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Revisiting the Digital Divide(s): Technology-enhanced English Language Practices at a University in Pakistan



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Abstract

With the rapid penetration of technology in the lives of students, it has become important for educators to look for opportunities to enhance students' engagement and achievement by integrating technology in education. However, deciding which technologies should be included is a big challenge for higher education institutes, particularly in developing countries with limited financial resources, such as Pakistan. As students' non-educational use of technologies shapes their academic use of technology and learning process (Swanson & Walker, 2015), integrating students' preferred technologies can help fulfil their educational needs and expectations. This paper investigates the digital practices of undergraduate students in a public university in Pakistan and examines the impact of gender, study major and medium of education on the use of digital devices by students. The data is drawn from 316 responses to an online survey, administered online. The results of the study reveal that although a substantial proportion of the students had access to digital tools such as smartphones and computers, there was limited use of them for educational purposes. The technology most extensively accessed by undergraduate students for this purpose was mobile phones. Use of university-provided computers and bringing their own computers/laptops to campus were much less popular choices. Further, most students were not sufficiently comfortable with their digital skills to use their devices for educational purposes, although many were interested in getting training in how they could do this.

Keywords: mobile-assisted language learning, digital divide, digital practices, technology-enhanced language learning, smartphones, learner training

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Data Availability Statement: All relevant data are within this paper.

Introduction

Technology can play a key role in facilitating and improving learning, not only in classroom environments but also in self-directed learning, collaborative learning, and teaching through connecting learners otherwise separated by time and space. With the widespread availability of technology in many contexts, it is no longer a question of whether technology should be used in educational environments, or how much. Rather, the question is how to make best use of technology to enhance students' educational experiences and outcomes (Dahlstrom & Bichsel, 2014). Educators now face the challenge of enhancing students' educational engagement by applying student-preferred technologies which not only fulfil students' needs but also meet their expectations. A first step in this regard is to identify students' pre-existing technology environments and practices, so informed decisions can be made about technologies, and associated support and infrastructure, that can help support student success (Dahlstrom & Bichsel, 2014).

Many studies have been conducted to explore students' perceptions and practices related to technology in various contexts. The most common digital devices used by students were found in a number of studies to be laptops and mobile phones, with tablets the least used devices (e.g., Al-Hariri & Al-Hattami, 2017, in Saudi Arabia; Deng & Tavares, 2015, in Hong Kong; Dahlstrom & Bichsel, 2016, and Swanson & Walker, 2015 in the USA; Gosper, Malfroy & McKenzie, 2013, in Australia). Researchers also report a difference in the use of technology for academic and non-academic purposes. Students in Hong Kong, for example, were reported by Deng and Tavares (2015) to perceive Moodle to be an academic platform for downloading material, but not suitable for sharing their thoughts and communicating with peers. In a study of students in the USA, Swanson and Walker (2015) found that social media applications were used mostly for non-academic purposes whereas emails were used mostly for academic purposes. Similarly, Gosper, Malfroy, and McKenzie (2013) report that students in Australia perceive social networking sites to be more suitable for non-academic purposes and learning management systems and online line libraries as preferable for their studies.

Most research in the field of students' perceptions and practices in information and communications technology (ICT) is conducted in developed countries where 94% of the young population aged 15 to 24 use the internet, compared to 67% in developing countries, and 30% in least developed countries (The International Telecommunications Union [ITU], 2017). Hence results from these studies cannot be generalised for developing and least developed contexts where facilities and infrastructure related to ICT are more limited. Standing at 142nd place in a global ICT index of 166 economies, Pakistan is still a developing country (Baloch, 2014).

Research into the use of technology by students for educational and non-educational purposes is a neglected area in Pakistan. Of the few studies that have been carried out in Pakistan in this field, the majority aimed to explore the use of social networking sites by students and teachers in educational and non-educational contexts (Arif & Kanwal, 2016; Hussain, Bhutto, Rai, Hussain & Zaheer, 2016; Javed & Bhatti, 2015), and the general use of the internet by tertiary students (Bashir, Mahmood & Shafique, 2016). Furthermore, digital practices go beyond access, skills and experiences in using ICT (Abu-Shanab & Al-Jamal, 2015). They are influenced by income, disabilities, and education (Abu-Shanab, 2013); age and socio-economic factors (Geana & Greiner, 2011); and gender (Lepadatu, 2013; Antonio & Tuffley, 2014; Singh, 2017).

Many studies on ICT use and gender have indicated that women in developing countries lag behind men in relation to access and use of digital devices (Abu-Shanab & Al-Jamal, 2015; Bogdan-Martin, 2016; Huang, Hood & Yoo, 2013). Further, despite the efforts of governments in some countries, the digital gender gap has continued to grow (Singh, 2017). Indeed, the global gender gap had increased

from 11% in 2013 to 12% in 2017 (ITU, 2017). This digital gender gap is very apparent in Pakistan, which was ranked 143 out of 144 countries in a gender inequality index by the World Economic Forum (2016). Another investigation which explored the digital gender gap in 40 developing countries found the gap in Pakistan was 13% (Pew Research Center, 2015).

Along with a digital gender gap, the content language of technology is a major factor in shaping the preferences and experiences of students' use of technology. Around seven thousand languages are spoken in the world, but there are relatively few digital content languages (primary content language of a site or application) (Bolluyt, 2014). Among these, English is the most common language, used by 26% of internet users worldwide (W3Techs, 2017). Around 53.6% of websites, applications and online services use English as a content language. In contrast, Urdu, one of the two official national languages and the lingua franca in Pakistan, is used by less than 0.1% of the websites (W3Techs, 2017). Bolluyt (2014) argues that this particular digital divide is a problem, not only for inexperienced users who want to access the internet in a language they know, but also for the digital world that wants to access these new users.

In Pakistan, where English is the second official language of all the population but first language of relatively few, only 10% of the population use the internet (United Nations e-Government Knowledge Database, 2017); of this 10%, the majority are 20- to 24-year-olds studying at various institutions in Pakistan. These students come from two major streams of education; Urdu-medium schools where Urdu is the language of instruction, and English-medium schools where English is the language of instruction. The Ministry of Education and Training and Standards in Higher Education (2014) recognises two major types of schools in Pakistan; public schools and private schools. The majority of the public schools are Urdu medium schools and cater for rural or semi-urban localities and low-income families. On the other hand, private schools are preferred by upper-middle and elite class families. Most private schools are English medium schools and have qualified and trained teachers, higher quality classroom facilities, and more imported educational materials compared to public schools. Many researchers have described English medium schools being well equipped with digital tools such as computers, projectors and access to digital libraries as compared to Urdu medium schools (Dogar, Butt, Butt & Qaisar, 2015; Khurshid, Shah & Reid, 2016; Siddiqui & Gorard, 2017). Access and exposure to these digital facilities influence English medium schools' students' skills and digital practices positively (Shabbir, Wei, Chong, Marwat, Nabi & Ahmed, 2014). On the other hand, Urdu medium school students' use of digital tools relies on their personal access to these tools at home (Salam, Jianqiu, Pathan & Lei, 2017).

Of all digital devices, there has been immense growth in popularity of smartphones in particular, in Pakistan in recent years. A news report published in *The Nation* (2016) claimed that the estimated smartphone user count in Pakistan would reach 40 million by the end of 2016. A number of researchers have investigated the effect of mobile technologies on the digital divide in developed countries (e.g., Lee, Park & Hwang, 2015; Mascheroni & Olafsson, 2015) and have argued that mobile technologies can help with 'leapfrogging' the digital divide in developing countries (Puspitasari & Ishii, 2016). The benefits of mobile devices in teaching and learning, especially teaching and learning of English language, have also been documented by many researchers (Kukulska-Hulme & Shield, 2008; El-Hussein & Cronje, 2010; Franklin, 2011; Mueller, Wood & Archer, 2011; Chen & Denoyelles, 2013; Oz, 2015). However, in Pakistan no research has been carried out yet to explore the use of smartphones in English language learning.

Building on previous research, the present study explores the digital practices of students for both educational and non-educational purposes in the specific context of Pakistan. It also gathers information on whether and how students are using mobile phones for learning English. Information

has been collected on students' previous digital and mobile assisted language learning (MALL) practices, as well as demographic factors (gender, medium of education during high school, and study major in their undergraduate studies) that may impact their digital and MALL practices, in order to establish what is currently being done, and to gain insights into how to maximise educational outcomes by integrating students' preferred digital devices. Hence, the present study attempts to answer the following research questions:

1. What are the digital practices of undergraduate students both in and out of the classroom in Pakistan?
2. Is there any difference in the digital practices of undergraduate students in Pakistan based on gender, study major, or medium of education?
3. What are undergraduate students' MALL practices for enhancing English language skills outside classrooms in Pakistan?

Methodology

The Digital Practices Survey was administered online. Several heads of departments at Bahauddin Zakariya University (BZU) in Pakistan were contacted to fully inform them about the study and seek their agreement to participate in the study. Following agreement from four department heads, information sheets were sent electronically for distribution to their students. The consent process for students was included in the initial part of the survey. It comprised yes/no questions requesting confirmation that the participants had received a full explanation about the study and had had an opportunity to ask questions. The voluntary nature of participation was reiterated, and confirmation was sought of the students' understanding that submission of the survey constituted their agreement to take part in the study. If consent was given to these questions, students were able to proceed to the next section of the survey.

Digital Practices Survey

The Digital Practices Survey was developed by the first author to identify

- technologies currently being used for educational and non-educational purposes;
- technologies being used to communicate with teachers and other students;
- use of smartphones to enhance English language skills;
- future preferences of students related to the use of technologies for educational, non-educational and English language learning purposes; and
- the extent to which gender, study major and medium of education impact on students' current use and future preferences of technology.

The existing Student Experiences and Expectations of Technology (SEET) survey, developed by Gosper *et al.* (2013), was drawn on to develop the Digital Practices Survey. The SEET survey explored students' current use and future preferences related to learning management systems and 25 other technologies for social and study purposes, to identify students' experiences and expectations of technology. It contains 127 questions arranged into five categories. The survey was administered online to undergraduate and post-graduate students studying full-time or part-time in three Australian universities, generating a data set of 10,269 participants.

Although the SEET (2013) survey shared some of the same objectives as the current study, it did not consider the impact of demographic differences between students on their use of technologies, and the differences in context, education system, and availability of technologies between Australia and Pakistan meant that the SEET survey was not fully applicable to the current study. In addition, a key

objective of this study was to not only understand trends among students in using technology for educational and non-educational purposes, but also to explore whether and how students were using their smartphones for learning English. As a result, the Digital Practices Survey drew on some of the questions from the SEET survey, with some major modifications and additions to cater for the differences noted above. Changes included the removal of technological tools that were included in the SEET survey but were not in common use in Pakistan, the inclusion of additional questions, including a full section related to the MALL practices of students, plus items to elicit additional demographic information that was of particular interest for this study.

The Digital Practices Survey comprised 120 questions organised in five sections. It was a combination of multiple choice tabular questions, open and closed questions, and yes/no questions. A four-point Likert scale; *never or rarely, a few times a month, a few times a week, and one or more times a day* was used to measure how often students currently used various technologies. The use of four-point Likert scale was chosen to avoid the middle option and to measure the frequency of the use of technology in a consistent way. Furthermore, a three-point Likert scale; *yes, yes and I would like to have training in it, and no, I would not* was used to document the future preferences of the students in the use of technology. The estimated time to complete the survey was approximately 20 minutes. Cronbach's Alpha (α) was calculated to measure the overall internal consistency reliability. The 0.95 value of α suggested that the survey was a reliable instrument.

The first section of the survey contained information and consent information. The second section sought background information including the students' age, gender, mother tongue, study major and semester. Students were also asked about the medium of education for their studies prior to beginning university education. Information about students' self-evaluation of their English for the four major language skills (speaking, listening, reading, and writing) was sought, as well as their access to technology hardware, locations where they accessed them, and the devices they used for studies. This section also contained separate questions related to their access, purpose and the duration of smartphone usage.

The third section of the survey explored participants' use of technology for educational and non-educational purposes. This section consisted of five items to collect information about the students' use of technology for studies (educational purposes), social life (non-educational purposes), and contacting their teachers and class fellows for academic purposes. Instant messages, text messages, phones calls, emails, Skype, Facebook, face-to-face meetings and other social networks such as Twitter and Instagram were included in the category of ways to communicate with teachers and other students. For social purposes, online computer games, online photo or video sharing, Wikis, FaceTime, Adobe Connect and Google hangouts were included in the above list. Since Gosper *et al.* (2013) point out that *the potential of technologies cannot always be judged in isolation from the purpose for which they are to be used* (p. 271), the technologies associated with studies were linked with learning activities in the survey. The overall reliability coefficient (Cronbach's Alpha: α) for this section was 0.92.

The fourth section of the Digital Practices Survey covered the use of smartphones for enhancing English language proficiency. It consisted of questions arranged in seven sub-categories to collect data on how participants used their smartphones for enhancing reading, writing, listening and speaking skills. It also contained items related to the use of smartphones for learning English vocabulary. Students' future preferences and beliefs about the use of smartphones for English language learning were also sought. The overall reliability coefficient (Cronbach's Alpha: α) for this section was 0.93.

The final section of the survey included five questions related to students' willingness to participate in learner training in MALL, plus a question seeking consent to use the information they provided in the

survey for academic publications. The instrument was piloted on eleven students at Department of English, Bahauddin Zakariya University Multan, Pakistan.

Participants

The target population for this study was students studying towards their undergraduate degrees at BZU. The participants had previously completed 12 years of education at different schools and colleges. The total population size was 319 students. However, three participants did not complete the full survey, resulting in a final data set of 316 (135 females and 181 male). The majority of the participants reported Urdu as their mother tongue (52%), with Punjabi (30%) and Siraiki (16%) the next most common mother tongues; none had English as their mother tongue. The students' ages ranged from 17 to 34 years. The participants were studying four different majors; Computer Sciences (CS), Humanities and Social sciences (HSS), Molecular Biology and Biotechnology (MBB) and Management Sciences (MS). They were studying in a variety of semesters, ranging from Semester 1 to Semester 8 which is the final semester of the undergraduate degree at BZU. Table 1 provides the number of participants from each discipline.

Table 1 *Participants from each discipline*

Major	Female	Male	Total
Computer Sciences	5	19	24
Humanities & Social Sciences	38	22	60
Molecular Biology & Biotechnology	36	28	64
Management Sciences	56	112	168
Total	135	181	316

Participants were also asked about the type of school they attended for their high school studies. The schools were divided based on two factors; status of school (private, public, religious/Madrassah) and medium of education at school (English, Urdu). Table 4.2 reports the institutions where students had been studying prior to entering their current level of studies. *Note: Due to the small number, the data related to Madrassah students were excluded from analysis.*

Table 2 *Participants' previous education institutions*

Medium	Private	Public	Total
Urdu-medium school students	72	87	159
English-medium school students	122	32	154
Madrassah students	0	3	3

When asked about number of years spent studying English, 16% of the participants reported that they had been studying English for less than five years, 35% had spent five to eleven years studying English, and 25% reported they had spent twelve or more years studying English.

Findings

The findings of the study are arranged and reported in sequence with the research questions. Firstly, students' access to digital tools and their use of technology for educational and non-educational purposes is reported. Secondly, students' use of smartphones for English language learning is described. Both of these findings are reported in relation to the independent variables of this study: gender, medium of education and study major.

Access to digital tools

Students were asked to indicate their access to digital hardware. For this purpose, seven digital tools were included in the survey:

1. Desktop or laptop computer at home
2. Tablet (e.g. iPad, Samsung Galaxy or similar)
3. Own laptop at university
4. University provided computer on campus (e.g. in labs, library)
5. Smartphone (e.g. iPhone, Android, Blackberry)
6. eBook reader (e.g. Kindle, Noodle)
7. Other devices with internet access (e.g. game consoles)

These digital tools were chosen after careful consideration of the availability of digital tools to students in Pakistan and debriefing with the pilot study participants. The results of the study revealed that the most common digital tool accessed by undergraduate students in Pakistan was smartphones, followed by a desktop or laptop computer at home. Figure 1 presents the students' reported access to the digital tools.

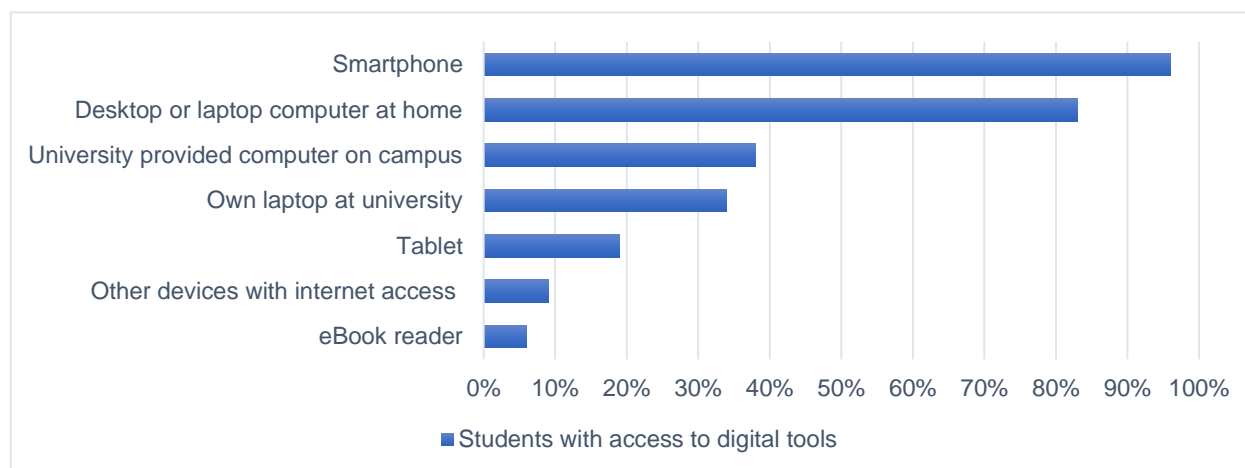


Figure 1 Digital tools accessed by undergraduate students

Although there was minimal difference between Urdu-medium and English-medium students' access to a desktop or laptop at home (83%-84% of students from both the groups had access), bringing their own laptop to university was not as popular among Urdu-medium students (28%) compared to students from English-medium schools (40%). Similarly, tablets were less common among Urdu-medium students (14%) compared to English-medium students (25%).

The data were also analysed to explore the relationship between the study major and undergraduate students' access to digital tools. Differences emerged in relation to this variable. The CS students showed an overall higher access to digital tools. Access to tablets (38%), own laptop at university (46%), university provided computers on campus (46%) and other devices with internet access (21%) was noticeably greater among CS students compared to the students with the other three study majors.

A related question investigated which of the digital tools were used for study purposes. The results revealed that a desktop or a laptop at home were the most common digital tools used for studies (78%). Fifty percent of students reported using smartphones for this purpose. The students' own laptop at university or a university provided computer on campus was a less popular choice for study-related

purposes (26% and 30% respectively). Eighty-five percent of participants reported accessing digital tools from home daily or a few times per week, and 40% to 50% of students accessed these tools on campus and on the move.

Use of technology to communicate with students for study-related purposes

An overview of which technologies were being used by undergraduate students to communicate with other students for study-related purposes is provided in Figure 2. The results indicated that text messages (72%), face-to-face meetings (59%), instant messages (49%) and Facebook (47%) were being used most frequently (one or more times a day) to connect with students. A high proportion of students were using email a few or more times during a week (39%), compared to those using email every day (21%). Skype and other social networks such as Twitter and Instagram were among the least used technologies for this purpose.

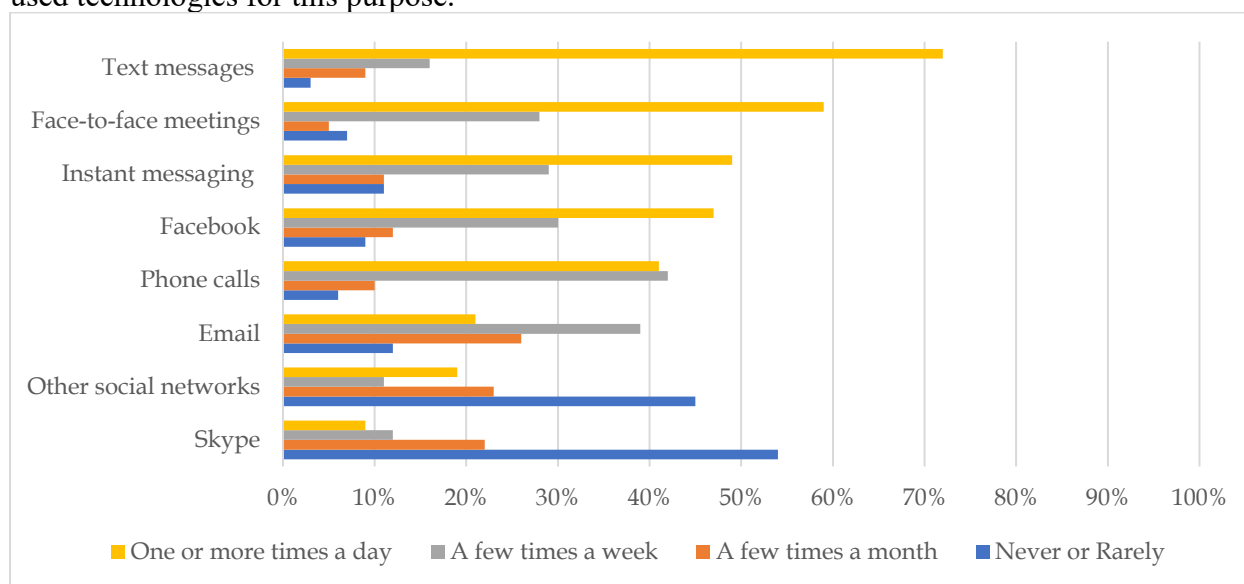


Figure 2 Current use of technologies to communicate with students for study purposes

Analysis based on participants' study majors revealed differences in the use of technology. All CS students were using phone calls to communicate with students, ranging from one or more times a day to a few times a week. Usage of email by CS students was also much higher than the other three study major students, with 75% of CS students reporting they used emails for this purpose on a daily basis, compared to 19% of MBB students, 23% of MS students and 3% of SS students. Minimal difference was found in the use of technology between Urdu-medium and English-medium students. Both these groups preferred using face-to-face meetings, Facebook, instant messages and text messages every day to communicate with other students for study-related purposes.

Male students seemed to be more actively involved in the use of technology to communicate with their fellow students compared to female students. Although there was a slight digital gender gap in the use of instant messages, text messages and face-to-face meeting, male students were using emails (70% male and 46% female students), phone calls (89% male and 75% female students), Skype (30% male and 10% female students), and Facebook (82% male and 73% female students) more frequently compared to female students.

Use of technology to communicate with university teachers

The participants' modes of communicating with their teachers are shown in Figure 3.

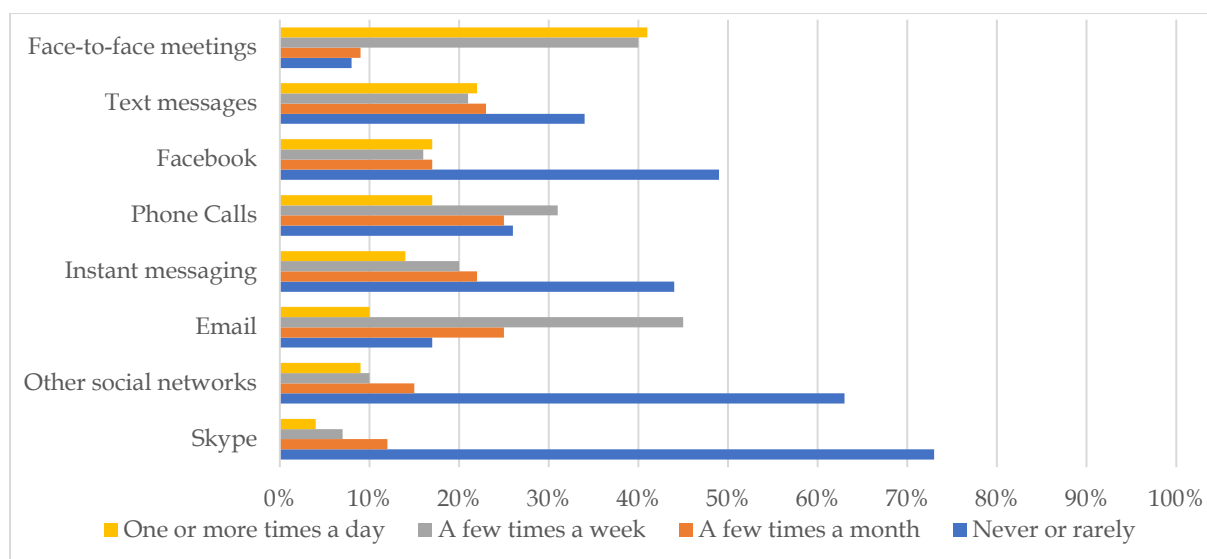


Figure 3 *Current use of technologies to communicate with university teachers*

A comparison of these results with those in Figure 2 reveals that the students were using less technology to communicate with their teachers compared to their communication with other students for learning purposes. Further, the students were relying on face-to-face meetings rather than using any digital tools for communication with their teachers. Students' use of technology to communicate with university teachers occurred more frequently on a weekly rather than a daily basis. This was most apparent with email use, with 45% of students using email for this purpose weekly compared with 10% using them daily. Similarly, 31% of students were making phone calls to their teachers weekly compared to 17% of the students contacting their teachers daily through phone calls. It was also found that Facebook was used much more frequently by male students (39% students using it daily or once or more time a week) to communicate with their teachers compared to female students (25% female students were using Facebook daily or weekly).

Use of technology for non-educational purposes

The most common technology being used daily for social purposes (i.e. the purposes which are not associated with their studies) by the students was text messages (84%). Facebook and instant messaging were also used by a majority of the students daily for non-educational purposes (71% and 61% respectively). Twitter and Skype were the least used digital technologies for this purpose. Figure 4 provides further detail on the use of technology among these undergraduate students for non-educational purposes.

The MBB students relied on only three technologies, text messaging (87%), Facebook (69%), and instant messaging (52%) one or more times a day. The CS students also reported relatively higher daily use of Wikis (38%), Facetime, Adobe Connect, or Google Hangouts (38%) and emails (46%) for social purposes when compared to the other study major students. Along with instant messaging, text messaging and Facebook, the SS students were also using online computer games (40%) and photo or video sharing on the web (33%) for non-educational interactions on daily basis. Figure 5 displays a comparison of daily use of technologies for non-educational purposes by different study major students.

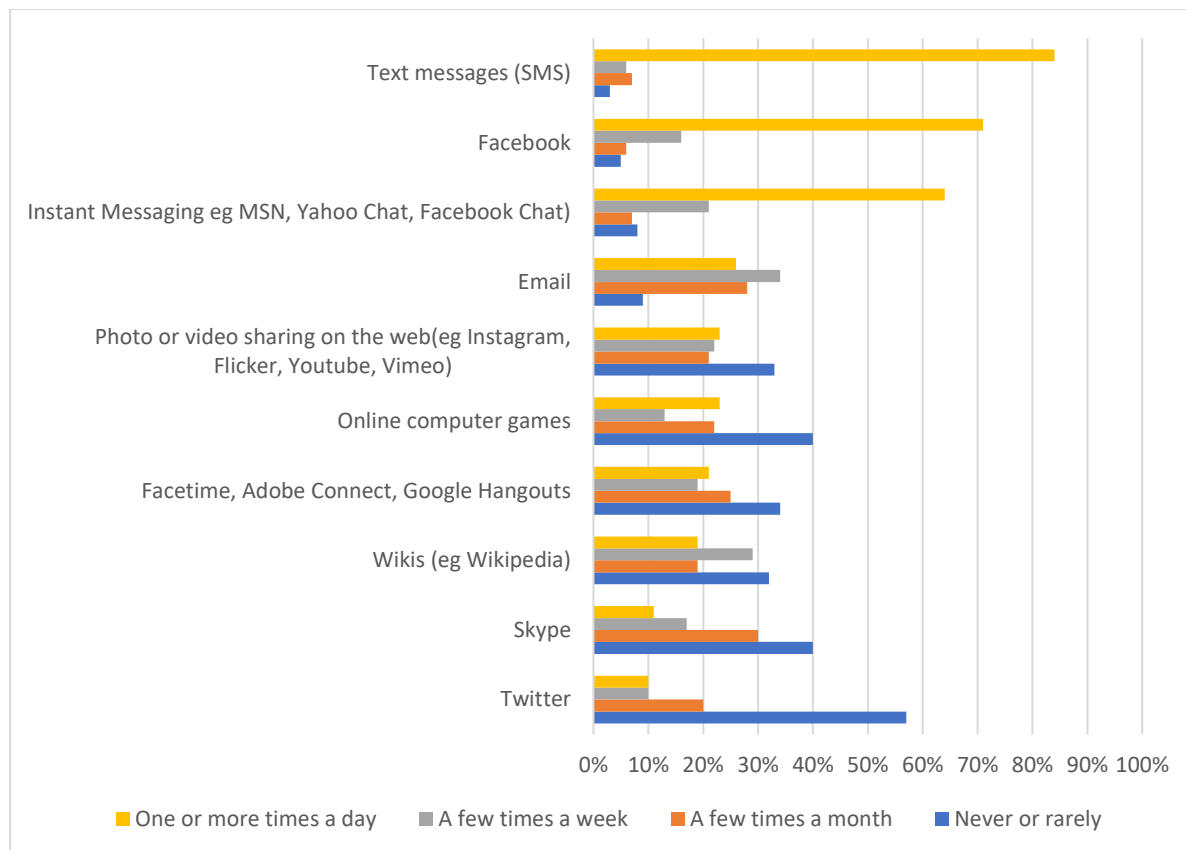


Figure 4 Current use of technology for non-educational purposes

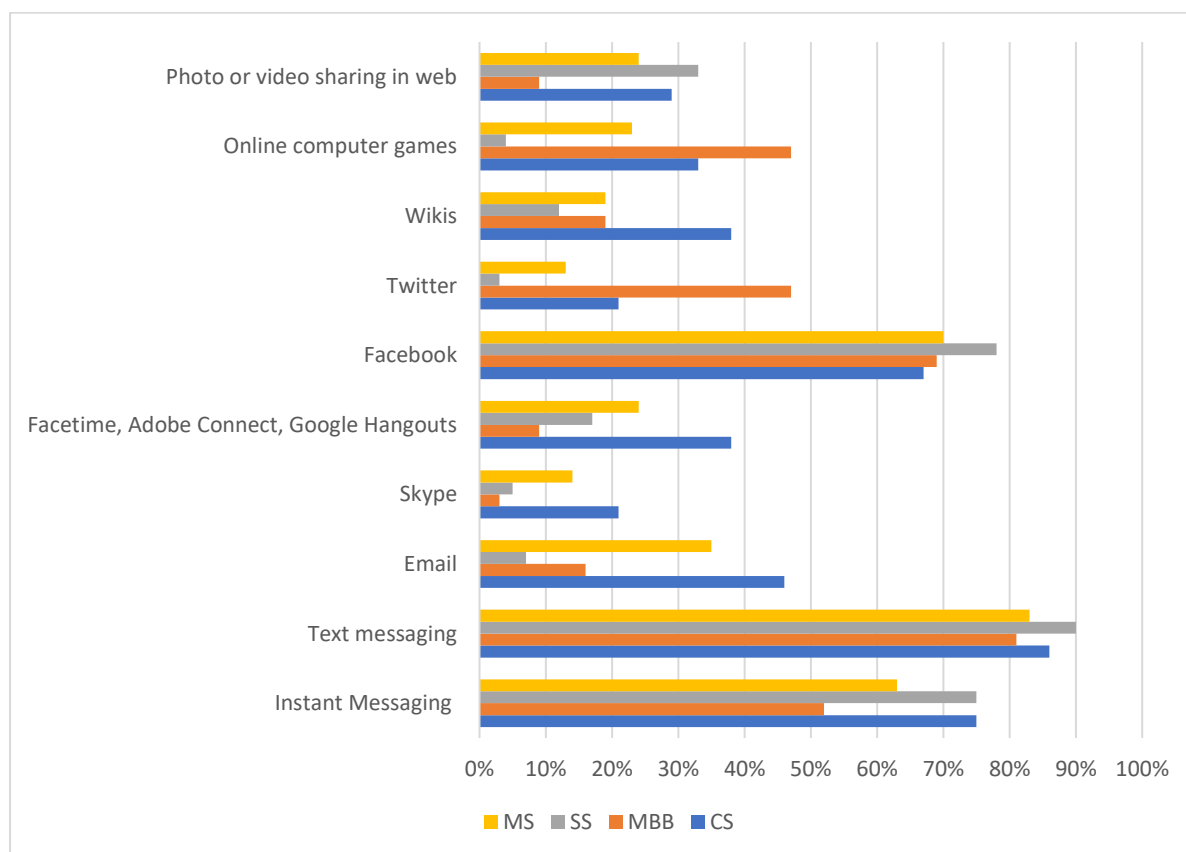


Figure 5 Daily use of technologies for social purposes by different study major students

Although female students showed less usage of these technologies overall, the gender digital gap was not as evident in their use for social purposes. Text messages, instant messages and Facebook were the most common technologies used overall by both male and female students, with Twitter and Skype among the least used technologies.

The results for relationship between medium of education and the use of technology for social purposes was as expected: English-medium students reported using technology more frequently than Urdu-medium students. However, a higher proportion of Urdu-medium students (30%) used online computer games on daily basis compared to English-medium students (17%).

Use of technology for educational purposes

Eight different activities involving use of technology were presented in the survey to explore undergraduate students' use of technology for educational purposes. Students were asked to identify how often they engaged in the given learning activities for their studies. Overall, the results revealed that students' engagement with the technology for educational purposes was low. Although many students used internet search engines and Wikipedia on a daily or weekly basis (84% and 64% respectively), and Facebook for group activities (60%), frequency of use for educational purposes was low overall compared to non-educational use (see Figures 4 and 6).

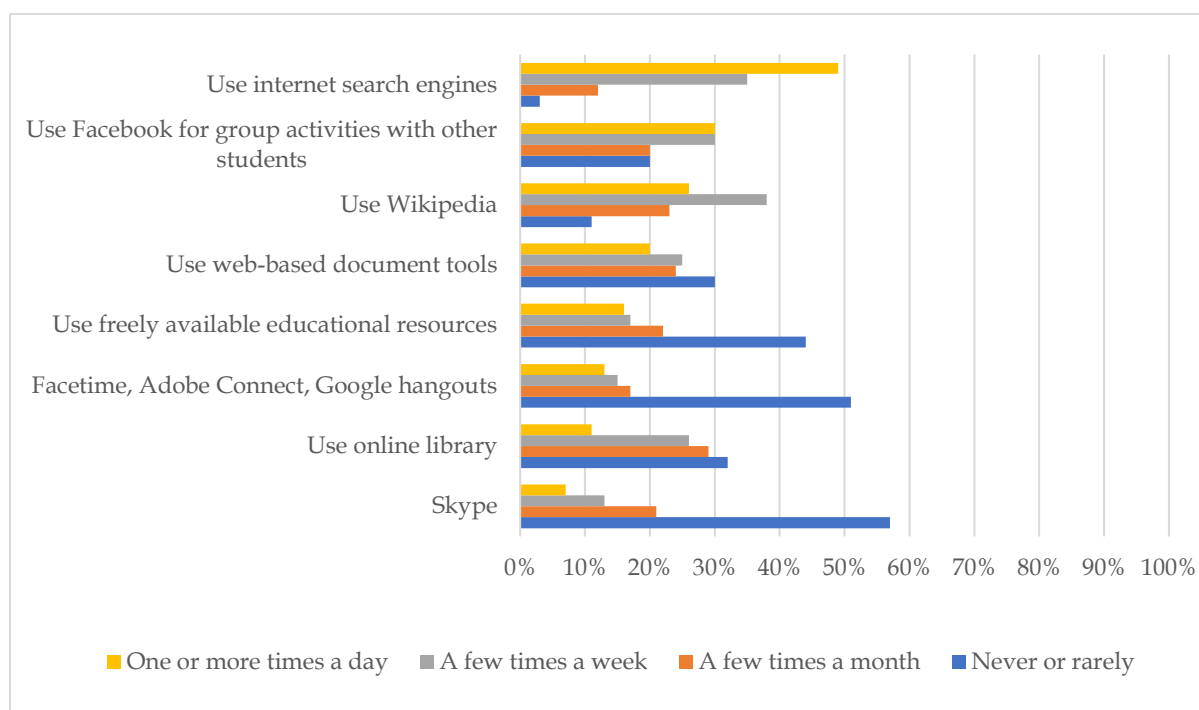


Figure 6 *Current use of technology for educational purposes*

Given the other results thus far, the results based on study majors were not surprising. On average, the CS students (60%) were using more technology for their studies on daily or weekly basis as compared to SS (36%), MS (50%) and MBB students (43%). More than 50% of the CS students reported using freely available educational resources, such as Khan Academy, and web-based document tools for learning purposes. Use of technology for educational purposes was similar between students with Urdu- or English-medium education, and between male and female students. Figure 7 shows students' preferences for future use of technology for educational purposes.

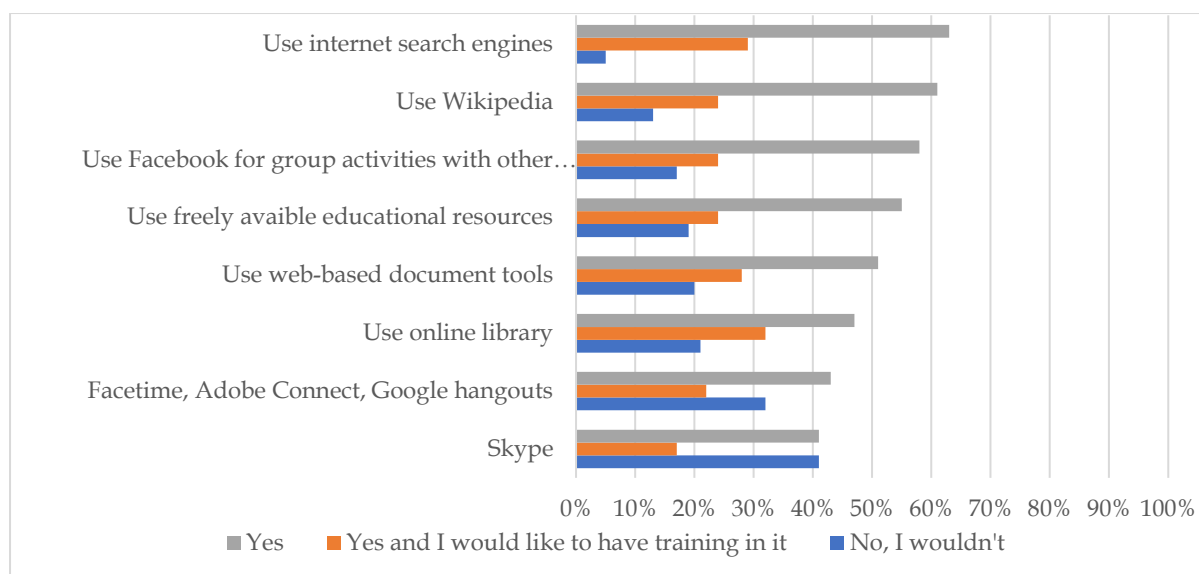


Figure 7 Preferences for future use of technology for educational purposes

Students' current use of technologies revealed Skype and Facetime, Adobe Connect and Google hangouts as the least used technologies. However, both male and female students reported they were more interested in using Facetime, Adobe Connect and Google Hangouts more in the future for their studies; the majority of male and female students indicated that they would like to use these technologies or would like to have training in how to use them (70% and 65% respectively). Overall, most students were interested in using internet search engines and Facebook for group activities, although, as Figure 6 indicates, over half the participants indicated an interest in greater future use of each of the options.

Analysis of the data in relation to the students' majors indicated that the majority of students in each of the faculty cohorts were interested in greater use of technology for their studies in the future and/or would like to have training for this. The findings also revealed some distinctions between current use and future preferences for technology in some study majors. For example, none of the SS students used Skype every day, and just 10% reported using it a few times a week, yet 53% of this group of students reported interest in using Skype in the future. Further, of these students, it appears that almost all felt capable of using Skype for study purposes, as only 5% of the SS cohort reported they would like training in using Skype.

Interest in further training was strongest overall in the CS major group, particularly for the use of internet search engines (54%) and Wikipedia (42%).

Use of smartphones for English language learning

This section examines the responses of undergraduate students related to the third research question reports the results for third research question: *What are undergraduate students' MALL practices for enhancing English language skills outside classrooms in Pakistan?* The results are further analysed in relation to the three variables of the study; gender, study major and medium of education.

As reported earlier, smartphones were the most commonly accessed digital tool among the participants (96% of students had access to smartphones). However, only 50% of the participants reported using smartphones for their studies. The majority of the students (53%) had been using smartphones for one to two years. Only 22% had more than two years' experience in their use, and 25% were new to the smartphones with less than one year of experience. Figure 8 presents the general practices in

smartphone use among the groups in this study.

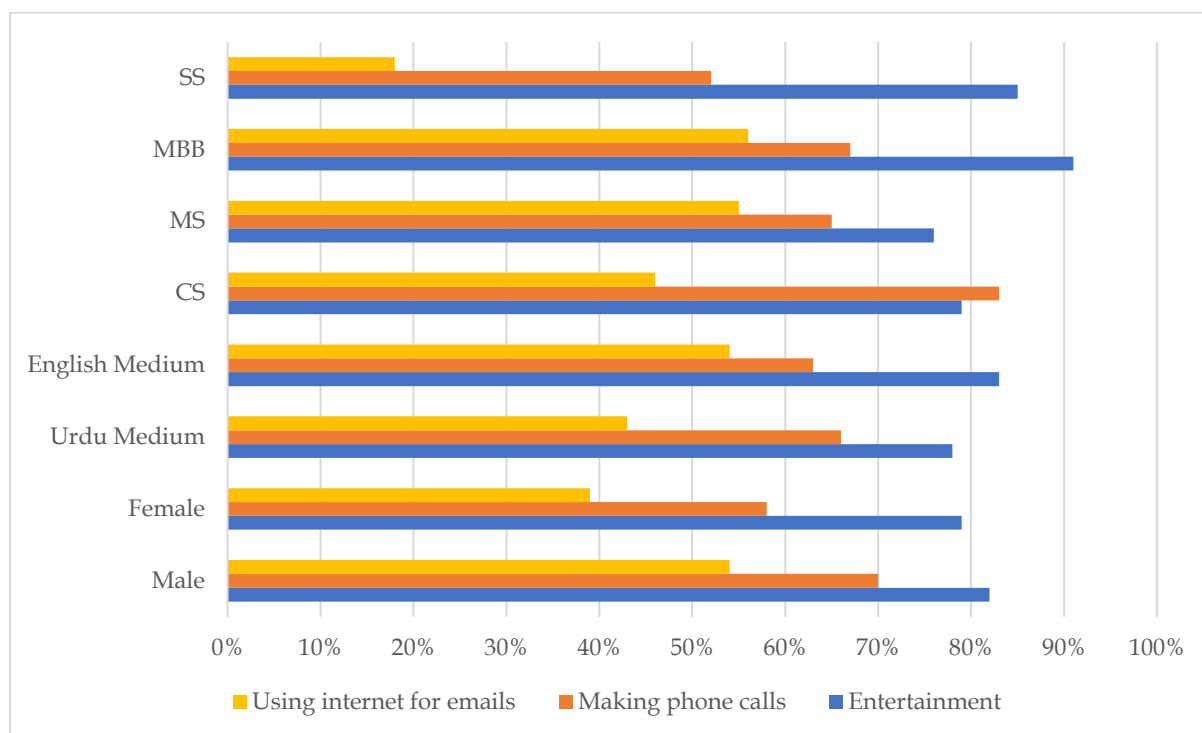


Figure 8 General practices of students in using smartphones

Use of smartphones to enhance reading and writing skills

To explore their current use of smartphones to enhance English reading and writing skills, students were asked to respond to a number of statements using a four-point Likert scale: *never or rarely, a few times a month, a few times a week, and one or more times a day*. As indicated in Figure 8, only four smartphone features were being used by over half the students on a weekly or daily basis for enhancing their English language skills: 65% reported using smartphones to access English dictionaries and thesaurus; 54% used text messaging; and 52% used Google Translate frequently on daily or weekly basis for this purpose. Although 54% of students used their smartphones' memory to store reading materials for the ease of access at anytime, anywhere, just 33% used them for reading e-books.

The use of smartphones for storing reading materials and for text messaging to practice every day English was less frequent among Urdu-medium students (49% and 46% respectively) compared to the English-medium students (60% and 61% respectively). The CS students reported greater daily use of their smartphone for storing reading materials (52%) and taking a photo and writing about it (42%) than students in MBB major (15% and 11% respectively), MS major (27% and 21% respectively) and SS major (22% and 21% respectively).

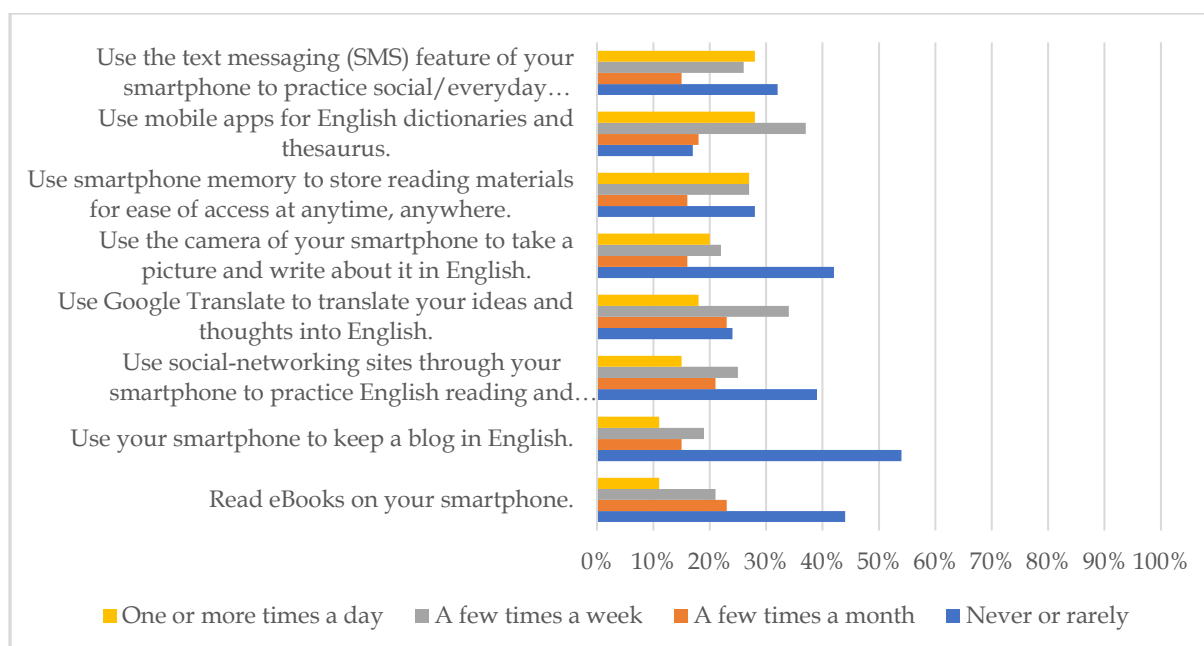


Figure 9 Current use of smartphones to enhance reading and writing skills

Future preferences: Results relating to the students' future preferences in the use of smartphones for enhancing their English reading and writing skills indicated that, on average, 57% reported wanting to use smartphones for this purpose in the future. As illustrated in Figure 10, an additional 26% of the participants indicated they would be interested in using each of the stated smartphone applications and would like to have training to do this in the future to enhance their reading and writing skills.

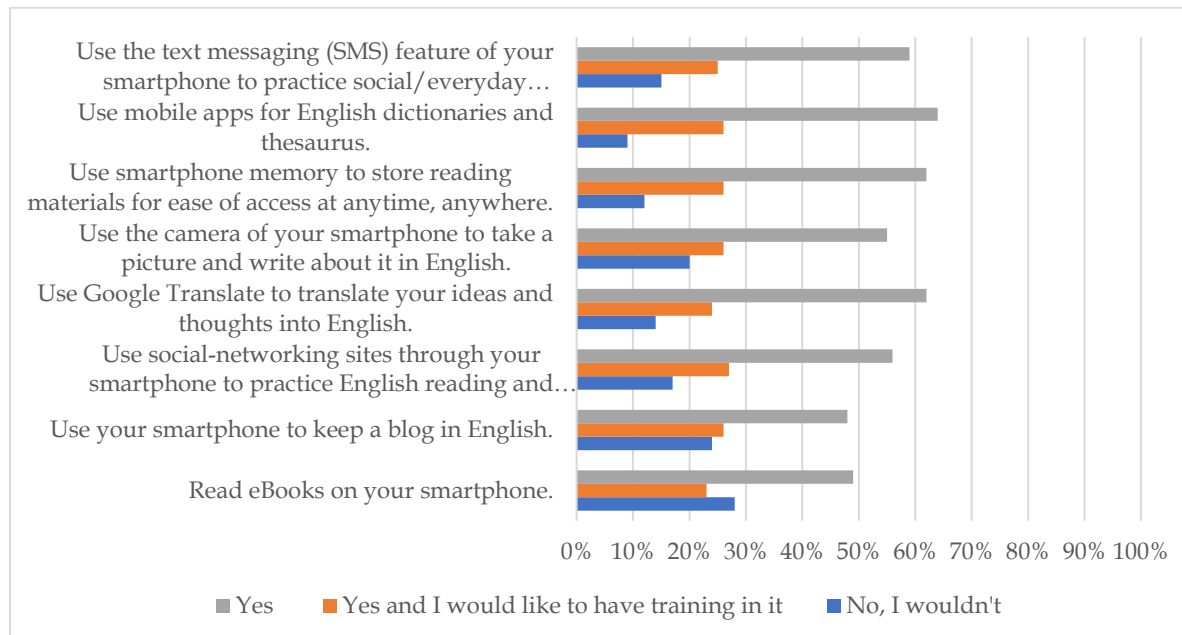


Figure 10 Preferences for future use of smartphones to enhance reading and writing skills

Use of smartphones to enhance listening and speaking skills

The results indicated a low usage of smartphones by the participants for enhancing their English speaking and listening skills. As shown in Figure 10, only 10% of the students reported using smartphones on daily basis to practice listening and speaking skills. The voice calling and voice

recording features were the least used features for this purpose.

Overall, female students demonstrated a slightly less frequent use of the smartphones for listening and speaking skills compared to male students. However, a bigger difference was found in the use of the voice calling feature to practice speaking skills with a fellow student, with just 19% of female students using this at least a few times a week compared to 30% of male students. A difference was also found between Urdu-medium students and English-medium students in their daily use of smartphone memory to store English listening materials to be used for practicing English listening skills at anytime, anywhere (11% and 19% respectively). On average, The CS major students reported more frequent English language learning practices (one or more times a day or a week) using their smartphones than the SS, MS and MBB study majors (48%, 15%, 30% and 23% respectively).

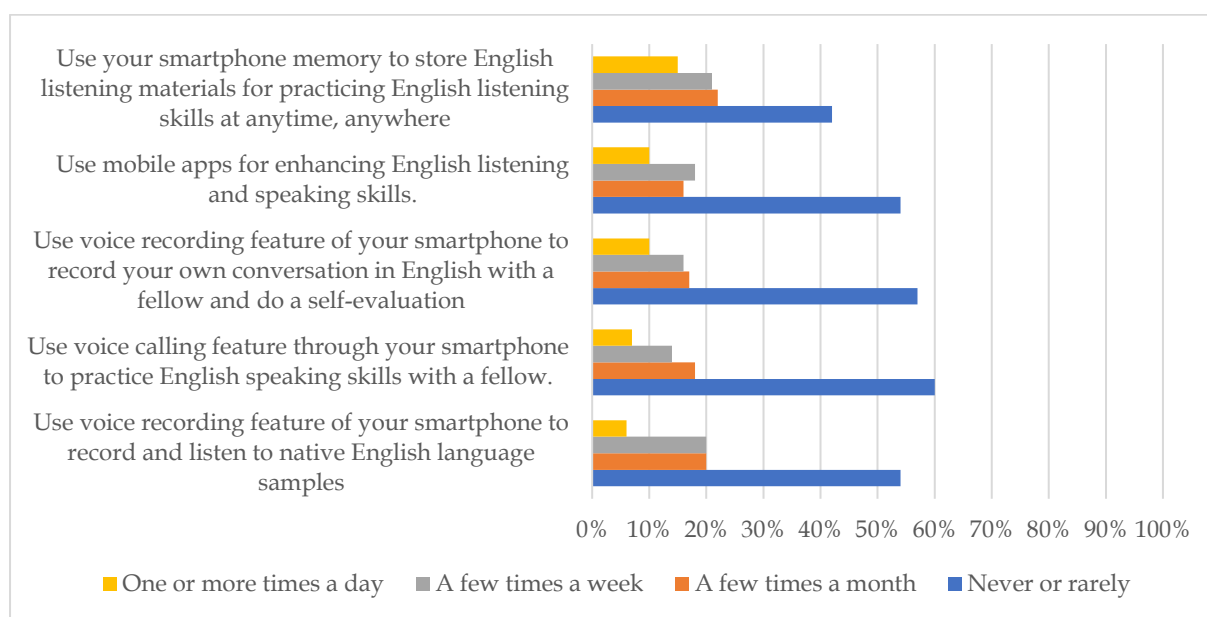


Figure 11 *Current use of smartphones to enhance listening and speaking skills*

Future preferences: The results for students' future preferences indicated that the majority of students did not see smartphones as a learning tool for English listening and speaking skills. On average, 51% students reported that they did not want to use smartphones in different activities aimed at enhancing English listening and speaking skills. However, 24% reported they were not only interested in using smartphones, but they wanted to have training in using them for developing their listening and speaking skills. Figure 12 shows the results in relation to each of the smartphone applications for this purpose. A comparison of Figure 9 and Figure 11 provides an indication of the contrast between participants' interest in future use of smartphones to enhance reading and writing skills versus for listening and speaking skills. Overall, 83% of the students indicated their future preference for the use of smartphones for enhancing their English reading and writing skills. On the other hand, only 49% of the students wanted to use smartphones in future to improve their listening and speaking skills.

Use of smartphones to enhance English vocabulary

The last set of questions in this part of the survey sought information about the frequency of students' current use as well as future preferences in the use of smartphones for enhancing English vocabulary. As seen in Figure 13, use of smartphones for learning English vocabulary was not common among the majority of the students. However, as Figure 14 illustrates, participants' reported a high level of interest in future use of mobile phones for this purpose.

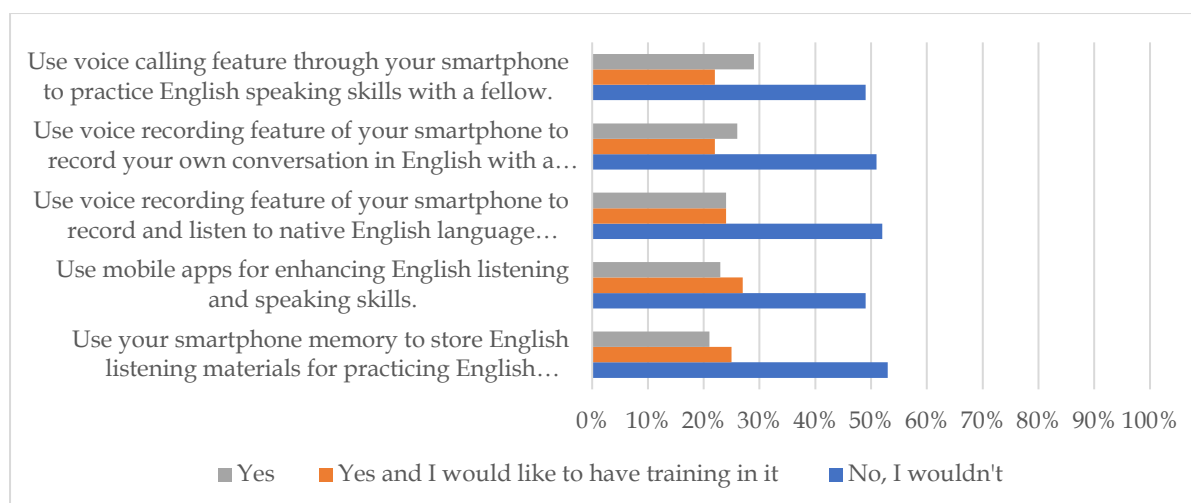


Figure 12 Preferences for future use of smartphones to enhance listening and speaking skills

The CS major students reported a higher level of interest in training in order to enhance listening and speaking skills compared to reading and writing (33% compared to 8% on average). Of particular interest to this group were mobile apps (such as Speakingpal, Audacity, and Listen & Speak), with 46% reporting they were interested in getting training in these to enhance their English listening and speaking skills, compared to 31% of MBB students, 26% of MS students, and just 17% of SS students.

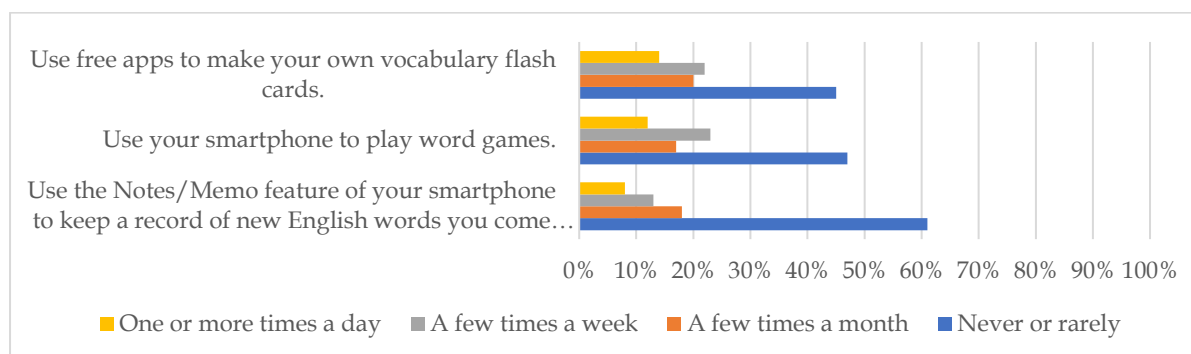


Figure 13 Current use of smartphones to enhance English vocabulary

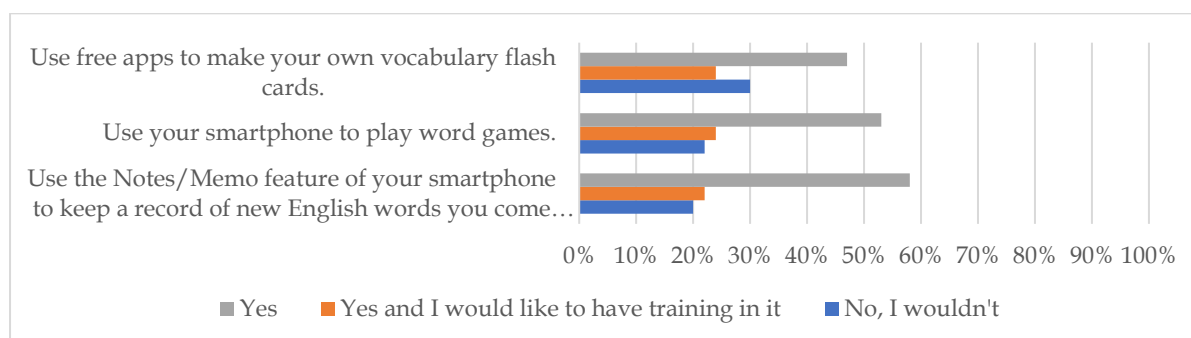


Figure 14 Preferences for future use of smartphones to enhance English vocabulary

A comparison between Figure 14 and Figure 12 suggests that the participants' perceived smartphones to be a better digital tool for future use to enhance English vocabulary than for listening and speaking skills. On average, 76% of students would like to use smartphones for future English vocabulary learning, compared to 49% who expressed interest in using them in future for learning English speaking and listening skills. In comparison, Figure 13 and Figure 9 suggest that future smartphone use is perceived to be of slightly more interest to the participants for improving reading and writing

skills than for vocabulary learning.

The CS students were high users of smartphones for vocabulary learning (on average 30% of the CS students were using it daily) compared to the MS, MMB and SS students (12%, 7% and 7% respectively). Differences were found between Urdu-medium and English-medium students in relation to playing word games and using notes or memo features on smartphones, with 43% of English-medium students using these at least a few times per week compared to 29% of the Urdu-medium students.

Discussion

This study explored undergraduate students' digital practices in Pakistan, with a focus on students' existing practices both in and out of the classroom, and, in particular, their use of smartphones for enhancing English language skills. It also explored students' preferences for future use of digital tools for English language study and examined whether participants' digital practices differed according to gender, medium of education during their high school studies, or the study major at undergraduate level.

The findings from the Digital Practices Survey that was developed for this study revealed that undergraduate students in Pakistan are well equipped with digital tools, with smartphones the digital tool reported to be accessible by most participants (96%), followed by desktop computers or laptops at home (85%). These findings are aligned with the findings of Ahmed (2017) who reported that smartphone penetration rate in Pakistan has increased from 30% to around 50% in last couple of years. Although smartphones users belong to all age groups in Pakistan, 77% of them are aged between 21 to 30 years. Furthermore, Pakistan has been placed among four developing countries by Google, from where the next billion users of smartphones will emerge (Google puts Pakistan among 4 countries that will give next billion smartphone users, 2017). With this large ownership and access, and even higher rates predicted, smartphones present a valuable opportunity to capitalize on this digital tool for educational purposes.

The present study found that although the majority of the participants were using desktop or laptop computers at home for study-related purposes, bringing their own computers to university or using university provided computers was not popular. The use of digital tools for study on campus was limited primarily to smartphones. The limited use of computers for study-related purposes on campus could be due to the lecture-style teaching methods adopted by most teachers in this context, and the absence of a learning management system at the university concerned. Ammar et al. (2015) pointed out that teaching methods was a neglected area in Pakistan. Many researchers have found that teachers solely relied on the lecture method, which makes teaching more teacher-centered and students remain passive listeners, at tertiary level in Pakistan (Sajjad, 2011; Hameed & Jan, 2016; Mohammad, Masum, Ali & Baksh, 2017). In a study conducted by Sahito, Siddique, Khawaja, Shaheen, Saeed and Laghari (2017) at undergraduate level in Pakistan, 90% of the students reported their dissatisfaction about lack of use of digital resources during teaching. In relation to this, Khokhar and Javaid (2016) reported similar findings in Pakistani context, proposing that a lack of ICT policy and training for teachers resulted in less use of ICT equipment in educational institutions. This could be a factor in the minimal use of personal computers on campus reported in the current study.

This study revealed a gap between the use of digital technologies for educational and non-educational purposes, with students being more inclined to use digital tools for non-educational purposes. The most common digital activity overall was communicating through text-messages. Text-messaging, Facebook and instant messaging were the most common tools used daily for non-educational purposes.

In comparison, students' engagement with technology for their studies was low, with students' most common educational use being search engines and Wikipedia to look for information and using Facebook for group activities. It was interesting to note that the use of freely available educational resources and online libraries by the participants was minimal, which may indicate a lack of knowledge and/or awareness of the availability of these tools. Bashir, Mahmood, and Shafique (2016) claimed that the use of internet for academic and non-academic purposes by tertiary students in Pakistan is based on their self-learning. These students do not seek help from library staff, support staff or attend internet training classes. Hence their knowledge and skills in the use of Internet and freely available educational resources through Internet are very limited. Bashir, Mahmood, and Shafique (2016) suggested that the Higher Education Commission in Pakistan should plan and organize specialized training programs for these studies.

Students' use of text messaging, instant messages and Facebook to communicate with other students could indicate that the students considered these to be non-formal means of communication and they, therefore, may not see them as relevant or appropriate for communication with their teachers. On the other hand, students preferred meeting their teachers face-to-face and used emails on a weekly basis to communicate with their teachers. This finding aligns with results from previous studies which found that the use of technology among college students was highly contextualised and it was hard for students to conceptualise the academic benefits of certain technologies that were otherwise used for non-academic purposes (Gosper et al., 2013; Swanson & Walker, 2015). Similarly, Gosper *et al.* (2013) found that the availability of new technology, in itself, did not necessarily mean that the tertiary students in their Australian study wanted to use them for educational purposes.

The results of Digital Practices Survey tentatively confirmed previous reports of an established digital gender gap among undergraduate students in Pakistan (Zakar, Zakar, Qureshi & Fischer, 2014; Chopra, 2017) and are also similar to the findings of other studies conducted in developing countries (e.g., Antonio & Tuffley, 2014; Abu-Shanab & Al-Jamal, 2015; Alozie & Akpan-Obong, 2017). Overall, male students in this study reported using digital tools more frequently for both educational and non-educational purposes than female students, although further statistical testing of this data is warranted. A recent report published in the Samaa TV also suggested this digital gap in Pakistan in the use of digital tools such as Facebook, where only 22% of the females were reported using Facebook as compared to 78% males (Pakistanis entering digital revolution with smartphones, 2017). Singh (2017) pointed out that in developing countries such as Pakistan, many structural and socio-economic factors such as lack of educational opportunities, inadequate infrastructure for ICT, and cultural preferences for boys are the major causes behind lesser access to and usage of ICT by women and girls. Singh (2017) further claimed that these factors contribute to psychological barriers for females in the form of lack of confidence, hesitation to participate in learning activities related to ICT, and considering ICT for men and the elite class only.

Differences in the use of technology among Urdu-medium and English-medium students were apparent in the findings of this study. Overall, English-medium students reported more use of technology both at home and on campus compared to Urdu-medium students for educational and non-educational purposes. However, there were some exceptions to this overall pattern; the strongest of these was that Urdu-medium students played online computer games more compared to English-medium students. As explained earlier, this increased use of technology by English-medium students can be related to availability and access to better digital facilities in schools.

Differences in patterns of use and purpose were also apparent between the different study major groups. Overall, students studying computer sciences reported greater access to digital tools compared to other students, and also a higher frequency of digital practices. Whether greater access was a factor in this

groups' more frequent use, or, conversely, their greater access was a result of these student's interest or need to engage digitally was not able to be determined from the findings. This warrants further investigation, particularly as differences between study majors may mean that a one-size-fits-all solution may not be the most appropriate course in some contexts and differentiated use of digital devices and tools may be of more value across the different faculties in an institution.

As stated earlier, a high percentage of students in this study had access to smartphones (96%). Although these were used by the students primarily for non-educational purposes, with only limited use to enhance English language skills, more than 80% of the participants reported an interest in using smartphones in the future, particularly to enhance vocabulary development and for reading and writing skills. Interestingly, very few of the students reported using smartphones to develop their listening and speaking skills, and less interest was shown for using them for this in the future, compared to for vocabulary, reading and writing development.

The findings of this study clearly indicate that although a substantial proportion of undergraduate students in Pakistan have access to digital tools, they are not using them for educational purposes. However, the high rate of smartphone access reported indicates that these are certainly available to most students to use to augment their studies, should they choose to. Given the high level of interest students in this study expressed for training in the future for at least some of the technologies and applications proposed, this suggests exploration of potential types of learner training for learners and tertiary educators in the context studied is warranted in order to capitalise on the interest students expressed.

Conclusion

This study of Pakistani undergraduate students' digital practices has implications for faculties, higher educational institutions in Pakistan, and possibly also in other developing countries. With growing awareness of the educational potential of some digital technologies, many tertiary providers have included technology as a part of their curriculum delivery in order to enhance the learning of students who are well equipped with digital tools. Some institutions also highlight their integration of technology as a point of difference in their institutional branding (Royo-Vela & Hünermund, 2016). However, the challenge for many providers in contexts where resources are more limited is to determine which technologies to adopt in order to maximise institutional and individual outcomes. Documenting students' existing digital practices and their future preferences, as has been done in this study, is an important step in this process.

The data from this study provide evidence that undergraduate students studying at BZU are aware of and have access to certain technologies and are interested in using at least some of them for study-related purposes. Smartphones, in particular, were accessible to almost all of the participants in this study, and, in the absence of a learning management system, could serve as a useful tool for communication between an institution and its students, as well as for teaching and learning purposes. A challenge for curriculum developers and teachers in the Pakistani context is how to best utilise the technologies that students are currently using for non-educational purposes as teaching and learning tools, and to prepare teachers and students for these developments.

Due to self-report data and lack of triangulation, the present descriptive study does not offer robust conclusions. However, several areas for future research investigation arise from the findings of this study. These include: documentation of teachers' perspectives on which technologies should be used for teaching and learning purposes at tertiary level in developing countries, and how; exploration of ways to manage and bridge potential gaps between digitally-savvy students and digitally-naïve

teachers; and how and by whom planning and provision of training for teachers and students will be managed. Further research could also include the use of the Digital Practices Survey in other private and public universities in Pakistan, in order to establish the extent to which the findings of this study are representative of the wider situation there, and also in other developing countries.

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