveys [19]. Previous studies have been done in this regard and the students' viewpoints regarding a good teacher have been assessed. Understanding the students' viewpoints as the main beneficiaries of education helps educational policymakers consider the characteristics on a successful teacher in order to make necessary decisions for evaluating teachers and organizing educational programs.

I found that the students perceived course management, improving interaction and cooperation, supporting students and commitment and electronic skills as effective factors in defining a successful teacher in an ICT-based educational environment. With a suitable pedagogic plan and with suitable ICT-based methods a cooperative, dynamic and interactive learning environment is created which would in turn make interaction and flexibility among the students as well as the students and teachers possible. Garrison [14] planned a concept model entitled "the model of learning society". According to this model, every effective educational experience is the result of distance education and needs the presence of 3 evident factors: social, cognitive and educational presence. Therefore the teacher should make the educational environment in such a way in which the students can easily and in their complete assurance communicate with each other. He must activate in the students the grounds of associating the viewpoints, searching the differences, similarities and a confidence feeling towards the peers and instructor. In addition, the teacher should provide a situation which can develop the main skills of concept and thought in the learner. He can provide the cognitive by presenting content and activities that reinforce the critical thought, problem solution and high level of concept in the students.

Moreover, I found that among the virtual students of Shiraz, improving interaction and cooperation had the highest priority in defining a successful virtual teacher. Interaction is an integral part of ICT-based education and plays a key role in the gradual development of the students' personal understanding. Holmberg's theory of interaction and communication also states that the core of education is interaction between teaching and the teacher and students. In order to teach effectively, the teacher must interact and communicate with the students. Moreover, the students should be encouraged to interact with each other and with the educational content. This relationship creates a feeling of presence among learners and encourages a group spirit in the students. Studies have shown that as the student-teacher interaction increases, dropout rates and academic failure reduce. The teacher's online and offline communication with the students increases their motivation and improves their learning experience. Therefore, the teacher must be capable to communicate using modern technology and have an evident presence in the online environment. This issue is in line with other related studies [20].

The students in my study believed that the course management method was effective in defining a successful teacher. Being able to manage time and benefit from modern knowledge and the capability of analyzing concepts and scientific content, encouraging students to do research, explaining learning objectives and expectations clearly at the beginning of the course and evaluating the students' educational improvement during and at the end of the course are among the criteria for a successful teacher in this field. These findings are consistent with studies done by Roberts and Dyer and inconsistent with Richard ET all's study [21].

During the teaching process the scientific viewpoints and experiences of the teacher are not the only effective factors. The teacher's support in providing learning conditions and transforming students to active learners is also effective. Teachers in ICT-based environments should present sources other than the available resources during the course. Moreover, the teacher should guide and plan group and individual learning activities and consider diverse learning styles. These characteristics in fact correspond with the flexibility feature of ICT-based learning. With the help of offline capabilities of ICT, students would be able to learn at any time and place at their own pace. The learner could follow his/her studies regardless of geographic distance, disabilities, or work and family preoccupations and would have enough time to read, understand and respond. These flexibilities would further motivate and encourage the students. This would reduce the central role of the teacher and provide students with independent resources. Here, the teacher's role is very important because he/she should design active learning activities and make it possible for students to communicate with each other and with himself/herself offline. The teacher should support the students and respond to the discussions and questions raised in chat rooms at suitable time intervals.

As shown, female students thought that commitment and electronic skills and supporting students were better indices for defining a successful teacher; while Master's students thought course management and commitment and electronic skills were better indicators. Gillian has stated three main problems with online learning environments: increased data load, learner diversity and the web as a media for educational presentation. To overcome these problems, Gillian suggested a personalized educational program based on the students' needs. Therefore, he considered elements such as the students' social characteristics, method of communication, personality, cognitive ability and their academic background and presented the social inquiry teaching model. His online learning environment was based on Vygotsky's cognitive theory, was student centered and based on the individual needs of students [22]. Since the students put special emphasis on commitment and electronic skills in defining a successful teacher, it is necessary for teachers to know how to use educational technology and present educational content, assess the students' educational activities and solve their problems with such technology.

CONCLUSION

In conclusion, I suggest the following points for having a better teaching experience in ICT-based education:

- ICT-based education needs certain skills, abilities and training. The most effective method for being sure about success in such an education system is to plan on enabling teachers before and during the teaching process.
- Teachers who are willing to teach in such environments should be evaluated for factors such as tendency to learn, ability to create support systems, patience, use of modern technology, etc.
- Teachers should be aware of educational methods that increase student involvement. Class management, methods of interaction with students and course planning all need preparation.
- Teachers should use a wide array of educational strategies for meeting the learning needs of different students and help them evolve into independent learners. A suitable teacher is one who is flexible, encouraging and up-to-date.
- Teachers must receive sufficient support during their course and have enough time to interact with students. This amount of spent time should be included in their teaching schedule.

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