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Use of Information and Communication Technologies in a Resource-Constrained Setting: A Survey of Students from two Urban Universities in Azerbaijan

L'usage des technologies de l'information et de la communication dans un contexte de ressources limitées : une enquête auprès d'étudiantes et d'étudiants de deux universités d'Azerbaïdjan en milieu urbain

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Abstract

Information and communication technologies (ICT), or digital technologies**,** have become an integral part of higher education globally. The literature is dominated by studies from major industrialized countries where technology has been widely adopted in the education sphere. Using a survey constructed based on previous research, the present paper explores the rate and determinants of ICT use in a post-Soviet country with a considerable lag behind the Western education system. The survey, based on a convenience sample of 191 students from two urban universities in Azerbaijan, found that the most frequently used device is the mobile phone. While the majority of survey respondents accessed technology for free at their institution, only around half of the sample has had training on the use of technology resources. Nevertheless, the majority of students feel confident about using ICT, suggesting that they have developed the necessary skills through alternative methods, such as self-learning or peer support, even in the absence of formal training. Linear regression analysis suggests that the students' ability to use ICT has a significant positive impact on their rate of ICT use.

Keywords

Information and communication technologies (ICT); digital technologies; post-Soviet higher education; Azerbaijan

Résumé

Les technologies de l'information et de la communication (TIC), ou technologies numériques, sont devenues partie intégrante de l'enseignement supérieur à l'échelle mondiale. La littérature sur le sujet est constituée pour l'essentiel d'études provenant de pays fortement industrialisés, où ces technologies ont été largement adoptées en éducation. Utilisant un questionnaire d'enquête fondé

sur des recherches antérieures, cet article explore l'ampleur et les déterminants de l'utilisation des TIC dans un pays de l'ex-Union Soviétique dont le système d'éducation accuse un retard important sur l'Occident. L'enquête, fondée sur un échantillon de convenance de 191 étudiants et étudiantes de deux universités d'Azerbaïdjan, situées en milieu urbain, montre que l'appareil le plus souvent employé est le téléphone cellulaire. Bien que la majorité des personnes répondantes disposaient d'un accès gratuit aux technologies via leur établissement, seule la moitié avait reçu une formation à l'usage des ressources technologiques. Néanmoins, la majorité des étudiants et étudiants s'estiment confiants en matière d'usage des technologies, ce qui suggère qu'ils ont développé les compétences requises par d'autres moyens que l'apprentissage formel, tels l'autoapprentissage et le soutien entre pairs. Une analyse par régression linéaire suggère que la capacité des étudiants et étudiantes à utiliser les technologies numériques a un effet positif significatif sur l'ampleur de leur utilisation des TIC.

Mots-clés

Technologies de l'information et de la communication (TIC), technologies numériques; enseignement supérieur en ex-Union Soviétique, Azerbaïdjan

Introduction

Universities are changing in the digital age due to the rapid developments in information and communication technologies (ICT) and digital technologies, which encompass a diverse range of technologies, tools, services, and applications using various types of hardware and software (Rice & Haythornthwaite, 2002). An idea that has gained currency is that the generation born after 1980 grew up with access to computers and the Internet, hence they are sometimes known as "Digital Natives" or the "NET Generation" (Palfrey & Gasser, 2008). While ICT's positive impact on the teaching and learning process is evident (Kreijns et al., 2013), Kirkwood and Price (2005, p. 257) state: "It is not technologies, but educational purposes and pedagogy that must provide the lead, with students understanding not only how to work with ICTs, but why it is beneficial for them to do so."

Despite the growing significance of ICT skills among the university cohorts, labeling all university students as "digital natives" would be an inaccurate description of the reality, for the student body comprises a wide spectrum of digital competence, rate of use, and interests (Henderson et al., 2015). Demographic characteristics, faculty membership, perceived ease of use, enjoyment, and a wide array of other contextual factors affect the uptake of ICT among students (Alfalah, 2023; Bond et al., 2020; Dirckinck-Holmfeld et al., 2023; Strzelecki, 2023; Tien & Fu, 2008; Tulinayo et al., 2018). However, our understanding of the use and correlates of ICT among students is limited geographically, a gap the present study attempts to address to some extent.

The majority of the studies to be reviewed below are conducted in either Western countries or Australasia. Indeed, the systematic review of 243 studies by Bond et al. (2020, Abstract) concluded that "research within the corpus was predominantly undertaken within the United States and the United Kingdom, with only limited research undertaken in the Global South". Those geographical areas adopted key components of ICT, such as the Internet and learning management systems, at a much earlier period in history compared to the post-Soviet landscape, which was sealed off behind the Iron Curtain until the early 1990s. Searching various databases reveals that there are no studies focusing specifically on the use of ICT in higher education among post-Soviet countries. While there are several articles about the implementation of technologies in higher education in

general, as well as distance education or learning (e.g. Ilyasov et al., 2023; Isaeva et al., 2023; Vakaliuk et al., 2020), we did not find any surveys measuring the rate and determinants of ICT use. In this regard, the present study can be seen as a potential addition to the literature on the rate and determinants of ICT use in the post-Soviet landscape, which is considerably different from that in more industrialized countries, where most of the studies have been conducted.

A recent study by Isaeva et al. (2023) shows that, despite changes relating to quality assurance, internationalization, teaching and learning, and institutional governance in general brought about by the Bologna process, the country is characterized by "resource inaccessibility, the poor quality of teaching and support staff, and the level of infrastructural development" (p. 1,919). A significant number of universities still do not use any learning management systems, cloud-based service tools, online assignments, and other ICT facilities that have become almost a necessity in more economically developed countries. Despite the global digital divide, one can observe the underrepresentation of research evidence from post-Soviet middle-income countries in the scientific literature. Given such circumstances, we believe that it is worthwhile to endeavour to find out how and how much students use technologies in this environment. The findings could also be useful in making comparisons between countries at various levels of development in terms of ICT adoption. Moreover, given the institutional and historical similarities between Azerbaijan and other post-Soviet countries, our results could, to some extent, be informative for educators in those nations as well.

The current work will take cues from other works (Al-Emran et al.,2018; Park, 2009; Tulinayo et al., 2018) and extend the geographical scope of the existing literature. From a policymaking perspective, as noted by Lai et al. (2012), understanding the factors affecting undergraduate students' digital choices for learning can help educators to identify possible areas of support. In the case of Azerbaijan, despite significant tax money spent on these programs, we do not know the rate of ICT use among students. This paper relies on a non-random sample from two urban universities in the capital city in an attempt to answer the following questions:

A) Which means of ICT are used at what rate?

B) What factors predict the use of ICT?

Context of Azerbaijan

Azerbaijan is an oil-rich, middle-income country, with a per-capita GDP of nearly $7,155 in 2023 (World Bank Group, n.d.a). It has a population of around 10 million. More than 222,000 students are enrolled at higher education institutions (The State Statistical Committee of the Republic of Azerbaijan, n.d., Education Section). Azerbaijan started incorporating ICT into its educational system soon after gaining its independence. Isaeva et al. (2023), for instance, note that government spending on education was 4.3% of GDP in 2020. The foundation for a digital transformation in education has been laid by national initiatives such as the "State Program on the Informatization of the Education System in the Republic of Azerbaijan" (2008-2012) and the "Program for Providing Educational Institutions with Information and Communication Technologies in the Republic of Azerbaijan" (2005-2007). Azerbaijan has demonstrated its commitment to promoting digital literacy and improving educational quality. Through the Azerbaijan e-Learning Network experience, which distributes the knowledge and abilities gained in the area of e-learning design and the facilitation of online instruction, universities in Azerbaijan decided to create an efficient e-learning system (Muradkhanli & Atabeyli, 2012). Consequently, looking at the current situation

among universities, one can see notable improvements compared to the early years of independence.

Overall, technologically advanced modern campuses have become a more common sight (Isaaeva et al., 2023). By 2020, nearly 90% of individuals had Internet connectivity (World Bank Group, n.d.b). The country ranked 53/139 in 2016 on the Networked Readiness ranking (World Economic Forum, 2016). Additionally, using e-learning platforms has emerged as a central theme for educational changes in Azerbaijan. E-libraries and computer halls have been increasingly established in universities, although there is no data on their use and effectiveness. Several institutions have established e-learning centres to assist students with their online education. Khazar University and the Azerbaijan Tourism University are examples of universities with established e-learning teams and vital institutional frameworks supporting e-learning initiatives. The Azerbaijan Diplomatic Academy took things a step further a few years ago and became the first institution in the country to operate a learning management system – Blackboard. In another milestone for the country, the University of Economics collaborated with Bloomberg Inc. to set up a Bloomberg Finance Lab to provide students with knowledge about economic indicators, currencies, fixed income markets and equities (Azerbaijan State University of Economics, 2024).

Despite significant efforts, the use of ICT in the higher education system is plagued with problems. Ilyasov et al. (2023) stress the importance of educators making continuous investments in ICT infrastructure and pursuing ongoing professional development to keep pace with technological changes and to effectively integrate ICT into their teaching methods. However, the author highlights a problem reminiscent of the Soviet era: the limited autonomy of universities. Evidence of this is provided by the appointment of universities' top managers – including board members, university presidents, and vice presidents – by the government. Ilyasov points to the detrimental effect of the central planning model in the higher education system. Ilyasov and colleagues (2023) argue that the universities' limited ability to independently develop and update their curricula poses a significant barrier to the successful adoption of ICT-based educational reforms.

Even though the Azerbaijani government has made efforts to improve ICT infrastructure in education, significant obstacles remain. The report by the Asian Development Bank (2019) claims that inadequate teacher training and the slow pace of e-course material production are the main challenges in the country. While there is no analogous data for universities, statistics on schools provide some crucial insights into the level of computer availability. Target computer/student ratios are incorporated into the country's policy statement: Azerbaijan aims for a medium-term ratio of 1:33. In 2010, it was reported to have attained about 1:29, yet findings from school surveys indicate that 1:50 would be more accurate (Asian Development Bank, 2019). Inadequate funding for creating digital materials and instructional tools is another significant barrier. Budgets for ICT in education are frequently constrained, which leads to out-of-date technology and insufficient funding for new projects (European Training Foundation, 2019). For example, discrepancies have been documented in distributing and utilizing 18,000 laptops, even after the government launched a nationwide campaign to provide them to schools. Finally, COVID-19 conditions showed lack of teacher's knowledge of use of ICT. In fact, only 2 out of 52 higher education institutions had solid distance learning arrangements that included relevant software, trained faculty, and digital content (Johansson De Silva et al., 2022).

Literature Review

Many studies in the broader literature have explored the determinants that encourage or inhibit students' use of ICT, as well as the rate of use. In their survey of undergraduate students (n = 1,658) from two Australian universities, Henderson et al. (2015) found that students' engagement with digital technology is clearly varied, variable and shaped by an array of contextual factors. They found that 50% of the students use university computers for their studies, though the figure for the use of personal computers and smartphones was higher. The students in their sample also supplement their studies by watching videos on YouTube. In terms of searching for information, Google, Google Scholar and Web of Science all were cited widely, as well as university library resources. The survey of 628 subjects in Konkuk University's Seoul Campus by Park (2009) rather intriguingly found that "neither perceived usefulness nor perceived ease of use had a significant direct effect on behavioral intention to use e-learning" (p. 159), which contradicts the findings reported from Uganda. Thus, Tulinayo et al. (2018) looked at the sample in a developing nation (Uganda). Within the framework of TAM, these authors collected data from a sample of 341 undergraduate students in Uganda. Their questionnaire measured the frequency of use of multiple ICT in learning, their role in facilitating learning, students' experience and the support they get from others such as instructors, and the problems students face. Tulinayo et al. (2018) concluded that students' access, students' awareness, ease of use, student capacity, and lecturer characteristics are external constructs that influence the acceptance of technology in higher education. Some of the findings reported by them involve limited use of cloud-based service tools, low bandwidth leading to slow Internet, lack of training on how to use the various digital technology tools, and lack of exposure to the different ICT. Work by Lai et al. (2012) also sheds light on the factors that affect the acceptance of technology by students and the possible associations among them. By surveying Hong Kong university students, the study identifies the alignment between technology and their learning preferences, the presence of motivation from peers and teachers, and their attitudes towards technology usage as the primary predictors of students' adaptability to technology use for academic purposes. Tien and Fu's survey (2008) among 2,719 first-year college students in Taiwan found that female students and students with a parent who is from an ethnic minority, has blue-collar status or is unemployed are lagging in terms of computer skills and knowledge.

To our knowledge, only one study relevant to the subject and geography of the present paper has been published. The study resembling the current paper looked at intentions to use ICT, rather than actual use. Chang et al. (2017) employed the General Extended Technology Acceptance Model for E-learning among 714 students in Azerbaijan to measure their intentions and found that "subjective norm, experience, and enjoyment positively and significantly influence students' perceived usefulness of e-learning" (p. 128). Those with computer anxiety, however, are less likely to intend to use it. The authors concluded that Azerbaijani students increasingly accept and recognize the advantages of digital learning environments. However, our paper goes one step further by looking at actual use and its correlates, which can be useful for policymakers and may contribute to this line of study in other countries.

Methods

Design and Sample

This cross-sectional study recruited undergraduate students (n = 191) throughout May 2024 from two public universities in Azerbaijan, in Baku, the capital city, and another populated city (which

is not mentioned here to maintain anonymity, as that city has only one university). The selection of these two particular universities brings issues with external validity, which we acknowledge and will discuss towards the end of the paper. A non-random technique of convenience sampling was employed, as the author distributed the survey among her students. The choice of these particular public universities and of chemistry, mathematics, and philology courses stems primarily from accessibility issues, as the author of the study worked as a lecturer in one of these institutions and had previous work experience in the other. While the author taught only one of these subjects, students of the other two subjects were recruited by asking permission from respective instructors and participating in the class. Given its student-based sample, the author does not claim that the findings are representative of the general population of Azerbaijan.

Data Collection Method

The questionnaire was based on previous research (primarily, Henderson et al., 2015; Tulinayo et al., 2018) discussed above. The structured questionnaire consisted of close-ended questions designed to address the factors that influence students' digital technology use and acceptance. The questionnaire comprised three blocks. Block 1 and Block 2 measured the frequency of use of the listed ICT in learning and access to ICT at the institution, respectively. Finally, Block 3 consisted of demographic items. Gender was binary (1-male, 2-female), while faculty membership consisted of three dummy variables, as there were three faculties.

The questionnaire items are presented in their respective tables. The method used was a self-administered online survey. The author distributed the survey link (hosted by Qualtrics) in the classes. All the responses were anonymous, and no identifying information was required. One of the advantages of this approach is that it gives respondents ample time to think and reflect before answering, which was especially important for certain detailed questions.

Questionnaire Reliability and Creation of Constructs

Since perceived ease of use, student capacity, students' access to ICT, lecturer characteristics and student awareness have been regularly found to affect the use of ICT, we constructed the questionnaire based on these. We created four constructs, as they consisted of multiple items. Perceived ease of use and perceived usefulness were single items. Table 1 presents each construct, its corresponding items, and Cronbach's α values, which showed the internal consistency or reliability of the constructs. Furthermore, the use of ICT itself was also a construct based on nine items (technology resources). As Table 1 suggests, only one construct reached above the minimum level (0.7) suggested by Kline (2000), indicating a high internal consistency with their corresponding measurement indicators. The other three were slightly below, meaning that their level of consistency can be questioned, which is a limitation we acknowledge. inappropriate.

Analysis

The data were analyzed using SPSS 28.01. Following the descriptive statistics, confirmatory factor analysis was done to measure factor loadings and determine the reliability of the items (student access to ICT, student capacity to use ICT, and lecturer characteristics). Next, bivariate analyses were run between constructs and demographic items. In the end, linear regression analysis was used, since the dependent variable was based on a scale of 1 to 4. Following the internal consistency tests of each construct, six regression models were run. In line with Tulinayo et al.'s analyses, in each regression model, one construct was regressed as a dependent variable while holding the other five as independent variables to assess their effects.

Table 1
Constructs, Their Corresponding Items, and Cronbach's α Values

Construct	Cronbach's α value	Items
Students' access to digital technology	.721	The university has enough ICT for all students to access I can freely access all available ICT* The university has clear rules and regulations which permit the use of ICT
Students' capacity to use ICT	.624	I use ICT (Yahoo, Google, Bing) to search for information and study materials I use ICT to communicate with lecturers and share information with fellow students I have undergone enough training to use the different ICT I have all the desired skills to use different ICT
Lecturer characteristics	.683	My lecturers provide high-quality instructions on how to use ICT My lecturers motivate me to use different ICT
Perceived ease of use	–	I have no difficulty in using different ICT
Perceived usefulness	–	Using technology resources has a positive impact on my academic performance
Overall ICT use	.691	Personal desktop computer or laptop University laboratory computers Mobile device (e.g. mobile phone) Tablet YouTube and other video platforms Social media platforms Dropbox Google Docs Projector Smart board

* This item was removed to increase α from .637 to .721. It shows that the item "I can freely access all available ICT", for unknown reasons, undermines internal consistency of the construct.

Results

Descriptive Statistics – Demographic Profile

In all, 370 students were invited to do the survey; 191 actually participated. A few participants who started the survey but did not finish were also excluded. The majority (86.9%) of the students were female. Participants were split roughly equally between chemistry (36.6%) and philology (33.5%) classes. Students from the math class were represented at a relatively lower percentage (29.9%).

Use of ICT

The average score for the items regarding the use of ICT was 2.62 (SD = 0.42), which suggests the presence of a relatively greater proportion of the students actively using ICT. At the same time, however, one can interpret it as proof of the notable size of the sample using ICT rather infrequently. Based on mean scores, the three items used most were mobile phones (m = 3.78),

social media platforms (m = 3.11), and personally owned laptop or desktop computers (m = 2.93). YouTube and other video-sharing platforms are also widely used by the students in the sample (m = 2.91). The score for the use of laptop or desktop computers owned by the university was considerably lower (m = 1.90), suggesting a need for explanations, which are provided later on. Dropbox (m = 1.44), tablets (m = 1.58), and smart boards (m = 2.24) were the three items used least. The figure for Google Docs, a service similar to that offered by Dropbox, was notably higher (m = 2.53), which may partly reflect a greater level of awareness of Google Docs among the sample. Full results are presented in Table 2.

Table 2
Students' use of Different ICT Items

Item[a]	Mean[b]	SD
Personal desktop computer or laptop	2.93	0.923
University laboratory computers	1.90	0.943
Mobile device (e.g. mobile phone)	3.78	0.541
Tablet	1.58	0.856
YouTube and other video platforms	2.91	0.867
Social media platforms	3.11	0.901
Dropbox	1.44	0.800
Google Docs	2.53	1.070
Projector	2.42	1.052
Smart board	2.24	1.051

a. Learning management systems did not feature in the questionnaire because neither university has one.
b. Min – max: 1 (strongly disagree) – 4 (strongly agree)

Students' Experience and Support in Using and Accessing ICT

The average score of items regarding the use of ICT was 2.80 (SD = 0.54), which suggests that a relatively greater proportion of the students are satisfied at different levels with their experience and support in using and accessing ICT at their institutions. The lowest score of agreement was recorded for the item "the university has enough ICT for all students to access" (m = 1.99). A greater proportion of the sample has never had any training in the use of technology resources (m = 2.07). The mean score of 3.30 reflects the almost unanimous agreement that the use of technology resources positively impacts students' academic performance. Nearly all participants (m = 3.64) stated that they do not pay anything for the use of technology resources. Full results are presented in Table 3.

Bivariate Analysis and Linear Regression Analysis

While the rate of use correlated with multiple independent variables, the strongest positive correlation (as indicated by the coefficient) was observed for the relationship with students' capacity to use ICT (r = .520, p < .01). As well, both Lecturer Characteristics and Perceived Ease of Use also correlated with the dependent variable at the p < .01 level, although the effect sizes were relatively lower. Gender had a weak correlation (r = .171, p < .05), with female students more likely to use ICT more frequently. This result partly stems from the fact that the majority of the participants were female. Table 4 presents full results.

Table 3
Students' Experience and Support in Using and Accessing ICT

Item	Mean[a]	SD
Access to ICT	2.66	0.850
The university has enough ICT for all students to access	1.99	0.955
The university has clear rules and regulations which permit the use of ICT	2.37	0.896
I can freely access all available ICT	3.64	0.699
Lecturer characteristics	2.99	0.850
My lecturers provide high-quality instructions on how to use ICT	2.94	0.911
My lecturers motivate me to use different ICT	3.04	0.796
Students' capacity to use ICT	1.44	0.800
I have all the desired skills to use different ICT	3.01	0.803
I use ICT to search for information and study materials	3.47	0.789
I use ICT to communicate with lecturers and share information with fellow students	2.99	1.005
I have undergone enough training to use the different ICT	2.07	1.109

a. Min – max: 1 (strongly disagree) – 4 (strongly agree).

Table 4
Bivariate Analysis

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Frequency of use	2.48	0.47									
2. Students' access to ICT	2.18	0.82	.308**								
3. Lecturer characteristics	2.99	0.75	.283**	.553**							
4. Students' capacity to use ICT	2.72	0.68	.520**	.552**	.516**						
5. Perceived ease of use	3.01	0.80	.363**	.315**	.302**	.527**					
6. Perceived usefulness	3.30	0.75	.192*	.204**	.318**	.265**	.284**				
7. Chemistry	0.34	0.47	–.126	–.261**	–.121	–.231**	.033	–.011			
8. Philology	0.34	0.47	.172*	.234**	.076	.182*	.005	–.053	–.504**		
9. Mathematics	0.25	0.43	.034	.080	.096	.110	.086	.058	–.406**	–.406**	
10. Gender	1.87	0.33	.171*	–.007	.118	.074	.128	.070	–.064	.100	.071

* $p < .05$; ** $p < .01$; *** $p < .001$

The regression analysis explores the relationship between various predictors and the frequency of digital technology use. Linear regression analysis (Table 5) suggests that only one of the seven independent variables is statistically relevant. The model summary shows an R-squared value of .289, indicating that approximately 30% of the variance in frequency of use can be explained by the predictors included in the model. Notably, the variable "Students' Capacity to Use ICT" has a significant positive impact ($\beta = .445$, $p < .001$). To test whether that was the case for all participants or correlated with the "degree of use of ICT" means, we calculated a main score across all ICT means to indicate the average degree of use. The new computer variable was subjected to a correlation analysis, with the variable representing the self-reported impact on academic performance. The Pearson correlation analysis indicated a statistically significant but weak correlation ($r = .20$, $p < .007$). This means that, in terms of the impact of ICT devices on academic performance, frequency or intensity of use does matter. Other predictors, such as gender, students'

access to ICT, and lecturer characteristics, taken individually, do not show significant contributions.

Table 5
Regression Analysis Results

Independent variable	Standardized coefficient (β)	T	p-value
Gender	.099	1.390	.167
Students' access to ICT	.007	0.080	.936
Lecturer characteristics	.009	0.103	.918
Students' capacity to use ICT	.445	4.497	.000
Chemistry	.052	0.391	.696
Math	.019	0.149	.882
Philology	.072	0.550	.583
Perceived usefulness	.049	0.654	.514
Perceived ease of use	.083	0.995	.322

Note. $R^2 = .289$

Discussion

The current paper provided some insights into a country lagging significantly behind major industrialized nations. First of all, across the current sample, cell phones and social media, including YouTube and other video-sharing platforms, were the most commonly used technologies. On the other hand, university-owned laptops and desktops were used less frequently than personal devices. This is similar to the findings of Tien and Fu (2008) and Henderson et al. (2015), who also noted that students use social media and mobile devices extensively for personal and academic purposes. One reason for this tendency is that personal gadgets offer convenience, familiarity, and continuous access, while institutional resources might not be as readily available, might have accessibility problems, and may use outdated technology.

Another notable reason for not using university laptops and desktops is inadequate training. A significant portion of the sample reported that they had never received any instruction on how to use technological resources. The absence of training could be due to the dearth of specialists in the field. For instance, Park (2009) indicates the existence of various levels of training, some more extensive, depending on the institution. This difference may reflect regional or institutional disparities in support structures. However, the majority of students feel confident about using ICT, suggesting that they have developed the necessary skills through alternative methods, such as self-learning or peer support, even in the absence of formal training.

The mean score of 3.30 shows almost unanimous agreement that using technology resources has a positive impact on academic performance. This result aligns with Alfalah's (2023) findings, which show that students believe that technological advances improve their performance and learning experience. Similarly, Tien & Fu (2008) found a favourable relationship between computer use, computer literacy, and enhanced academic achievement, supporting the idea that ICT use improves student learning outcomes. However, this is inconsistent with the previous study by Lai et al. (2012), which found that computers did not substantially impact students' use of technology for learning.

Nearly all of the participants stated that they do not pay anything for the use of technology resources, indicating that the university generally provides these resources for free. This is a positive aspect, ensuring that financial barriers do not impede access to essential digital tools. However, Tien & Fu (2008) suggest that financial inequities result from the digital divide—where access to technology is frequently driven by economic factors. This comparison draws attention to the disparities in financial dynamics and how they affect the accessibility of ICT in diverse learning environments.

The degree of the lecturers' role was shown in our study by their mean scores of 2.94 for offering high-quality instruction and 3.04 for encouraging students to adopt digital technology, suggesting that faculty engagement is fairly effective in encouraging technology use among students. However, in terms of statistical relevance, current findings are in contrast to Alfalah's (2023) observation that lecturer influence has a positive impact on the intention to use. It is interesting that this factor has no significant impact on the utilization rate of ICT even though students are generally satisfied with the support provided by their lecturers. Further work is required to understand this detail.

As expected, students' capacity to use digital technology determines their actual ICT use rate. Our data suggests that their training background and knowledge of search engines play crucial roles in their ability to make use of technology in education. In Azerbaijan, some students have extra support outside of the university, including special tutors, courses, etc. As a result, they may be able to use technology even though they do not have training. Moreover, our bivariate correlation tests indicate that capacity, lecturer characteristics and access to digital technology are all mutually associated. It means that, for instance, a student with a relatively high capacity is also likely to have both a higher level of support from a lecturer and access to digital resources.

Intriguingly, access to digital technology and lecturer characteristics do not significantly affect the dependent variable. That the access to digital technology does not have a statistically significant impact on the dependent variable confirms the idea of Tien & Fu (2008, p. 422), who argued that "having the opportunity to access computers does not equal being able to use information technologies." In the present case, it is the capacity that matters most.

Overall, the data suggest the specific challenges faced by a country like Azerbaijan. Certainly, the universities have become much better equipped in terms of ICT. However, it is evident that not all students have benefited from this. This is somewhat surprising in light of a number of government initiatives and strategies mentioned earlier. As a result, we can infer that the authorities must pay more attention to the implementation of ideas. While the two universities have varying degrees of computerization and other electronic equipment, the participants expressed its insufficiency. However, insufficiency cannot be an excuse for not providing training. Thus, one can argue that the source of the problem is not the inventory, but rather the people managing it. The challenge here is to a) motivate, b) teach and c) monitor the administrators to make sure that everyone receives training.

Perhaps one reason for the lack of training is that administrators are not motivated to provide it, since they have not understood the benefits of using ICT. This argument seems somewhat plausible given that a significant number of the pedagogical staff were educated and worked primarily either during or after the fall of the Soviet Union. One has to consider that the computerization of the universities in Azerbaijan is a relatively recent phenomenon compared to countries like Great Britain or Japan. Thus, in this country, it is not surprising to come across an instructor who is unaware of the instructions for using ICT. Either the Ministry of Education or each university

independently must therefore make sure that all of their staff are trained adequately. Finally, there's a need to monitor the use of ICT, which in itself sounds like a massive challenge for now. Not all universities have a clear reporting mechanism in case of a lack of professional conduct or incompetency. Even if there is one, given the strict hierarchical social relations in Azerbaijan, it is unlikely that students would report any senior members of the staff who cannot or may not want to use ICT and tell students to do the same.

Limitations

While providing some insights into the context of Azerbaijan regarding the use of ICT among university students, these results must be interpreted in the light of certain limitations. The primary limitation stems from the selection of two particular universities. Technologically speaking, Azerbaijan does have better-equipped universities with more knowledgeable students. In other words, neither of these institutions is a leading example in terms of ICT adoption and use. Indeed, the absence of learning management systems in either university can be interpreted as an indication that these institutions have adopted ICT to a notably lesser extent. The implication is that these results cannot be representative of all Azerbaijani institutions. The sample size is also somewhat problematic, as more students would have generated more statistical power. The sample is also restricted to three faculties – math, chemistry and philology. Having more faculties and a larger sample size would have allowed us to better understand the role of the subject on the outcome variable. Similarly, the sample lacks gender balance, preventing us from gaining a better understanding of the impact of gender.

Notes

Data Availability

The data supporting the article and collected during the research described above are available from the author upon request.

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