

Mobile learning through the pandemic

パンデミックにおけるモバイル学習

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Abstract

This study looks at student use of technology—how university students feel about using mobile language learning technology to learn English prior to and during the COVID-19 pandemic. Throughout the research period, starting three years before and extending two years into the pandemic, the data show little significant change in students' attitude to mobile learning in or out of the classroom. The closure of classrooms and the move to online remote learning did not dampen the enthusiasm for using their mobile devices. The paper begins with background on the growing field of mobile language learning including the theoretical and pedagogical concerns within this field. This is followed by a description of the study, participants, survey, and discussion of results. Although this study is limited to English language learning, the results can be applied outside the language learning sphere to any kind of learning with mobile technology.

Key words : Technology in language learning, Mobile learning, M-learning, Lifelong learning, Autonomy, Pandemic

概 要

本稿は、学生のテクノロジー活用、コロナ禍前およびコロナ禍の期間中において、大学生が英語学習のためのモバイルテクノロジー活用をどのように感じていたかに注目する。本研究の調査期間、すなわちコロナ禍前3年間とコロナ禍中の2年間を通して、本調査データでは教室内外および教室外でのモバイル学習に対する大学生の学習態度にほとんど重要な変化が見られなかった。対面授業の教室の閉鎖とオンラインでの遠隔授業への移行によって、学生が携帯機器を使う興味をそがれることはなかった。本稿では、理論的および教育的懸念を含みながら、まず拡大するモバイル言語学習分野の背景を述べる。次に、本研究の詳細、参加者、本研究の調査結果、考察を述べる。本研究は英語学習に限定されるものではあるが、この調査結果は言語学習分野のみならずモバイルテクノロジーを利用するいかなる学習にも適応することができる。

キーワード：言語学習におけるテクノロジー、モバイル学習、Mラーニング、生涯学習、自律性、パンデミック

INTRODUCTION

How will technology, and particularly mobile technology, inform teaching in the future?

Mobile and wireless technologies are considered by many an important component of the future of education and learning (Attwell, 2007; Shih & Mills, 2007; Bradford, 2010; Luciano, 2014; Monther et al., 2019). Literature in the field suggests many positive influences of mobile and wireless technology use in the classroom: “increased flexibility, engagement, critical thinking, collaboration and communication” (Cobcroft, 2006, p. 162). Luciano (2014) suggests “mobile technologies seem able to promote social inclusion mainly by increasing participation in learning, expanding learner choice, and favouring flexible or personalised learning programmes, which can take place everywhere and at any time” (p. 162). Technology has greatly changed teaching over the last 20 years. With its ability to be used anytime anywhere, mobile technology has the ability for learners to access quality materials no matter the context in which they find themselves. With thoughtful use and implementation, mobile and wireless technology will further transform teaching in the future.

Education has changed forever

The onset of the COVID-19 pandemic (pandemic) has forced emergency remote teaching and educational technology upon student and teacher alike. And, as the pandemic continues, educational technology has become indispensable in teaching and learning. We have gone from teaching in the classroom to teaching and learning in the living room via wireless technology (McCarty, 2020). Students and teachers have been forced into anonymous online education with both positive and negative feelings and results. The upshot of this has been confusion and exhaustion but also the innovative use of technology by educators and learners.

Technology has been used extensively to meet the challenges presented by the pandemic’s forced separation of teacher and student and become an important tool to support them in these changing times. Saikat et al. (2021) notes that “Stay-at-home orders and in-office and in-school environment closures brought an unprecedented number of learners and educators into the virtual [class] room” and that the pandemic “demonstrated the potential of M-learning as a medium to pursue education despite the challenges experienced by both learners and educators” (p. 2). In their wide-ranging review of literature dealing with mobile learning in the pandemic, Saikat et al. examined more than four-thousand pandemic related academic papers from all over the world and narrowed the field down to 22 that meet their criteria of demonstrating the benefits and challenges of using mobile learning during the pandemic. The selected papers revealed that the most significant benefits of using mobile learning were the cost effectiveness, mobility, flexibility, and organized content mobile devices offer. While the challenges were the lack of content, connectivity, and laboratory facilities. They noted that teachers were especially challenged by the time-consuming and complicated nature of preparing materials for mobile learning and thus needed guidance and support from administrators to better facilitate remote learning.

A definition of mobile learning

In the requisite literature, mobile learning is often referred to as mL, m-learning, mobile technology, and Mobile Assisted Language Learning (MALL) among others. Stockwell & Hubbard (2013) use Kukulska-Hulme’s (2013) definition of MALL as “mobile technologies in language learning, especially in situations

where device portability offers specific advantages” (p. 3701). Monther (2019) defines M-learning as “any learning that can take place on the move, or when learners use the advantages of mobile technology in learning” (p. 260). Luciano (2014) adds that mobile learning is simply “the use of mobile and wireless technologies for a range of learning experiences” (p. 163). There are difficulties in formulating a comprehensive definition due to the changing nature of technology, innovative products (hardware, software, and internet resources), and our limited understanding of this everchanging field of knowledge, its efficacy and utilization.

In this paper MALL, mobile technology, mL, M-learning are all referred to as mobile learning. Mobile learning is simply the use of mobile communication devices, mainly smartphones but also tablet and laptop computers, to learn. The participants in this study were learning English, but a person can learn anything with a mobile device.

MOBILE LEARNING

With the inevitable advancement of technology, ideas, hardware and software become outdated quickly, especially in the field of mobile language learning. What is new today is old tomorrow. In the not too distant past, students could make use of online resources accessed from desktop or laptop computers. Recently though, students have come to use their mobile devices to access new and more powerful language learning sites, applications, and resources. Smartphones and other mobile learning devices, as they become more powerful and smarter, offer a convenient way to incorporate digital technology into the learning process. The ubiquitous ownership of smartphones among students also means that access to online content can be used for a whole range of learning activities. For example, many publishers provide an online component for their texts and supply apps for smartphones to accompany them.

Mobile learning has become critical to everyday teaching and an indispensable aid during the pandemic. Anecdotal evidence has repeatedly supported the use of online resources and mobile devices to access them and that their use increases student motivation to study and use English (Cobcroft, 2006; Terhune, 2013). The consensus in language-learning literature is that technology-rich learning offers a transformative, accurate, and natural interactive experience that has become a requirement for students (Mullen et al., 2009; Wu et al., 2013). “Mobile learning provides an interesting and engaging opportunity for students who have little chance to use English for authentic communication” (Tsukamoto et al., 2009, p. 165). Language educators have noted that smartphones are an extremely interactive communication tool that can increase motivation and effectively assist language learning (Warschauer, 1996; Levy, 2009; Cobcroft, 2006; Terhune, 2015; Blilat et al., 2020).

Mobile technologies are becoming ubiquitous in education, but the wider implications of mobile technologies are not well understood (Luciano, 2014). By taking learning out of the classroom and into the real-world, mobile learning can be applied in a variety of contexts where language is being used, thus moving learning from the classroom to a much more dynamic environment. How does this stimulate and influence learning and how can it be used to the advantage of educators and learners?

Theoretical framework

Mobile language learning literature in the past tended to focus on connecting formal and informal contexts of learning (Kukulska-Hulme, 2016). Monther et al. (2019) suggests “findings from existing literature show that studying and reviewing mobile learning leads to a deeper understanding of its effect and possibilities

with respect to learning the English language” furthermore, “mobile technology has helped students carry their own personal small computers that contain exceptional computing power, such as laptops, tablets, cell phones and e-book readers” and “allows people to learn across contexts and without being restricted by location” (p. 257). Recent innovations have allowed a move from text-based learning to a much more engaging and useful technologically-based one with “many advantages such as spontaneity, portability and connectivity, blending, interactivity and collaboration” (Monther, 2019, p. 259). With the appropriate and innovative implementation of mobile learning technologies and online resources students can transform everyday activities into learning opportunities.

Wu et al. (2013) maintains “EFL has evolved from training to interact only with native speakers, to training to interact with others who also speak English as a second or foreign language” and that “effective use of technology is not just important but vital to preparing the student to function in the cosmopolitan international culture” (p. 525). Nonetheless, Levy (2009) warns successful use of technology depends on effective pedagogies to accompany them.

Mobile Pedagogy

Mobile learning offers an accepted, stimulating, and effective alternative approach to traditional teaching and learning that enhances language acquisition in and out of the classroom. Yet, “students need proper preparation, and the methodology needs pedagogical considerations for its use to be successful” (Terhune, 2015, p. 1073). Widdowson (1990) saw the need for language teaching to continually adapt to changes happening in the world. He argued:

The contexts of language teaching, like the more social contexts within which they are located, are continually changing, continually challenging habitual ways of thinking... Unless there is a corresponding process of critical appraisal, there can be no adaptation, no adjustment to change. (p. 172)

Kukulska-Hulme in *Mobile pedagogy for English language teaching: a guide for teachers* (2015) argues that a pedagogical framework for English language teachers has:

always aimed to make learning relevant to their learners’ lives and language needs. Mobile learning facilitates this by strengthening connections between people, and between the places where language is learned and used. Mobile learning takes advantage of powerful features on mobile phones and other devices that make it easy for users to create simple content (photos, videos, texts, recordings) and to share them with others. (p. 8)

Language learning now increasingly goes beyond the classroom forcing a convergence of formal and informal learning. In ‘*Mobile Learning Revolution: Implications for Language Pedagogy*’ Kukulska-Hulme et al. (2017) argues for a new pedagogic age where “teachers can exploit mobile technology to adapt and transform their practice by enabling authentically communicative learning opportunities for their students both in the classroom and beyond the classroom” (p. 3). Kukulska-Hulme et al. suggest a ‘mobile pedagogy’:

Mobile technologies, including cell phones and tablets, are a pervasive feature of everyday life with potential impact on teaching and learning. ‘Mobile pedagogy’ may seem like a contradiction in terms, since mobile learning often takes place physically beyond the teacher’s reach, outside the walls of the

classroom. While pedagogy implies careful planning, mobility exposes learners to the unexpected. A thoughtful pedagogical response to this reality involves new conceptualizations of what is to be learnt and new activity designs. This approach recognizes that learners may act in more self-determined ways beyond the classroom walls, where online interactions and mobile encounters influence their target language communication needs and interests. (p. 1)

Consequently, Kukulska-Hulme et al. argue that “teachers need to evaluate how learners are using mobile technology and adapt lesson plans to make use of their mobile devices and online resources” (p. 5). Taking advantage of student use of mobile technology will enable “authentically communicative learning opportunities for students both in and out of the classroom” (p. 3). Teachers should be free to craft their own unique teaching methods while being aware of the many different approaches and methods available to them and their students. They should be free to take learning out of the classroom and into the real world with the help of mobile devices.

Mobile learning, learner autonomy and a life of learning

Mobile learning technologies are uniquely qualified for lifelong and autonomous learning. Luciano (2014) quotes the European Parliament and Council (2006) documents:

‘lifelong learning’ means all general education, vocational education and training, non-formal education and informal learning undertaken throughout life, resulting in an improvement in knowledge, skills and competences within a personal, civic, social and/or employment-related perspective. (p. 164)

And in a related paper Kukulska-Hulme et al. (2017) adds that:

language learning should be an important lifelong pursuit, carried out in a variety of ways according to changing social, educational, and working life imperatives, as well as personal interests and needs. New technologies make a lifelong commitment to language learning much more feasible and attractive than was the case in the past. In particular, mobile technologies are uniquely suited to supporting language learning on an on-going basis, in a range of settings, according to a person’s ability and adapted to their needs. (p. 2)

In general, successful learners are successful independent learners throughout their lives. Mobile learning empowers student independence, encouraging them to becoming lifelong autonomous learners. Mobile learning and the online resources this technology grants access to gives students the enthusiasm, confidence and knowledge to act independently. Our job as educators is to empower students by coaching them on how they learn as individuals so they can have the confidence and knowledge necessary to act independently throughout their lives. Mobile learning and multimedia resources can cater to that independence and the many ways learners learn.

RESEARCH AND METHODOLOGY

Purpose

This paper investigates student attitudes to mobile language learning technology (mainly smartphones)

in second language learning to better enable personal learning and integrate its use in and out of the classroom. It strives to understand how smartphones can be less of a distraction to learning and more of an asset and gives guidance in how best to utilize mobile learning on an individual and institutional level. The study covers a five-year period prior to and during the first two years of the pandemic showing student use of and opinion on using technology and mobile technology to learn. Technology, especially mobile learning, can support and enhance our understanding of learning via the interactive nature and social interaction capabilities of smartphones. With the switch from face-to-face to remote learning being done several times in the last two years students' attitude on using mobile technology to navigate learning before and during the pandemic is important to consider and understand for a future that will increasingly rely on technology to solve problems.

Participants

The participants in this study are four-year university students studying communication and culture in Japan. They are first-, second-, third- and fourth-year students between 18 and 21 years old with their main language of interest being English. The students are digital natives—young people that have grown up in the digital age and are familiar with using technology (Prensky, 2001). As is typical with university students in Japan, nearly all own a smartphone and have access to a laptop or desktop computer at home or through the school. The instructor gives students the freedom to innovate and explore learning in their own way. Thus, the students have a choice of how to study in and out of class and, in this instructor's experience, often use technology over traditional methods like textbooks and paper notebooks. Events of the last few years have made the use of educational technology less of a choice but the students in this study made the transition relatively easily. In many instances students guide the instructor in the use of technology for learning. The classes involved in the data are a mix of topics, but all are taught in English. Anecdotally, students' attitudes towards using and learning English is generally very good as is their attitude towards using technology for learning.

Surveys

The surveys were end-of-semester questionnaires with 34 questions about the class, materials and students use of technology. The questionnaires were administered anonymously over a six-year period before and during the pandemic from 2016 to 2021 with no data in 2019. It generally took students about 15 to 20 minutes to complete the 34 questions. It was conducted online in English using the Moodle course management system. The instructor had confidence that students had no difficulty understanding the content. Students used laptop computers and smartphones to answer the questions.

Six questions out of the 34 were selected for discussion in this paper. These questions span the time prior to (before 2019) and during the pandemic (2020–2021). They give a good indication of how students felt about using technology and mobile devices for learning and how these feelings changed pre- and post-pandemic. Of course, many other questions were asked but due to relevancy they will not be discussed here. To compare across years, the data were converted into percentage values.

Likert scale & divergent stacked bar charts

Likert scale questions were selected to determine central tendency of student statements about their feelings towards use of technology and mobile technology for learning. "The Likert scale works particularly well in the context of a series of questions that seek to elicit attitudinal information about one specific matter" (Rea

& Parker, 1997, p. 60). The students responded by selecting *strongly agree*, *agree*, *neutral* (neither agree nor disagree), *disagree*, or *strongly disagree*. Divergent stacked bar charts were selected for the presentation of these results for their clear graphic representation (Pirrone, 2020; Vidya, 2018). Positive results (*strongly agree*, *agree*) are listed as positive percentage values and negative results (*disagree*, *strongly disagree*) are listed as negative percentage values. Neutral results are split evenly between positive and negative values in the charts. Some divergent stacked bar charts eliminate the neutral values but here they are presented to show the percentage of students that had no opinion on a topic. See Appendix 1 for numeric data.

Survey questions and results

1. I like using a computer to learn English more than a traditional textbook.

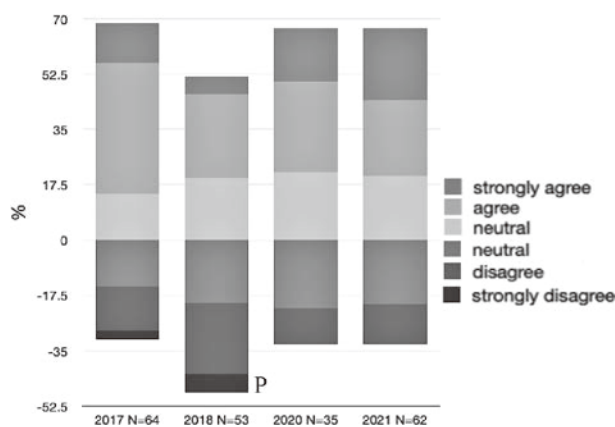


Figure 1

This question shows students enthusiasm for using technology did not decline and possible increased during the pandemic period.

2. I would rather use a smartphone in class instead of a computer or laptop computer.

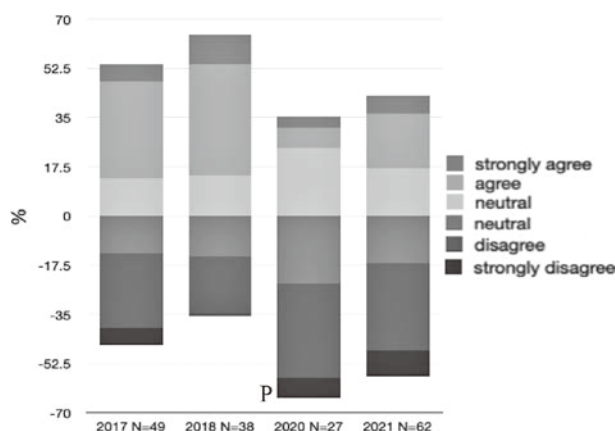


Figure 2

Pre-pandemic students were quite enthusiastic about using smartphones in class. In 2020 the pandemic

emerged and in class teaching was less frequent and screen learning increased. As the amount of screen time increased, it appears positive sentiment and the need for a small-screened smartphone decreased. At this time most students were taking classes online at home and could make use of a desktop computer. In addition, the fact that they are not having to travel to school where they only bring their smartphones for its mobile convenience may have influenced the students and therefore these results.

3. I prefer to use a mobile device like a smartphone or tablet computer rather than a desktop computer to learn English.

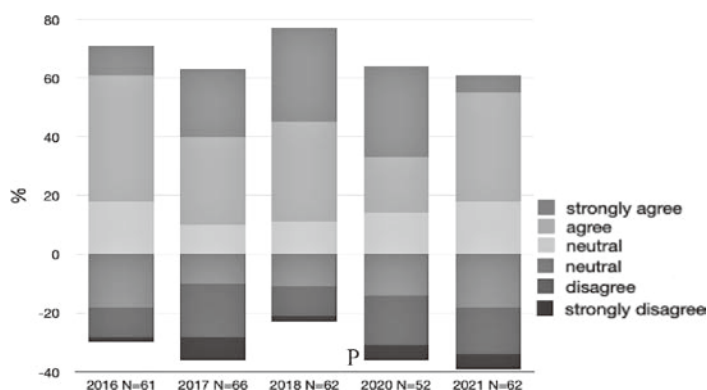


Figure 3

This question leaves out the in-class portion and asks more generally what mode of learning students prefer to use overall. The pre- to post-pandemic decrease was not as great in this more general question. The overall enthusiasm for using mobile devices like smartphones remained positive with students preferring the mobility offered with their smartphones.

4. It is unfair for teachers to ask students to use their smartphones to do schoolwork.

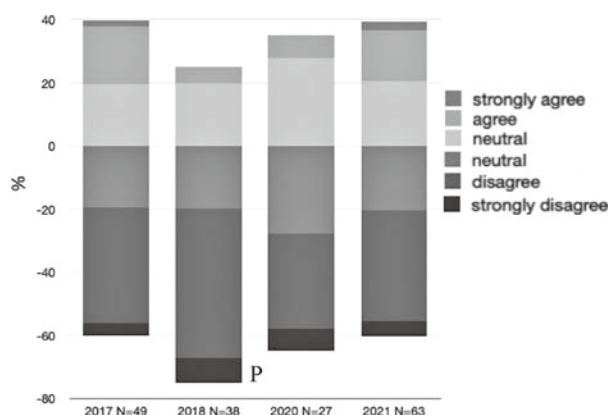


Figure 4

The ethics of asking students to use their personal smartphones for schoolwork has long been a concern of educators but these students did not seem to mind. Very few had a strong negative opinion about this and most felt it was not a problem, disagreeing or strongly disagreeing with the statement.

5. How much do you use your smartphone for school/learning related activities?

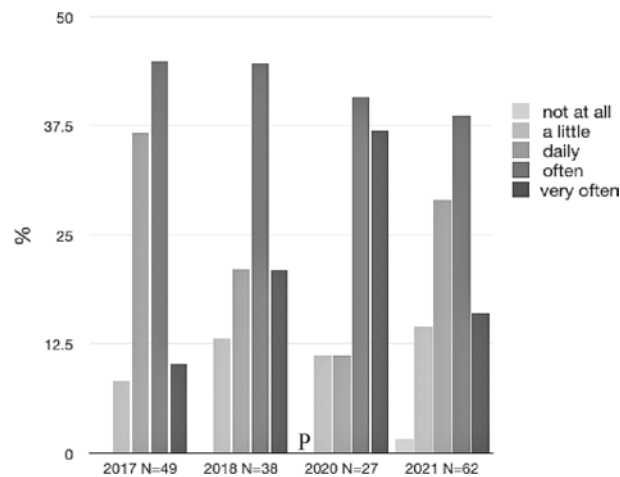


Figure 5

Here the researcher used a scaled response series that asked students to subjectively rate themselves on how much they felt they used their smartphone for school or learning related activities (*not at all, a little, daily, often, very often*). Overall, 'daily' to 'very often' was the overwhelming response. Few students indicated 'a little' and over the course of the four years and 176 students asked, only one indicated 'not at all' (see Appendix 1).

6. Choose the statement below that best describes your feelings about using a smartphone for schoolwork.

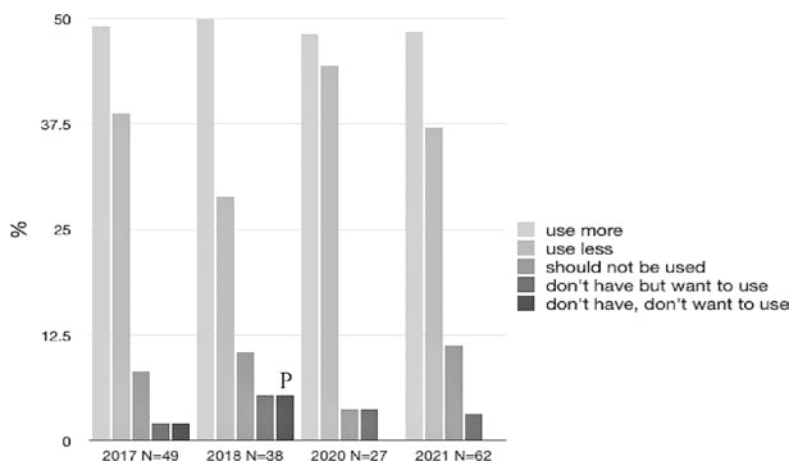


Figure 6

In this scaled response series, students were asked if they thought smartphones should be used for schoolwork. The students were asked to select a statement in a series that describes their feelings about 'using smartphones for schoolwork' – 'use more', 'use less', 'should not be used', 'don't have but want to use' or 'don't have and don't want to use'.

Very few students were against using smartphones for schoolwork shown by not selecting 'should

not be used’ or *‘didn’t have and don’t want to use’* often. Roughly half the students thought smartphones should be *‘used more’* with fewer saying smartphones should be *‘used less’*. These values do not change much pre- to post-pandemic. As is consistent with the other data collected, students that are positive about using smartphones for learning are in the majority.

Limitations

The data presented in this study are subject to a number of limitations. Considering the ‘do it anywhere’ ability of mobile learning many students do this at home, often in their bedroom, thus problems of privacy are unavoidable and uncomfortable. A class discussion on these problems can help prepare students for the challenges of adapting to technology and this way of communicating with their classmates (Terhune, 2013). The number of participants was small and although it is over a 5–6-year period, the total number of participants (176) limits the interpretation of the conclusions reached here to a narrow group. In addition, as is well known in survey research, there is an inherent problem with self-reported data. Participant’s opinions on their own usage is a valuable but not wholly reliable source of data. Unfortunately, due to the difficult and intrusive nature of asking actual usage questions as well as gathering this type of data, and privacy concerns, no attempt was made to get actual usage data from students’ smartphones. Furthermore, the nature of qualitative research with its emphasis on the behavior and opinion of individuals limits the application of the findings in other groups as the variables, circumstances and context differ from setting to setting. Additionally, students will often say what they think the instructor wants to hear which may also skew the data. The author, as the teacher-researcher, is aware of the biases inherent in teachers reporting on their own classes and inserting partiality into the data and interpretation of results. Efforts have been made to limit these effects.

Nevertheless, with the thoughtful applications of these results, the experienced educator can find value and applicability to these findings.

DISCUSSION

Mobile learning is here to stay

In a 2015 study by this author on remote learning in the classroom, students generally favored traditional classroom learning over learning English remotely:

Students principally favored learning in a traditional classroom setting as opposed to participating in online learning. Students enjoy the personal interaction and social experience of learning in a traditional classroom. These students are successful in a classroom but for students that may find that setting intimidating, online learning may be more attractive. (Terhune, 2015, p. 1081)

But, evidence here (Figures 1-6) suggests that attitudes to using technology for language learning in the classroom and remotely have changed since 2015, becoming an acceptable way for students to learn. Is this the pandemic effect? Perhaps not. Throughout the research period, starting three years before and stretching two years into the pandemic, students seemed quite comfortable with using mobile learning and technology in and out of the classroom. The pandemic did not change this. The data show no significant change in students’ attitude to learning with technology remotely or not. Anecdotal evidence from the classroom implies students for the most part still prefer in person classes. Yet, the use and enjoyment

of learning with technology, mobile and stationary, has stayed relatively consistent before and after the pandemic. Of course, students still enjoy the personal interaction and social experience of meeting their classmates but possibly a hybrid setting, a mix of online learning they can do anywhere with fewer classroom meetings, would be a better way to enhance learning, attract students and better meet individual learning needs and styles.

Autonomous lifelong mobile learning

The self-directed nature and benefits of mobile learning include lifelong learning, autonomous learning, authentic communication, fewer inhibitions, better meeting of student needs, and low cost not to mention the freedom, convenience, and wide variety of content a mobile online environment offers. This all lends itself to the ability to enjoy learning throughout one's life. Yet who could have predicted the significance, acceptance and explosive growth in mobile technology and learning seen recently.

Thanasoulas (2000) points out that "learner autonomy consists of becoming aware of, and identifying, one's strategies, needs, and goals as a learner and having the opportunity to reassess and modify approaches and procedures for optimal learning" (p. 10). Students should then be given the freedom, guidance, and encouragement to carry out learning in their own way. Xu (2020) applies Reber's (1967) implicit learning theory by suggesting that students have a deeper language learning experience when information is presented in a mobile hypermedia format (audio, visual, interactive) in the varying context that a smartphone encourages. Xu suggests the combination of implicit learning theory with "traditional teaching and digital teaching based on the interactive function of mobile learning" (p. 28). The vast amount of material available on the net and its multi-media format keeps motivation high as does the convenience of a mobile device. This enables students the freedom to develop their own intrinsic motivation for language learning and do it anywhere throughout their life.

CONCLUSION

How will technology and particularly mobile technology inform teaching in the future?—*Mobile learning will improve language teaching and encourage personalized language learning that will have a lasting effect not only in a classroom but throughout a person's life.*

The pandemic effect has forever changed the classroom for teachers and learners. McCarty (2020) calls for teachers to "reconstitute academia in cyberspace" and see themselves "anew as lifelong learners" (p. 2). We need a more blended learning approach to teaching and learning (Kim, 2020) that combines traditional face-to-face classes with teleconferencing, online learning and mobile learning that makes use of images, text, audio, and video in a hybrid teaching and learning environment. Students are calling for learning to be more accessible via technology. To adapt to this new reality and reach a wider array of learning styles, teachers will have to reevaluate their teaching methods and improve their use of technology in the classroom. By doing this, educators can reach more students, bring in a greater variety of resources, communicate more effectively and better serve students individual learning needs.

All pandemics fade eventually. This one has imposed the use of technology, with emphasis on online and mobile learning, on all of us. It has sped up the process of adapting mobile and other technologies in all parts of society especially in teaching, learning and working environments. Importantly though, the effects of the changes brought on by this pandemic will last forever. How can we make the most of these

advances—the crash course we are going through—and encourage students to get the most out of technology and online resources, hence turning casual use of smartphones into productive learning? We should encourage and support the use of personal electronic devices like smartphones and promote autonomous learning skills so students can learn more effectively and continue using technology for learning throughout their lives. Understanding the transition to a technology-based learning environment and advocating approaches for successful language learning with these new innovations is something teachers should encourage in all aspects of learning.

Mobile learning is a dynamic field with changes and improvements in technology on almost a daily basis. With these fast-paced changes, it is important to keep up to date with technology. In most cases students lead in the use of smartphones for social interaction. However, not all students are aware of how their smartphones can be used for learning. Thus, teachers need to be on top of how mobile technology can be used to enhance students' learning experience, make use of these tools in and out of the classroom and encourage mobile lifelong learning. Knowledge gained through adapting to this pandemic has accelerated the use of technology in education and shown the value of using technology in the classroom. It will continue to inform teachers and students about innovations in learning technology, help overcome obstacles and give students greater access to education via mobile devices or whatever comes next.

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Appendix 1 – Graph data tables

In questions 1-4 divergent stacked bar charts were selected for the presentation of Likert scale results for the clear graphic representation of the data (Pirrone, 2020; Vidya, 2018). To compare across years the data are converted into percentage values. To make a divergent stacked bar chart positive results must be listed as positive values on the right and negative results must be listed as negative values on the left. Neutral results are split evenly between positive and negative values. All numbers are percentage values. The year the data were collected is on the left with the number of respondents (N).

Table 1 – Figure 1

I like using a computer to learn English more than a traditional textbook.

	neutral	agree	strongly agree	neutral	disagree	strongly disagree
2017 N=64	14.7	41.5	12.3	-14.7	-13.8	-3
2018 N=53	19.8	26.4	5.7	-19.8	-22.6	-5.7
2020 N=35	21.5	28.6	17	-21.5	-11.4	0
2021 N=62	20.2	24.2	22.5	-20.2	-12.9	0

Table 2 – Figure 2

I would rather use a smartphone in class instead of a computer or laptop computer.

	neutral	agree	strongly agree	neutral	disagree	strongly disagree
2017 N=49	13.26	34.69	6.13	-13.26	-26.53	-6.12
2018 N=38	14.47	39.47	10.53	-14.47	-21.05	0
2020 N=27	24.07	7.41	3.7	-24.07	-33.33	-7.41
2021 N=62	16.95	19.35	6.45	-16.93	-30.65	-9.68

Table 3 – Figure 3

I prefer to use a mobile device like a smartphone or tablet computer rather than a desktop computer to learn English.

	neutral	agree	strongly agree	neutral	disagree	strongly disagree
2016 N=61	18	43	10	-18	-10	-2
2017 N=66	10	30	23	-10	-18	-8
2018 N=62	11	34	32	-11	-10	-2
2020 N=52	14	19	31	-14	-17	-5
2021 N=62	18	37	6	-18	-16	-5

Table 4 – Figure 4

It is unfair for teachers to ask students to use their smartphones to do schoolwork.

	neutral	agree	strongly agree	neutral	disagree	strongly disagree
2017 N=49	19.4	18.4	2	-19.4	-36.7	-4.1
2018 N=38	19.7	5.3	0	-19.7	-47.4	-7.9
2020 N=27	27.8	7.2	0	-27.8	-30.1	-7.2
2021 N=63	20.5	16	3	-20.5	-35	-5

Table 5 – Figure 5

How much do you use your smartphone for school/learning related activities?

	not at all	a little	daily	often	very often
2017 N=49	0	8.2	36.7	44.9	10.2
2018 N=38	0	13.2	21.1	44.7	21
2020 N=27	0	11.1	11.1	40.8	37
2021 N=62	1.6	14.5	29	38.7	16.1

Table 6 – Figure 6

Choose the statement below that best describes your feelings about using smartphone for schoolwork.

	use more	use less	should not be used	don't have but want to use	don't have, don't want to use
2017 N=49	49	38.8	8.2	2	2
2018 N=38	50	28.9	10.5	5.3	5.3
2020 N=27	48.2	44.4	3.7	3.7	0
2021 N=62	48.4	37.1	11.3	3.2	0