Access to and Utilization of Information and Communication Technology by the Teaching Staff at Tishk International University

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Abstract: The objective of this study is to assess the usage of Information and Communication Technologies (ICT) by TISHK International University (TIU) teaching staff. The data were obtained from 62 teaching staff from the Engineering, Information Technology (IT) and Education faculties. A standardized questionnaire was utilized to obtain data from research participants. Descriptive statistics, Confidence Interval, One-Sample t-test, Two-Sample t-test, and one-way ANOVA were all used to analyse the data obtained. This facilitated the evaluation of differences in usage by various departments and faculties at the university. The outcome of the study was that there were no differences in usage of ICT regarding the participants' educational status, ages, gender, educational level, and marital status. However, a significant difference in the number of hours spent using ICT tools was found.

Keywords: Descriptive Statistics, Confidence Interval, One Sample T-Test, Two-Sample T-Test, ANOVA, and ICTs

1. Introduction

ICTs are described as "a broad range of technical tools and resources used to transmit, generate, distribute, store, and manage information" (Blurton, 1999). ICTs refer to the computer and internet connections used to manage and communicate information for learning purposes (Milanović & Cveković, 2021). Sarkar (2012) defined ICTs as the varied collection of technological gear and resources which are used in communication. They are used to create, disseminate, gather, and manage data. They have developed into one of the fundamental building elements of contemporary civilization in a very short period of time (Anderson, Van Weert, & Duchâteau, 2002). They are often perceived as tools that bring about changes in teaching styles, in learning approaches and even in access to information (Watson, 2001). With improved functionality and the availability of new tools, ICT advancements have provided several intriguing prospects in the realm of education. Significant changes in our educational system have been affected with the emergence of these new technologies, by the following: from teaching machines to personal computers, from email to Web 2.0 and from audio-visual aids to interactive multimedia. This has resulted in the development of more integrated

and individualized forms of learning that place a high value on engagement, cooperation, and discovery.

A wide range of electronic delivery systems, such as radios, TVs, and projectors, as well as computers and the Internet, all fall under the broad category of information and communication technology (ICT) (fig.1). ICT presents a most compelling and robust platform for ensuring the much-desired qualitative education, and an avenue for reaching an optimal level in quality education by raising the standard of learning, teaching, and research (Nkiko, Ilo, & Osayande, 2008).

Figure 1: ICT Devices

Information and communication technologies (ICTs) are the most effective means of transferring and exchanging data in the age of globalization (Lewis, 2009). It is the fusion of media (print, audio, video, and multimedia) enabled by the use of a single digital platform. Additionally, it is believed to have the capacity to stimulate economic, social, and political growth, so contributing to the advancement of humanity as a whole (La Rue, 2011). It is capable of transmitting information quickly, efficiently, consistently, and accurately in a user-friendly format for practical use by the end user. ICTs may be used to augment, reinforce, or completely replace current information systems and networks (Islam, Haque, Afrad, Abdullah, & Hoque, 2017).

In higher education, the use of ICT to improve or assist learning and teaching has grown more significant (Mikre, 2011). As a result, governments, corporations, and people are all very interested in ICT capabilities. ICT has developed into a valuable asset in the battle against global poverty, presenting third world nations with an unparalleled potential to achieve critical development objectives such as poverty reduction, basic health care, and education considerably more effectively than ever before (Kamssu, Siekpe, Ellzy, & Kamssu, 2004).

ICT in education is a contemporary, efficient, and cost-effective approach that has produced a need to modify how students at tertiary levels of education could benefit optimally for a better quality of education (Venkatesh, Bala, & Sykes, 2010). In comparison to developed countries, developing countries' usage of ICT in educational programs is comparatively restricted. Several factors contribute to this gap, including financial constraints, inadequate Internet access, a paucity of skilled instructors, and a lack of appropriate legislation. Nonetheless, interest in the use of ICT in educational contexts has grown in developing countries (Woreta, Kebede, & Zegeye, 2013). Tishk International University,

as one of the prominent tertiary universities in the Kurdistan Province of Iraq, acknowledges the wide beneficial influence of ICT on educational quality and is active in the implementation of numerous initiatives. Thus, the purpose of this research is to examine participants' understanding and use of information and communication technologies (ICT) by Education, Information Technology and Engineering faculties' staff at TISHK International University. The content of this article is divided into the following sections: Section 2 provides the literature review related to ICT history and development as well as usage during COVID-19. Section 3 includes materials and methods used in this study. Section 4 covers results, and discussion of an analysis obtained from the survey and Section 5 concludes the paper.

2. Literature Review

2.1 The History of ICT

Since the 1970s, when employment started to be "computerized," the influence of technology in daily life has expanded significantly. The Internet and social media's growth over the last several decades are excellent examples of fast technological advancement. Precursors of the Internet existed as early as the 1960s, when researchers connected many computers for the first time, creating the so-called ARPANET. It took another 25 years for the CERN Research Center in Geneva to build the first web browser (1989). The "World Wide Web" (WWW) was established in 1991 and introduced to non-technical users in 1993 (Korunka & Vartiainen, 2017).

Internet usage was first limited to the United States and Western Europe in the early 1990s. Only since 2000 has there been an increase in Internet usage in industrialized nations. At the time, about half of all computer users lived in the United States, while around 25%–35% lived in European nations. Only around 1% to 5% of people in industrialised nations had access to the Internet (Korunka & Vartiainen, 2017). In 2006, over 1 billion internet users in the world were exchanging 82 billion e-mails and browsing the internet almost on a daily basis (Kamel, 2007).

In 2015, 88% North Americans, 74% Europeans, 40% Asians, and 29% Africans were connected to the Internet (Stats, 2015). The 21st Century is the current era which is a time of freedom and technological advancement. 21st century people are the first ones to experience a whole new digital world. Rapid progress in technology and advancement in learning system enables 21st century learners to be more 'connected' globally.

Business, government systems, and people's lives are all altering dramatically as a result of the use of ICT. Internationally, ICT is used for the majority of communication and information exchange. Some nations are completely reliant on ICT for a variety of activities. People have been using technology, educational tools, and learning for many years now.

2.2 ICT and COVID-19 (Lockdown)

In recent years, a significant quantity of empirical data (Giesenbauer & Müller-Christ, 2020) has demonstrated the necessity of employing ICTs not just for academic purposes, but also from a worldwide perspective. The goal is to promote the use of ICTs for more academic and research purposes. Based on the United Nations Organization for Education, Science, and Culture's Sustainable Development Goals (SDGs) (Rieckmann, 2017), these digital technologies contribute directly to one of the goals by offering a guaranteed opportunity of inclusive and equitable education, thereby expanding learning opportunities for everyone. Similarly, the use of ICTs contributes to other

sustainable development goals by eliminating social and economic disparities and thereby ensuring the well-being of all people. Thus, digital technologies are important as a reaction to the requirements of contemporary society (Liesa-Orús, Latorre-Cosculluela, Vázquez-Toledo, & Sierra-Sánchez, 2020).

Lockdown and social isolation measures imposed in response to the COVID-19 epidemic have resulted in the closure of schools, training institutes, and institutions of higher education in the majority of nations. Through different online platforms, educators are undergoing a paradigm change in their approach to delivering high-quality education. Despite the difficulties faced by educators and learners alike, online learning, distant education, and continuing education have proven vital in combating this unprecedented worldwide epidemic (Pokhrel & Chhetri, 2021).

2.3 ICT in Education

ICTs have clearly impacted the area of education, affecting teaching, learning, and research. Numerous studies have shown the advantages of increased educational quality. ICTs have the potential to enable the following: innovation, acceleration, enrichment, and enhancement of skills; motivation and engagement of students; bridging the gap between school and work practices; economic viability for future employees; and strengthening and enabling school adaption (Adomi & Kpangban, 2010). As (Jhurree, 2005) emphasizes, much has been said and written regarding the educational influence of technology, particularly computers.

A review of prior studies on the introduction of technology or the implementation of new technological applications in schools reveals that current research focuses mostly on the availability of ICT infrastructure (as measured by student-computer ratios) and instructor characteristics. The availability and accessibility of technology is critical for the effective use of ICT in schools (Eickelmann, 2011).

Consideration of school-based change processes, successful and sustainable implementation of pedagogical innovation, such as the integration of ICT into teaching and learning, and declines in the final stage of school-based change processes (Fullan, 2001). These comprehensive approaches of school improvement have been specified and used for school-based ICT deployment (e.g. Schnoor, 1998; Eickelmann, 2011).

Students, parents, and educators worldwide have felt the unanticipated rippling impact of the COVID-19 epidemic as schools have been shuttered to control the global pandemic. While governments, frontline workers, and health care authorities fight to restrict the pandemic's spread, education systems work to maintain a high standard of education for everyone during these tough times. Many pupils who have remained at home have experienced significant psychological and emotional suffering and have been unable to perform academically as they would have done in the past. The optimal procedures for online homeschooling have not yet been determined (Pokhrel & Chhetri, 2021).

Hitherto, research have shown that the creative use of ICTs in the academic context to achieve the educational objectives, have proved to be effective in achieving favorable outcomes for students enrolled in higher education (Tadesse, Gillies, & Campbell, 2018). Simultaneously, these instruments have the potential to enhance educational quality on all levels: academic, personal, and social.

However, more institutional support is necessary to maximize the beneficial influence of ICTs on the teaching-learning process. Likewise, proper faculty development and content and methodology updates are essential to enable the development of an ideal level of high-quality 21st century education (Chan, Fong, Luk, & Ho, 2017; Liesa-Orús et al., 2020).

Teachers are obligated to take innovative steps toward addressing the constraints of virtual instruction. At the local level, teachers are actively cooperating to develop online teaching approaches. As educators, parents, and students who share similar experiences, there are unmatched potential for collaboration, innovative solutions, and a desire to learn from others and experiment with new technologies (Doucet, Netolicky, Timmers, & Tuscano, 2020). Numerous educational organizations make their tools and solutions freely available in order to assist and support teaching and learning in a more dynamic and engaging setting. Online education has enabled creative teaching and learning experiences that are not possible in a traditional classroom environment (Pokhrel & Chhetri, 2021). In recognition of the critical role of ICT in higher education, the Ministry of Education and the Government of India have developed a number of national and state-specific plans and efforts to ensure the effective delivery of ICT in higher education. Each year, the government budgets for the development of ICT infrastructure in this respect (Saravanakumar & Padmini Devi, 2020). Also, Tanzania's Ministry of Educational and Vocational Training (MoEVT) developed the ICT for Teacher Professional Development (ICT-TPD) framework to address the following challenges: teacher shortages in key subjects (English, Mathematics, following, and Science), teacher support, and teacher quality, through the use of existing ICT infrastructure in Teacher Training Colleges (TTCs) for pre-service, in-service, and professional development programs (Philomina & Amutha, 2016).

2.4 ICT Applications

E-learning platforms were crucial throughout this epidemic, assisting schools and colleges in facilitating student learning when universities and schools were closed (Subedi, Nayaju, Subedi, Shah, & Shah, 2020). While teachers and students must adjust to the new developments, their preparedness must be assessed and supported appropriately (Chinengundu, Chakamba, & Hondonga, 2022). For the first time ever, the use of online platforms such as Google Classroom, Zoom, and virtual learning environments, as well as social media and various group forums such as Telegram, Messenger, WhatsApp, and WeChat, is explored and implemented for teaching and learning in order to continue education. This may be explored further once face-to-face instruction resumes, and these platforms can offer learners with extra materials and coaching (Pokhrel & Chhetri, 2021).

Tishk International University is actively using a special university platform to communicate with students. The Vimeo platform for online lecture videos monitors student attendance, by ensuring that students have watched the entire lecture videos, and Zoom platform for online classes (Fig.2).
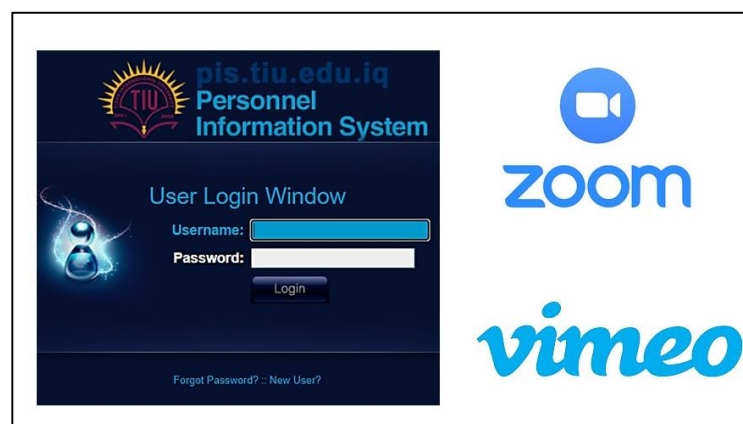

Figure 2: ICT Applications used in TIU

3. Materials and Methods

The Study was carried out at the Faculty of Education, Engineering and IT faculties, TISHK International University. Faculty of Education comprises 4 departments, namely, Department of Biology, Department of Mathematics, Department of English Language Teaching (ELT) and Department of Physics. Each department as well as faculties have been indexed as follows (see Table 1).

Table 1: Samples

Code	Definition	Number of respondents
C211	Bıology Dept	5
C212	Math Dept	9
C213	ElT Dept	15
C214	Physıcs Dept	7
C215	Engıneerıng	15
C216	IT	11
C217	Educatıon Faculty	36
C218	Total	62

All staff members of these faculties were asked to complete the structured questionnaire that was designed to assess their access to ICT tools and ICT utilisation. In this research, 22 questions on ICT use were posed, and participants were asked to rate their degree of ICT use on a five-point Likert scale for each statement (1-never, 2-rarely, 3-sometimes, 4-often, 5-always). ICT utilization was assessed by using the average score for each of these questions.

Minitab version 19 was used to analyze the data. The variables in the study were analyzed descriptively. In addition to one sample and two sample t-Tests and analysis of variance (ANOVA) were carried out for this study.

The statistic for one-sample t-Test was used:

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} \tag{1}$$

Where μ – population mean, s – sample standard deviation, n – sample size, and $\bar{x}$ – sample average.

For the two-sample t-Test:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \tag{2}$$

Where,

$$s_p{}^2 = \frac{(n_1-1)s_1{}^2 + (n_2-1)s_2{}^2}{n_1 + n_2 - 2} \; ,$$

n_1, n_2 – sample sizes, $\bar{X}_1, \bar{X}_2$ – sample means, and $s_1{}^2, s_2{}^2$ – sample variances.

For the analysis of variance (ANOVA) the table is:

Table 2: ANOVA Table

Source of Variation	Degrees of Freedom (df)	Sums of Squares (SS)	Mean Squares (MS)	F
Between Treatments	$k-1$	$SSB = \sum n_j(\bar{X}_j - \bar{X})^2$	$MSB = \dfrac{SSB}{k-1}$	$F = \dfrac{MSB}{MSE}$
Error (or Residual)	$n-k$	$SSE = \sum\sum(X_{ij} - \bar{X}_j)^2$	$MSE = \dfrac{SSE}{n-k}$	
Total	$n-1$	$SST = \sum\sum(X_{ij} - \bar{X})^2$		

Where X – individual observation, $\bar{X}_J$ – sample mean of the jth treatment (or group), $\bar{X}$ – overall sample mean, k – the number of treatments or independent comparison groups, and n – total number of observations or total sample size.

4. Results and Discussion

A total of 62 staff members from 3 faculties were included in the study. The age range of participants was from under 25 to more than 40 years. More than half (56%) of the respondents were male. According to the One-Sample T analysis for all departments, the mean is above average (72.08) which means that the participants use ICT tools actively in their daily life. 95% of staff reported that they have access to a smartphone, 30% to a tablet, 97% to a laptop, 22% to a smartwatch and 10% to other types of ICT tools (Fig. 3).
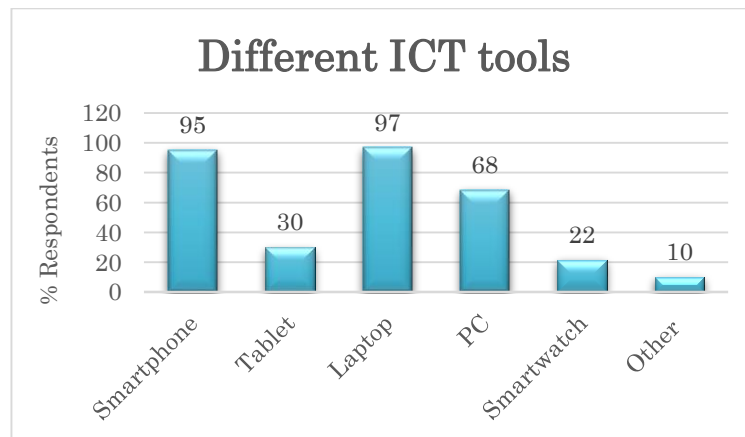
Figure 3: Access to the ICT tools

Using one way ANOVA (Table 2) for each of all the variables, it was found from the study that there is no significant difference in the academic status ($F = 1.88, p > 0.05$), ages ($F = 0.33, p > 0.05$), and educational level ($F = 0.13, p > 0.05$), of the respondents in access and utilization of the ICT tools. But there is a significant difference in the number of hours spent using ICT tools ($F = 3.08, p \leq 0.05$) among participants.

According to the One-Sample t-Test (1) nearly three quarters of the participants of the study responded positively to the questions ($t = 4.98, p \leq 0.05$), which is highly significant.

The Two-Sample t-Test (2) research revealed that also there is no significant difference in gender ($t = -1.42, \ p > 0.05$) and marital status ($t = 1.54, p > 0.05$).

52% of respondents spend 5-10 hours in a day on ICT tools, whereas 30% spend less than 5 hours, 13% spend 10-15 hours and 5% spend 15-20 hours.

According to the responses to questions on utilization of ICT tools, 77% of respondents use e-mail always, whereas 2% use it rarely. 36% of respondents read electronic books often, while 6% never read them. 32% and 36% of participants reported that they make use of audio and video chat sometimes, whereas 5% and 6% of them never do, respectively. The results also showed that 66% of the staff use Microsoft Office always. 40% attend online courses sometimes, and 66% of them never use smartwatch. 77%, 55% and 43% always use a smartphone, a laptop and a personal computer respectively. In Appendix section, survey results provided in detail in pie charts.

5. Conclusion

ICT is permeating all aspects of our professional and personal life. Information and communication technology is being increasingly used globally, and benefiting from its use. Education is also one of the areas where ICT is playing a pivotal role. It improves the efficacy and inclusiveness of education. It saves resources and enhances access.

ICTs are fundamental to the abilities required in the twenty-first century (Voogt & Roblin, 2012). The influence of effective ICT skills on electronic information resources used by lecturers cannot be overestimated. It is therefore concluded that the usage and access to ICTs by academic staff in TIU is significantly effective and valuable. Furthermore, this paper confirmed that there is no difference in usage and access to ICTs by female and male respondents, as well as their academic status at TIU. However, the survey showed that the number of hours spent on ICTs differs among respondents. Most academics responded positively to the questions on the usage of Microsoft Office, Emails, watching videos online, browsing the internet, and using a PC, a laptop and a smartphone. On the other hand, respondents answered negatively to the questions about vlogging and playing games.

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Appendix

E-MAIL USAGE
Rarely 2% · Sometimes 6% · Often 15% · Always 77%

READING E-BOOKS
Always 13% · Never 6% · Rarely 26% · Sometimes 19% · Often 36%

AUDIO CHATTING
Always 15% · Never 5% · Rarely 19% · Sometimes 32% · Often 29%

VIDEO CHATTIG
Always 6% · Never 6% · Rarely 23% · Sometimes 36% · Often 29%

SOCIAL MEDIA USAGE
Always 24% · Never 3% · Rarely 8% · Sometimes 28% · Often 37%

WATCHING VIDEOS ONLINE
Rarely 1% · Always 39% · Sometimes 26% · Often 34%

BROWSING THE INTERNET
Always 63% · Sometimes 11% · Often 26%

INSTANT MESSAGING
Never 2% · Rarely 11% · Always 29% · Sometimes 19% · Often 39%

MS OFFICE

Always 66%
Never 3%
Rarely 2%
Sometimes 8%
Often 21%

ONLINE DICTIONARY

Never 5%
Always 21%
Rarely 8%
Sometimes 31%
Often 35%

PROGRAMMING

Always 23%
Never 29%
Often 16%
Sometimes 10%
Rarely 22%

COMPUTER GAMES

Sometimes 13%
Often 3%
Always 2%
Rarely 13%
Never 69%

PHONE GAMES

Often 2%
Always 6%
Sometimes 14%
Rarely 26%
Never 52%

ONLINE COURSES

Always 13%
Never 7%
Rarely 19%
Often 21%
Someti…

VLOGGING

Sometimes 10%
Rarely 19%
Never 71%

EDITING TOOLS

Always 8%
Never 16%
Often 23%
Sometimes 31%
Rarely 22%

TEACHING ONLINE

- Always 3%
- Often 16%
- Never 24%
- Rarely 24%
- Sometimes 33%

USING A PC

- Never 5%
- Always 43%
- Rarely 8%
- Sometimes 13%
- Often 31%

USING A LAPTOP

- Never 2%
- Rarely 3%
- Always 55%
- Sometimes 11%
- Often 29%

USING A TABLET

- Always 16%
- Never 29%
- Often 18%
- Sometimes 14%
- Rarely 23%

USING A SMARTPHONE

- Rarely 2%
- Sometimes 6%
- Always 77%
- Often 15%

USING A SMARTWATCH

- Often 7%
- Always 11%
- Sometimes 5%
- Rarely 11%
- Never 66%