

Analysis of ICT usage for the Teaching and Learning Process by the Academics

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Abstract—Higher Education Institutions (HEIs) are very much concerned with enhancing the quality of education and managing the teaching and learning process effectively with ever increasing student population. Sri Lankan higher education system also faces many challenges in maintaining the quality of education with very large student intakes. Several researchers have investigated the importance of Information and Communication Technologies (ICT) in education and how they help to mitigate the problems in education systems. Therefore it's worthwhile to examine whether the HEI's effectively utilize such technologies. The purpose of this study examines the usage of ICT resources by the lecturers in the Sri Lankan University System. For the study, the Faculty of Management Studies and Commerce (FMSC), University of Sri Jayewardenepura was selected as a case study. Sample of 130 permanent lecturers in different seniority levels were randomly selected and data gathered from them using self-administered questionnaires. Analysis of the study reveals that the lecturers rely only on fewer amounts of ICT resources, even though numerous new technologies are emerging day by day that useful for educational purposes.

Keywords - Information and Communication Technology, Higher Education, Quality of Education, Teaching and Learning

I. INTRODUCTION

With the identification of the value, the demand for higher education is rapidly increasing. World Bank expects the number of students who seek higher education will be more than double from 70 million to 160 million by 2025 [1]. Therefore HEIs have to equip themselves to meet the requirements of these prospective students. Specially they should consider how they can effectively manage a large student population with existing resources and what are the other possible ways or methods that will be useful to cater for the upcoming requirements.

Rapid growth in Information and Communication Technologies (ICT) has created different opportunities to enhance the education systems. ICT includes different technological tools such as computers, the Internet, broadcasting technologies that used to communicate, disseminate, store, and manage information. Information acquisition, processing and analysis, dissemination are essential attributes of the effective teaching and learning

process [2]. Therefore the integration of ICT with teaching and learning process helps to achieve the expected effectiveness of an education system. Usage of ICT is now becoming a critical success factor for the effective teaching and learning process in the University education. ICT can leverage and extend the traditional teaching and learning activities to match with the changing requirements of the world.

As a country that is having a higher rate of development, Sri Lanka should focus on the quality of its education system in order to speed up the development process more with highly professional citizens. In this situation, it is vital to consider how Sri Lankan universities get the support of ICT to achieve the expected high quality educational standard. Before making any policy decision on implementing ICT and improving ICT usage in the Sri Lankan university system, it is essential to identify the current status of ICT usage in teaching and learning process.

With that aim, the researcher has studied the usage of ICT for the teaching and learning process by the university lecturers in the Management Education. To study how and to what extent the University lecturers who work in management field use ICT, the Faculty of Management Studies and Commerce (FMSC), University of Sri Jayewardenepura was selected as a case study. The population of the study was 150, which consists of permanent lecturers of the faculty whereas only 130 selected as the sample. Data gathered through questionnaires were analysed using descriptive statistic techniques. As per the analysis, lecturers of FMSC use only few of the technological tools and resources in the teaching and learning process. The use of new ICT resources is comparatively low. Furthermore, the results of the study revealed that the variations in ICT resource usage in different teaching and learning activities.

II. LITERATURE REVIEW

ICT industry is a rapidly changing industry that introduces different innovations to the society day by day. Researchers carry on studies to investigate the applicability of such innovations for the sake of education.

A. Importance of Using ICT on Education

Organizations and individuals highly gain through the implementing ICT for their activities. Shaikh [1] has stated that ICT aid in developing knowledge based societies while improving the quality of learning and educational outcomes. Large number of digital materials that were previously available in different institutions as physical objects in limited numbers are now made available over the Internet. Therefore, students can easily access to this knowledge sources at any time and from any place that they want [2]. ICT based teaching and learning process enhances the delivery of contents, improves the skills of learners, and prepares them for the global economy and information society. In addition, it promotes development of students' decision making and problem solving skills, data processing skills, and communication capabilities [3]. Another advantage of utilizing ICT for educational process is that it enables to work beyond traditional class time specially with the use of web based technologies such as chat, email, blogs etc. Therefore education becomes more flexible and students can engage with teaching and learning process at any time from any location. This condition successfully helps to provide lifelong learning capabilities to students. In addition, flexibility created through ICT allows the improvements in virtual education [4]. It provides ICT enable collaboration and this can be between students, between lecturers and students, between lecturers and lecturers so on. Students can share experiences with peer students in other institutions. Student and lecturer collaboration is important for knowledge sharing. In addition, lecturers can collaborate with university professors, or other lecturers from different institutions in different locations to share their experiences and expertise[2].

B. ICT resources for Education

According to [2] some of the technologies that aid education are desktop, notebook, and handheld computers; digital cameras; local area networking; the Internet and the World Wide Web; CD-ROMs and DVDs; and applications such as word processors, spread-sheets, tutorials, simulations, electronic mail (email), digital libraries, computer-mediated conferencing, videoconferencing, and virtual reality. According to [5], LMS is another good ICT based solution when there is a large student group which helps teachers to easily deliver learning content and to improve the teaching and learning process. E-mail is a good tool that supports different needs of individuals. Among all, the use of e-mail for education specially for communication purposes is becoming common. [6] has stated that, e-mails help to share knowledge asynchronously among different individuals. Apart from that, it allows communication among group of people with the use of features available in e-mails such as distribution lists.

Furthermore web 2.0 applications such as blogs, wikis, social networking, media sharing etc. provide opportunities to share content and resources, self-directed learning, collaborative learning, ubiquitous and lifelong learning. [7]. Apart from that [8] have also discussed the applicability of some more web 2.0 tools such as e-books, instant messaging, photo sharing, podcast, twitter, youtube etc. for education.

According to [9], interaction between students and teachers is important specially to online courses to maintain the quality of education. Social network sites help to provide such social interaction and they can become contributors for successful learning. Educational blogs are now popular among higher educational institutes as a mean for providing active learning environment for students [7].

C. ICT usage in Education

A study that have carried out by [10] with 834 faculty members working in 22 universities in Turkey and presented different purposes of using ICT by faculty members for education. The findings have revealed that, faculty members use ICT mostly for communication purposes (97.5%) followed by searching information about the course (96.5%) and preparing their lecture notes (91.6%). Their ICT usage is low for publishing their lecture notes and the announcements concerning the course on WWW (54.4%).

The study conducted by [11] to find out the usage of ICT in educational activities in the Faculties of Humanities and Social Sciences in Sri Lankan universities revealed that 57% of lecturers did not have skills other than in office applications, internet browsing and e-mailing. Similarly [12] has conducted a research with 125 medical academics in five universities of Sri Lanka to find out the utilization of ICT for scholarly communication process. This study have revealed that, almost all the medical academics use World Wide Web for searching information for their teaching, learning and research activities. In addition, all of them have used word processing packages in all scholarly activities including preparation of lecture notes, hand-outs, articles, abstracts etc. Presentation packages are used by them to prepare and deliver lectures and more than half of the respondents use them daily. Other than presentation packages, they have not used any other ICT tool to deliver lectures. Apart from that, most of the young academics have frequently used spread sheet program for data analysis purposes. Use of statistical packages, page-making software packages and graphic design packages have considerably low.

III. METHODOLOGY

The main objective of the research is to study the usage of ICT for the teaching and learning process by the university lecturers in the Faculty of Management Studies and Commerce (FMSC), University of Sri Jayewardenepura. It analyses the level of ICT resources usage and the differences in ICT usage in terms of different demographic factors.

A. Research Design

For this study, case study method was utilized and therefore selected FMSC, which is the largest management faculty in Sri Lanka. This research is a descriptive research, which systematically describes the state of using ICT by the University lecturers in FMSC. This study was used mainly the deductive approach where it evaluate the ICT usage of the lecturers in the FMSC, based on the theories developed through literature.

B. Sampling

The population under consideration for the research area is consisted with the permanent lecturers in FMSC amount to 150. A sample of 130 was selected from the target population instead of covering the whole population. Due to the heterogeneity of the population, stratified random sampling technique was used to represent all the categories of lecturers that based on their seniority level (Table 1).

TABLE 1 PROPORTION OF SAMPLE

Category	Population	Sample
Professors	14	12
Senior Lecturers	92	79
Lecturers	44	39
Total	150	130

C. Data Collection and Analysis

The data was collected through questionnaires, which distributed and collected manually. Level of ICT resource usage in different teaching and learning activities measured using 5 point Likert scale where 1 representing Never use and 5 representing Very Frequent use. The quantitative analysis was conducted with the use of computer based data analysis tool SPSS (Statistical Package for Social Science) Version 17.

IV. ANALYSIS

Out of the sample of 130 lecturers, 116 (89%) lecturers were responded to the questionnaires that includes 37 lecturers, 70 senior lecturers and 9 professors. Respondents provided details on their usage of different ICT resources for teaching and learning activities. The descriptive statistics were used to analyze the data.

A. Level of ICT resource usage in teaching and learning activities

The mode values obtained for level of usage are presented sequentially, within each category of teaching and learning activities in Table 2. The results reveal that, majority of the respondents very frequently use MS office package, World Wide Web, Virtual libraries to support course material preparation (mode 5). Majority of the respondents presented a very frequent use of LMS to provide course materials and send messages to students (mode 5). Furthermore, Ms PowerPoint and World Wide Web are the two main resources that the majority of the respondents very frequently use to prepare for lectures / to conduct lectures. When considering the overall resource usage, most popular ICT resource among the respondents is MS office package (82.8%) as mentioned in Table 2.

TABLE 2 ICT RESOURCES USAGE IN TEACHING AND LEARNING ACTIVITIES

Teaching and Learning Activity	ICT Resource	Frequency %					Mode
		Never (1)	Rarely (2)	Occasionally (3)	Frequently (4)	Very Frequently (5)	
Prepare course materials using	Ms Office	-	-	9	16.4	82.8	5
	World Wide Web	5.2	3.4	7.8	27.6	56	5
	Virtual libraries	5.2	5.2	23.3	31.9	34.5	5
Provide course materials through	LMS	10.3	4.3	9.5	30.2	45.7	5
	email	12.9	12.1	21.6	30.2	23.3	4
	Google/yahoo groups	47.4	15.5	21.6	15.5	-	1
	Drop box / Google drive	69	17.2	11.2	2.6	-	1
	Slideshare	78.4	14.7	4.3	2.6	-	1
	Blogs	75.9	17.2	5.2	1.7	-	1
Send messages to students using	LMS	19	5.2	12.9	25	37.9	5
	email	10.3	7.8	21.6	26.7	32.8	5
	Google/yahoo groups	51.7	12.1	17.2	9.5	7.8	1
	Facebook/ Twitter	58.3	13	11.3	10.4	7	1
Prepare for lectures / Conduct lectures using	Ms Power point	0.9	-	3.4	17.2	78.4	5
	World Wide Web	16.4	11.2	14.7	27.6	30.2	5
	Virtual libraries	18.3	7.8	16.5	36.5	20.9	4
	Youtube / Flickr	44	19.8	16.4	13	6.1	1
	Audio/ video conferencing	68.1	10.3	16.4	5.2	-	1
Conduct Mid Semester Exams / Continuous Assessments	LMS	31.9	11.2	16.4	16.4	24.1	1
	Email	60.3	14.7	10.3	11.2	3.4	1

However, the use of Google/yahoo groups, Drop box / Google drive, Blogs, slideshare (to provide course materials), Google/yahoo groups, Facebook/ Twitter (to send messages to students), Youtube / Flickr, Audio/ video conferencing (to prepare for lectures / conduct lectures), LMS, email use (conduct Mid Semester Exams / Continuous Assessments) are comparatively low (Mode 1). Furthermore 78.4% of the respondents never use Slideshare and 75.9% respondents never use Blog to support the teaching and learning activities (Table 2).

B. Activities most often Supported by or Used in Conjunction with ICT

The lecturers in the Faculty use ICT resources and tools for different teaching and learning activities. Figure 1 depicts the average use of ICT resources by the respondents to support the selected teaching and learning activities. There is a considerable variation in the level of ICT usage among the five activities. The respondents of the study have frequently used ICT resources to prepare course materials (4.31). However, the ICT usage is rare in two teaching activities; provide course materials to students and conduct mid semester examinations/ continuous assessments.

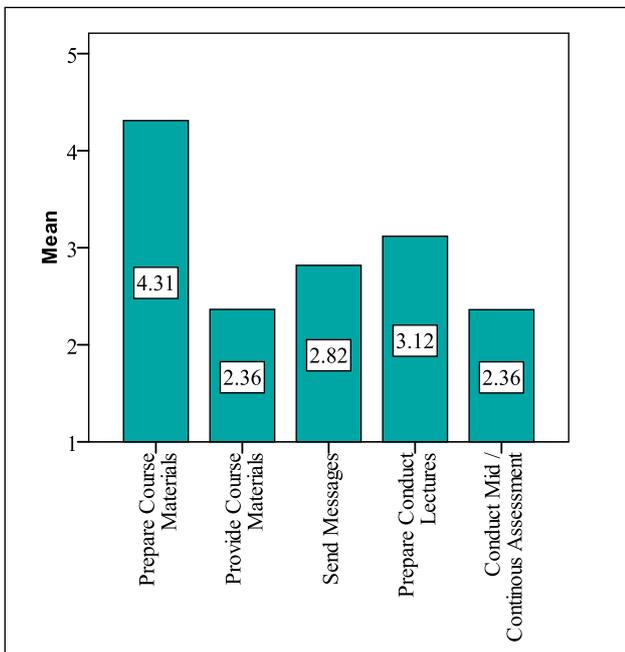


Figure 1 Usage of ICT for Teaching and Learning Activities

C. Analysis of Differences in ICT Usage in Teaching and Learning Process

The characteristics of the selected sample were not homogenous in terms of their demographical characteristics such as gender, age, employment category, teaching experience. Therefore analysis was carried out to identify

whether the ICT usage of the respondents differ with these demographical characteristics.

1) ICT usage based on gender

According to the literature some studies have found that female teachers’ ICT usage is lower than male teachers. However according to some other studies, there is no difference in ICT usage among males and females [13]. Therefore analysis carried out to test whether the ICT usage differ with gender in the selected academic environment.

H₀: Females ICT usage is equal to that of Males

H₁: Females ICT usage is not equal to that of Males

Independent sample t-test was conducted to test the hypothesis. According to the Levene’s Test for Equality of Variances (Table 3) p value is 0.001, which is less than α (0.05). This indicates that the variances are not equal. The confidence interval of the difference (lower -0.22234 and upper 0.22680) contains the value zero. Therefore it is required to retain the H₀. Similarly in the 2 tailed t-test, p value is 0.91, which is greater than α (0.05). This also indicates the requirement of accepting the H₀. The result concludes that the overall ICT usage does not differ with gender.

2) ICT usage based on the employment category

The population consists of three categories of lecturers Professor, Senior Lecturer and Lecturer. Analysis was conducted to find whether the ICT usage differs with the employment category.

H₀: ICT usage does not differ with the employment category

H₁: ICT usage differs with at least one employment category

One way ANOVA was carried out to test the hypothesis. According to the Levene’s Test for Equality of Variances (Table 4), Variances are equal (p = 0.249). Results of one way ANOVA (Table 5) indicated that there is no significant difference between the ICT usages of different employment categories (p=0.594).

3) ICT usage based on the Department

The Faculty of Management Studies and Commerce consists of 12 academic departments that offer degree programs in different disciplines. In order to find out whether the individual departments are having differences in ICT resource usage ANOVA was carried out.

H₀: ICT usage does not differ with the department

H₁: ICT usage differs with at least one department

Results of the Levene’s Test for Equality of Variances (Table 4) revealed that the variances are significantly different (p= 0.007). However p value of ANOVA is 0.249 (Table 5) which concludes that there is no significant difference of overall ICT usage among academic departments.

TABLE 3 INDEPENDENT SAMPLES TEST FOR ICT USAGE BASED ON GENDER

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ICT Usage	Equal variances assumed	11.084	.001	.115	114	.909	.01223	.10621	-.19817	.22264
	Equal variances not assumed			.113	95.870	.910	.01223	.10809	-.20234	.22680

4) ICT Usage Based on Teaching Experience

The respondents in the sample were having different levels of teaching experience (in terms of years) at the university system. With reports in United States (U.S National Centre for Education Statistics) reviewed that ‘teachers with less experience in teaching were more likely to integrate computers in their teaching than teachers with more experience in teaching’. However according to the survey of Granger et al. [13], there is no relationship between teachers’ teaching experience and their use of ICT. Therefore analysis was conducted to find out whether the ICT usage differs with respondents teaching experience.

H₀: ICT usage does not differ with the category of teaching experience

H₁: ICT usage differs with at least one category of teaching experience

Variances are equal as p =0.200 (Table 4). ANOVA test is not significant (Table 5) which indicates that there is no significant difference of overall ICT usage of respondents who are with different teaching experiences.

5) ICT Usage Based on the Age

The respondents in the sample are in different age categories and therefore analysis was carried out to find out whether the ICT usage differs with Age.

H₀: ICT usage does not differ with the Age category

H₁: ICT usage differs with at least one Age category

Results of the Test of Homogeneity of Variances revealed that the variances are not significantly different as p value (0.340) is greater than 0.05 (Table 4). According to the results of ANOVA (Table 5), p value (0.029) is less than α and therefore there is a significant difference of ICT usage among the respondents in different age categories. Results of the Post Hoc multiple comparison indicates a difference of ICT usage between under 36 age category and over 55 age category.

TABLE 4 TEST OF HOMOGENEITY OF VARIANCES OF OVERALL ICT USAGE

	Levene Statistic	df1	df2	Sig.
Employment Category	1.409	2	113	.249
Department	2.532	11	104	.007
Teaching Experience	1.571	3	112	.200
Age	1.131	3	112	.340

TABLE 5 ANOVA OF ICT USAGE

		Sum of Squares	Mean Square	F	Sig.
Employment Category	Between Groups	.342	.171	.524	.594
	Within Groups	36.858	.326		
	Total	37.200			
Department	Between Groups	4.421	.402	1.275	.249
	Within Groups	32.779	.315		
	Total	37.200			
Teaching Experience	Between Groups	.539	.180	.549	.650
	Within Groups	36.661	.327		
	Total	37.200			
Age	Between Groups	2.859	.953	3.109	.029
	Within Groups	34.340	.307		
	Total	37.200			

V. FINDINGS AND DISCUSSION

Results of the study revealed the variations in ICT resource usage in different teaching and learning activities. According to the findings, the most frequently used ICT resource by the lecturers in the faculty is Ms Office (Table 2). Course material preparation was the activity that mostly supported by ICT resources. For that purpose, the lecturers are frequently using Ms Office, World Wide Web and Virtual Libraries frequently. According to [12] findings in the study which has been carried out to investigate the utilization of ICT by medical academics in Sri Lanka, World Wide Web, word processing and presentation software are the most common ICT resources among medical academics. Comparing our findings with above, it is clear that the situation is similar to the management academics too.

LMS is one of the valuable ICT resource that support teaching and learning activities in numerous ways. Based on this research it was found that LMS is frequently used by the

lecturers to provide course materials and to send messages to students. However the use of LMS to support the mid semester examinations/ continuous assessments was not in a satisfactory level. There was no significant variations of LMS use among lecturer categories. Furthermore when considering the all academic departments in the faculty, usage of LMS was diverse.

Another common ICT resource being used among lecturers in the faculty is e-mail. They frequently use e-mail to provide course materials and to send messages to students. Lecturer category has presented a slight difference in email usage for above purposes compared to senior lecturers. This could be affected with the higher level of email usage of young generation. Conversely e-mail usage is rare as a supportive tool to conduct mid semester examination / continuous assessment.

Other than the above resources, limited level of usage was presented for the rest of the ICT resources by the lecturers. Specially Blogs, Slideshare, Dropbox / Google drive, Audio / video conferencing, Facebook/ Twitter, Youtube / Flickr were not popular among lecturers in the faculty. [9] have also found that Faculty members and students do not use Facebook for institutional purposes in a great extent. According to the findings of [14], majority of the lecturers in Indian National Capital Region had not use blogs for education.

Even though the literature provide evidences on differences in ICT usage in terms of gender, teaching experience and age, according to the present study ICT resource usage of the respondents were differ based only on their age.

These findings reveal that the lecturers' usage of ICT is limited to only few resources even considerable amount of new resources are emerged. It highlights the importance of enhancing the ICT usage in this education system in order to respond the increasing requirements of the education system. Numerous factors may affect to this lower level of ICT usage and therefore further studies will help to identify the critical of them. Specially unawareness on the new technologies could result in poor usage of them and therefore sharing knowledge about ICT resources and ways of implementing them in to their teaching activities is critical requirement. Level of access to new technologies could be another factor that affect to the ICT usage. The responsibility of providing adequate access to ICT resources is held with the institutions. Therefore the higher educational institutions should pay attention on these necessities while improving other educational factors.

VI. CONCLUSION

This study analyzed the usage of ICT by the academics for different teaching and learning activities. According to the findings of the study, the most popular ICT resource being used among the lecturers in the FMSC is Microsoft Office. World Wide Web and Virtual Libraries are the other resources that frequently used by the lecturers. When considering the LMS, it has presented frequent usage to provide course materials to students and to send messages to students. However the use of LMS as a supporting tool to conduct mid semester examination/ continuous assessment is not in a

satisfactory level. The use of other resources such as Blogs, Drop box / Google drive, Slideshare, Audio/ Video Conferencing, Face book/ Twitter is rare in the faculty.

With the results, it can be concluded that lecturers have lot of opportunities to use ICT to enhance the academic activities. However, these opportunities are not properly captured by the lecturers. Therefore more research work need to be carried out to investigate the reasons for the lower level use of such resources by the academics. Furthermore for effective integration, students' acceptance and perception of ICT resources is critical, and this highlights the importance of doing investigations from student perspective.

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