APPLICATION OF ICTS IN TEACHING AND LEARNING AT UNIVERSITY LEVEL: THE CASE OF SHAHID BEHESHTI UNIVERSITY

Kourosh Fathi VAJARGAH
Associate Professor f Curriculum Studies. Shahid Beheshti University. Tehran. Iran
Sheida JAHANI
PhD Student of Educational Technologies. Universiti Sains Malaysia. Penang. Malaysia
Nahid AZADMANESH
ICT Specialist in Education. Shahid Beheshti University. Tehran. Iran

ABSTRACT
Information and communication technologies (ICTs) are a diverse set of technological tools and resources used for creating, storing, managing and communicating information. For educational purposes, ICTs can be used to support teaching and learning as well as research activities including collaborative learning and inquiring. One of the main applications of the ICTs in higher education is teaching and learning based on these new technologies. This research is concentrated on the obstacles, facilitators, and the risks of using these technologies in teaching and learning in higher education. The main purpose of this research is to answer the question: in which fields and to what extent there are obstacles, facilitators and the risks in using ICT in teaching and learning at university level? This research was conducted at the National University of Iran, the second largest university in the country. The research population consists of the university academics and students. A questionnaire has been administrated for collecting the data. The main results are reported based on the following:

1. The possible domains of using ICT in curriculum decision-making in higher education
2. Obstacles of using ICT in curriculum development at university level
3. Facilitating factors and essential supports needed for application of ICT in curriculum development of higher education
4. Advantages and disadvantages of using ICT for curricular activities at university level.

Key words: ICT, Curriculum, Teaching and Learning, Higher Education

INTROUDUCTION

ICT originally is applied to serve as a means of improving efficiency in the educational process (Jones and Knezek, 1993). Furthermore, it has been shown that the use of ICT in education can help improve memory retention, increase motivation and generally deepens understanding (Dede, 1998). ICT can also be used to promote collaborative learning, including role playing, group problem solving activities and articulated projects (Forcheri and Molfino, 2000). Generally, ICT is promoting new approaches to working and learning, and new ways of interacting (Balacheff, 1993). Majority of faculty members are major catalyst to promote the necessary changes (Whetston, 2001) and to equip students with the skills they are expected to have upon graduation (Brandi, Gunter, 2004).

In higher education systems, there has been a significant shift in enterprise training policy in recent years (Bruce, 1995, 2002; Edward, 2004, 2007; Kemp, 1999; Martin and Rader, 2002). In the other words, ICT learning and utilization is one of the most concerns of educational issues around the world and for a number of years there has been evidence in the training and development area (Edwards, et al, 2006). It is essential that the pedagogy of ICT becomes the main focus of staff development and this will have to build upon in a constructive manner in order to allow instructors to achieve the full benefits of using ICT in their daily tasks (McCarney, 2004).

It is generally understood that university teaching and learning refers to both the contents (skills, understandings and values) and the processes of teaching in higher education. In the case of an institution's internationalization efforts, this may apply to both the 'what' and the 'how' of teaching and learning, usually with reference to educational borrowing or lending from international sources. Iranian universities like other higher education institutes in the region are in the process of internationalizing their respective curricula.

STATEMENT OF THE PROBLEM

Decision on teaching and learning activities in higher education can be done in various levels, including academic members, departments, and faculties as well as university levels (Stark & Lattuca 1997, Barnnet & Coate, 2005). The main problem of this research is exploring different aspects and scopes of the using ICT in university teaching and learning at academics and departmental level. There are important matters in relation with this subject, which we are going to clear them. To find out solutions for an effective application of ICT, we should answer some critical questions related to use of ICT in teaching and learning in higher education settings.

The results of a number of empirical studies on achievements related to the use of ICT in education are well highlighted in the related literatures (Kousha& Abdoli, 2007, Fathivajargah & Azadmanesh 2007, Montazer 2004). Thus, it is timely that the Iran's National ICT Plans has been developed to support and enhance the educational processes in schools, universities and governmental organizations, known as Development of Human Resources and Education Program. The National ICT Agency (NICTA) called "TAKFA" (Persian name) was established and responsible for supervising and managing ICT. One of the priority missions of the NICTA in 2002-2003 was the Plan for promotion of ICT application in education – including schools and universities – and expansion of digital skills of Iran's manpower – including state organizations – and plan for expansion of ICT application in higher education, health, treatment and medical education (Kousha & Abdoli, 2004). Building up the necessary infrastructures for scientific centers and applying ICT towards expanding the academic and research activities in universities are top priorities for the Ministry of Science, Research and Technology (MSRT) in Iran.

The Iranian Management and Planning Organization launch the ICT application development plan (TAKFA), to support the objectives (Karimian & Hosseini, 2004). According to the Future Outlook of the Islamic Republic of Iran for the next two decades, Iran has planned to be knowledge-based society, and ICT literacy will be enhanced. These trends and developments as well as new responsibilities of higher education in Iran for internationalizing the campuses and disciplines by using ICT features in universities require to encourage higher education intuitions encourage integrating ICT in teaching and learning activities .

LITERATURE RIEVIW
The recent century has been characterized with some new and outstanding technologies impacting human life, the most important of them is Information Technology. Researches conducted in both developed and developing countries prove that the educational authorities in these countries among their other activities have given the priority of "ICT Literacy" through developing various educational programs (Tapscott, 1998; Currier, 2001). In the other words, ICT learning and utilization is one of the most concerns of educational authorities around the world and for a number of years there has been evidence that a training and development area, which may be labeled information literacy is being formed (Edwards, et al., 2006). A variety of authors have surveyed the literature of educational technology in information skills teaching (e.g. Cox, 1997; Rader, 2000; Contain and Kaplowitz, 2000; Joint et al., 2001). Broadly speaking, the literature reveals the importance of using ICT in teaching and learning purposes (Ayers, et al., 2002).

There are reasons, today, necessitated the Iranian university professors to be equipped with new technologies, especially ICT applications in higher education (Villanueva, 1999; Meerts, 2003). Increased number of students in Iranian universities, greater demand for the use of the virtual materials within and outside of the university, an increase in the amount of educational activities being done by information and communication technology, changes in the nature of teaching and learning and becoming more and more web based (i.e. more use of CD-ROMs, electronic journals, on-line sources of materials, etc.), and the development of new and cheaper computers, are among the main reasons more attention is paid to ICT literacy of academics by Iranian authorities.

The roles and responsibilities of college and university faculty members are closely tied to the central functions of higher education. Broadly defined, faculty fulfills three primary functions at University: teaching, research, and service (Fairweather, 1996). The teaching role of faculty members reflects their centrality in addressing the primary educational mission among colleges and universities. Faculty members are expected to provide instruction and student advising as assigned by the departmental chairman. In brief the main aspects of teaching responsibilities of faculty members are classroom teaching, academic advisement, course development, academic program review and course duplication review, all of them can be categorized as curriculum development process. If ICT tools are to improve institutional effectiveness and efficiency, it is obvious that their application in support of teaching and learning should be seriously considered. However, investments in this area should always be carefully balanced against other ways in which teaching and learning may be improved and strengthened

Based on the research problem, the following research questions summarized:
1. What are possible domains of using ICT in curriculum decision-making in higher education?
 2. What are the main barriers of ICT application in curriculum development of higher education?
3. Which kinds of essential supports are needed for application of ICT in curriculum development of higher education?
 4. What are advantages and disadvantages of using ICT for curricular activities in higher education?

METHODOLOGY

The research has been conducted at the Shahid Beheshti University (SBU) (The National University of Iran), during the 2006-7 academic years. The SBU was established in 1959, started its academic life in 1960. It is located in Tehran, the capital city of Iran and also is one of the two best and largest universities of the country. As of 2008, the university offers 70 Masters and 30 PhD degrees. Since 1990, the university has placed more emphasis on postgraduate, in particular Ph.D., and research programs, while still aiming to enhance the quality of its well-established undergraduate courses. Students at the university are inspired by an outstanding and rewarding academic environment not only in Iran but also in the region.

The Research population consisted of the three major groups:University academics, curriculum planners and ICT`s professionals. The population of university professors was 578 working at the 16 faculties and research centers. Because of large size of population as well as impossibility of conducting the survey with participation of all academic members of the university and also shortage of resources and time for the investigators, a sample selected using stratified sampling technique n=231. Because of small size of other sections of population (23 for curriculum planners and 18 for ICT`s professionals) all of them have been requested to participate in the study.

The research employed a survey research method using a questionnaire designed through a documentary study on literature of ICT application in higher education. The first draft of a researcher-made questionnaire has been developed based on some outstanding works in literature (Villanueva, 1999; Mcknight, 1995; McNergney, 2000; Ayers et al., 2002; Baloh, 2003; Edwards et al., 2006; Trkman & Steinert et al., 2006; Fathi Vajargah and Azadmanesh, 2007; Ezziane, 2007; Fathi Vajargah, 2008) and designed in 4 sections with 40 items in Likert scale system. The first section with just one open ended question was about the possible applications of ICT in teaching and learning in higher education, second section with 15 items was about the barriers of ICT application in teaching and learning. In the third section 14 supporting factors were included 14 items in the instrument and finally in the last section, advantages and disadvantages of ICT application with 10 items were considered. Validity of the instrument reviewed by employing a specialist dominated focus group with participation of 10 experts and the questionnaire has been revised based on the session results. The questionnaire's reliability has been calculated through two methods: Alpha coefficient (0.90) and Split-half (0.91) and the results confirm the instrument reliability.

FINDINGS

For the first question on possible domains of using ICT in curriculum decision-making in higher education, the analysis of the answer to open ended question showed the following applications of ICT in Curriculum activities:

1. Using digital libraries and internet-based information for enrichment of curriculum content and process,
2. Sharing and exchanging leanings and experiences among university professors working inside and outside of the university,
3. Including students' interests and needs in curriculum decision-making through web based needs assessment,
4. Providing web-based presentation of curriculum before and during the semester,
5. Using email in teaching and learning activities,
6. Web-based diagnostic, formative and summative assessments,
7. Using supplementary soft wares for effective teaching and learning,
8. Designing a dynamic feedback system,
9. Producing digital unlimited leaning materials (e-books, handouts …)

Concerning other three questions have been posed in the research, here are three tables, which are showing the means of each item for three mentioned groups (Tables 1, 2, and 3).

Table 1: The barriers of ICT Application in Teaching and Learning in Higher Education from the three mentioned groups' point of view

Barriers of ICT Application	Academics				Curriculum planners				ICT professionals			
	Mean	T Value	LS	Final Result	Mean	T value	LS	Final Result	Mean	T Val ue	LS	Final Result
1)Inadequate familiarity of professors with computers hardware and the supplementary equipments	2,56	12.632	0.00	+	2,74	6.554	0.00	+	2,22	1.07	0.297	_
2) The lack of orientation /training program on computer literacy or low rate of academic participation	2,59	13.433	0.00	+	2,64	4.437	0.00	+	2,33	1.844	0.083	_
3) The faculty members` increasing average of age and their reluctance to use computers in education	2,31	6.053	0.00	+	2,57	3.873	0.00	+	2,17	0.900	0381	_
4) unfamiliarity of academics with	2,55	12.611	0.00	+	2,74	6.554	0.00	+	2,44	2.67	0.016	+

software which can be sued in their teaching											5	
5) unfamiliarity of academics with world wide web environment and the way of using it	2,54	11.894	0.00	+	2,52	3.761	0.00	+	2,28	1.317	0.205	–
6) inadequate access of faculty members to personal computers (pc) in their homes or offices	2,52	11.132	0.00	+	2,52	4.219	0.00	+	2,50	3.431	0.003	+
7) inadequate access of academics to enough budget	2,59	12.874	0.00		2,50	3.249	0.00	+	2,39	2.715	0.015	+
8)This common ` beliefs of academic that new ICT`s possibilities have no effect on improving of quality 0f higher education	2,31	6.008	0.00	+	2,58	4.158	0.00	+	2,50	4.123	0.001	+
9) Missing of a proper working place and labs or equipped classes with PC`s, video projectors and other equipments	2,56	11.683	0.00	+	2,77	8.450	0.00	+	2,67	5.831	0.000	+
10) The lack of budget in faculties to equip the classes and preparing equipments of hardware	2,77	21.116	0.00	+	2,77	8.450	0.00	+	2,78	6.018	0.000	+
11) The absence of moods, cooperative motivations and enough coordination in faculties staff for entering to new atmosphere	2,56	12.452	0.00	+	2,55	4.076	0.00	+	2,44	6.675	0.016	+
12) The absence of digitalized copy equipments like CD copiers in faculties	2,57	12.065	0.00	+	2,57	4.596	0.00	+	2,44	2.675	0.016	+
13) The budget weakness and the lack of financial possibility for students	2,61	13.483	0.00	+	2,59	4.695	0.00	+	2,44	2.675	0.016	+
14) The absence of students' access to personal computers (PC)	2,69	18.501	0.00	+	2,78	7.240	0.00	+	2,56	5.344	0.004	+
15) The students' illiteracy in computer knowledge	2,59	14.247	0.00	+	2,74	6.554	0.00	+	2,33	1.844	0.083	–

Table 2:The Supporting Factors in ICT Application in Teaching and Learning in Higher Education from the three mentioned groups' point of view

Supporting factors	Academics				Curriculum planners				ICT professionals			
	Mean	T value	LS	Result	Mean	T value	LS	Result	Mean	T value	LS	+
1)providing computer literacy training for university academics	2,71	17.90	0.00	+	2,76	6.478	0.00	+	2,47	2.704	0.016	+
2)The academics' familiarity with computer software that can help them in teaching and learning activities	2,74	20.146	0.00	+	2,81	7.249	0.00	+	2,56	3.576	0.003	+
3) The academic` familiarity with internet and the way of using it	2,74	19.683	0.00	+	2,89	12.369	0.00	+	2,38	2.423	0.029	+
4)The academics` access to personal computers in their homes or offices	2,76	21.792	0.00	+	2,62	4.240	0.00	+	2,65	3.801	0.002	+
5) Keeping academics informed on new and effective ICT`s instruments and equipments	2,63	15.870	0.00	+	2,70	5.480	0.00	+	2,44	2.406	0.029	+
6) Improving academics beliefs and views on the potential positive impacts of ICT`s feautures on improving the higher education	2,72	19.826	0.00	+	2,86	10.954	0.00	+	2,59	3.922	0.001	+
7)Availability of a well designed website or even an equipped class with PC`s, video projectors and the other necessary equipments	2,71	19.337	0.00	+	2,60	5.339	0.00	+	2,65	5.416	0.000	+
8)The possibility of having enough budget in faculty to equip the classes and prepare necessary equipments	2,77	22.292	0.00	+	2,65	5.940	0.00	+	2,88	10.247	0.000	+
9)The presence of moods, cooperative motivations and enough coordination in faculties staff for entering to new atmosphere	2,72	19.273	0.00	+	2,89	12.369	0.00	+	2,50	3.162	0.006	+
10)supporting students on financial resources	2,66	16.353	0.00	+	2,81	7.249	0.00	+	2,50	2.739	0.015	+
11) Encouraging Students to attend and	2,63	16.322			2,71	5.839			2,50	2.739	0.015	

	Mean	T value	LS	Result	Mean	T value	LS	Result	Mean	T value	LS	Result
participate in workplaces and labs to use ICT features			0.00	+			0.00	+	+			+
12)Students' access to personal computers in their homes or dormitories	2,69	18.340	0.00	+	2,67	5.292	0.00	+	2,63	3.478	0.003	+
13. Improving students' abilities on computer literacy	2,71	18.901	0.00	+	2,86	8.216	0.00	+	2,56	3.093	0.007	+
14) Increasing students' interest in digital features like eBooks, Slides and electronic pamphlets	2,65	15.801	0.00	+	2,76	6.487	0.00	+	2,59	3.922	0.001	+

Table 3:The advantages/disadvantages of ICT`s application in Teaching and Learning in Higher Education

Advantages/ Disadvantages	Academics				Curriculum planners				ICT professionals			
	Mean	T value	LS	Result	Mean	T value	LS	Result	Mean	T value	LS	Result
1)Viruses attacks to data and academic records	2,41	8.819	0.000	+	2,59	4.695	0.000	+	2,33	2.062	0.045	+
2)Sabotages, intended manipulations and information stealing	2,28	5.086	0.000	+	2,25	2.o32	0.000	+	2,39	2.364	0.030	+
3)Computers` frauds in doing the examinations and exercises	2,42	8.406	0.000	+	2,48	3.627	0.000	+	2,44	2.688	0.002	+
4)The destructive effects of missing the culture of using ICT in education	2,43	9.507	0.000	+	2,45	4.183	0.000	+	2,06	0.293	0.773	_
5)The missing of technical substructures which are necessary for the education and evaluation based on ICT	2,64	16.699	0.000	+	2,75	7.550	0.000	+	2,76	7.211	0.000	+
6)The interruption of electricity and computers network in time of teaching, examinations or transmission of educational matters	2,36	7.350	0.000	+	2,55	4.819	0.000	+	2,22	1.458	0.163	_
7)Disappearing the all information of faculty, professors and the educational course at once	2,37	7.227	0.000	+	2,57	4.382	0.000	+	2,33	1.844	0.083	_
8)The missing of enough security in computer systems and weakness to control them	2,49	10.155	0.000	+	2,86	10.954	0.000	+	2,50	3.431	0.003	+
9)The absence of transmitting positive values and also teacher – student interaction	2,44	9.736	0.000	+	2,65	4.951	0.000	+	2,24	1.167	0.260	_
10)More attention to quantity and more speed in education instead of quality and training	2,34	6.533	0.000	+	2,67	4.641	0.000	+	2,31	1.775	0.096	_

The F ratio test was used for each of 39 items and therefore the consequences were: there were no significant differences between the views of three mentioned groups. Between 15 items of the first section (research question) of the research, just one item indicates the disagreement between three groups. Between 14 items in the second section, again just one item indicates the disagreement between three groups. And finally for the last section between 10 items of the risks of using ICT there was just one item that indicates the disagreement. Ranking Items for each section (The Priorities) Ranking and priority for the main subjects in questions can help university and the decision-makers to allocate sources on the basis of priorities to improve using ICT in curriculum development in H.E. The ranks of various items from the viewpoint of the three groups have both similarities and differences with each other. Since in this research we don't aim to prefer any view points for preventing any bias, so the investigators had to use Fridman test to specify the priorities of these groups. The most important and the least important priority for the first section/question (obstacles of using ICT), depends on the total viewpoints of three groups are as below: The most important item is:

"The lack of budget in faculties to equip the classes and the necessary possibilities of hardware".
And the least important one is:
"The professors' increasing average of age and their reluctance to use computers in education".

The first important priority for the second section/question (facilitators for using ICT) is:
"The possibility of having enough budget to equip the classes and the necessary possibilities of hardware".
And the less important one is:

"Professor's notice and follow of the new and effective ICT`s instruments and equipments".

The most important item for the third section/question (the risks of using ICT) is:
> "The missing of the technical substructures, which are necessary for the education and evaluation based on ICT".

And the least important one is:
> "The destructive effects of missing the culture of using ICT in educational environments".

DISCUSSION

As it has been seen in research findings, it can be noted that there are several challenges pertaining to ICT application in Iran such as lack of National Policy for using ICT in Higher Education, lack of adequate investments, cultural obstacles, financial challenges, lack of continuity in ICT use, and lack of systematic training and development programs.

Regarding this challenges, it should be considered that the higher education system of Iran is centralized and, all general decisions are making at central level. Among different programs assigned to universities, ICT application is an important one. However, the scope and the rate of using ICT in higher education institutions are determinate by different bodies, which play major roles in this regard. There are many governmental entities, which are responsible for developing policies and strategies in ICT application. After Iran Revolution, High Council of Informatics established to systemize information technologies (IT) and ICT activities. Its primary role is to assess and to classify IT enterprises and supervise software development activities. Another entity is the National ICT Agency (NICTA), which is responsible for designing and managing the Application Plan of Information and Communication Technology (TAKFA), which is included ICT development plan for Iran (Sadeghnezhad, 2003). This situation reflects the limited authority of universities and MSRT in providing the financial and physical supports for ICT application.

However, findings related to unfamiliarity of academics with software, which can be used in their teaching, lack of culture of working in web environment, and faculty and student disability in using ICT in teaching and leaning refer to an important concept of "ICT competency" of faculty members in Iran. In the same way some important facilitating factors such as providing training programs, keeping academics informed on new developments in ICT, improving faculty members' belief on effectiveness of ICT and other factors imply on "ICT literacy" of academics in Iranian higher education community as a real and urgent need.

Regardless of the low rate of participation of faculty members in ICT workshops and training and development events, consequently most important prerequisites of ICT application in Iranian public universities are providing a basic set of ICT competencies that allow development of meaningful faculty members' development programs in order to integrate ICT into academics' teaching and learning to advance student learning and to improve other professional duties. As the data of the present research shows computer illiteracy of academics, especially experienced faculty members is one of the most important barriers and therefore, assessing ICT literacy of Iranian academics and planning the professional development for them will improve their performances on teaching and learning activities. In current situation, there is a training program called ICDL (International Computer Driving License) that is common for all university academics and non-faculty members. Regardless of their backgrounds on IT and assigned tasks in different universities, all staff is required to pass this common training program. Furthermore, according to MSRT, the total number of faculty members who participated in ICT workshops, which was conducted by MSRT from 2003 to 2007 was only 5399 (approximately 10% of the total of 43,134 faculty members working at the Iranian universities) (MSRHE, 2008). It seems there is a big discrepancy between current situations as official report says and ideal situation in which all academics equipped with required ICT competencies.

According to the new act of higher education about assigning curriculum development and change to major public university (2000), recently the universities have been given more authority on curriculum and training decision-making. Under such circumstances, with respect to importance of IT Literacy training in promoting internationalization of campus and doing different duties of university faculty members, assessing ICT literacy of academics and designing an specific program based on this assessment will be a real need for higher education community in Iran.

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