

An exploration of the mediating effects of a digital,
mobile vocabulary learning tool and device use on
Gulf Arab learners' receptive vocabulary knowledge
and capacity for self-regulated learning

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This thesis is submitted in partial fulfilment of the requirements for the degree
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This thesis results entirely from my own work and has not been offered previously for any other degree or diploma.

I declare that the word length of the thesis is 52,829 words (including the appendices).

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Abstract

Receptive knowledge of the meanings of the first 3,000 most frequent word families in English is a vital pre-requisite for enabling academic reading and contributing to academic success in higher education where English is the medium of instruction. While many English foundation programmes include frequency-based word lists for their students to learn, learning gains made by students have frequently proven to be disappointing and little attention has been paid to the technological interventions to learn these words. In addition, little consideration has been given to the negative aspects of smartphone use to learn these words.

In this naturalistic, mixed-methods study, I explore the mediating effects of using an off-the-shelf, digital vocabulary learning tool in out-of-class settings on the receptive vocabulary knowledge of students in the United Arab Emirates. I also examine how the same tool mediates the students' capacity for self-regulation and whether different devices had any effect on this, both through a self-reported, online survey tool and pair-depth interviews that aim to capture rich, qualitative data about the learners' own perceptions.

Overall, the findings show that students' receptive vocabulary knowledge increased, but their self-reported capacity for self-regulated vocabulary learning through technology showed no change. In terms of devices, many students preferred to use the web-based version of the digital tool on their laptops rather than the mobile application on their smartphones. While students saw the laptop as a serious learning device that better enabled self-regulated vocabulary learning, the smartphone is seen predominantly as a communication and entertainment device to access social media, which depleted students' ability to self-regulate their vocabulary learning, particularly their ability to remain committed to their learning goals. Device control is therefore an important dimension of self-regulated, mobile vocabulary learning, which needs to be considered in future research in this field.

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Publications derived from work on the Doctoral Programme

No sections of this thesis have been published or submitted for a higher degree elsewhere. The thesis is entirely the result of my own efforts and intellectual capacity.

List of Abbreviations

ALL	Academic Language and Literacies
AWL	Academic Word List
AVL	Academic Vocabulary List
BNC	British National Corpus
BYOD	Bring Your Own Device
CALL	Computer Assisted Language Learning
CEFR	Common European Framework of Reference for Languages
EAP	English for Academic Purposes
EFL	English as a Foreign Language
EMI	English as the Medium of Instruction
EMSAT	Emirates Standardisation Test
FOMO	Fear of Missing Out
HEI	Higher Education Institute
ICT	Information and Communication Technologies
IELTS	International English Language Testing System
iOS	iPhone Operating System
L1	First Language

L2	Second Language
MALL	Mobile Assisted Language Learning
MAVL	Mobile Assisted Vocabulary Learning
MCQ	Multiple Choice Question
MP3	Moving Picture Experts Group Audio Layer-3
MS	Microsoft
NGSL	New General Service List
SRL	Self-Regulated Learning
UAE	United Arab Emirates

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Chapter 1: Introduction and Background

In this study, I explore the mediating effects of using a digital vocabulary learning tool (Quizlet), itself mediated through different mobile, digital devices, in out-of-class settings, on the receptive vocabulary knowledge of Emirati students in a higher education institution (HEI) in the United Arab Emirates (UAE), where courses are taught through English as the medium of instruction (EMI). I also examine how the same tool has mediated the students' capacity for self-regulated vocabulary learning, and explore the relationship between receptive vocabulary knowledge and the capacity for self-regulation both before and after using the same digital tool. Finally, I am interested in the students' preferences for the devices that they used to access this digital tool and how this may have affected their capacity for self-regulation. This study is particularly relevant at the current time with a global pandemic causing a mass shift to online learning in nearly all higher education contexts, especially in the UAE, and a complete reliance on technology for teaching and learning.

1.1 Research Background

The ability to recall meaning from the orthographic forms of words in a second language plays a vital role in reading skills and the ability to decode and comprehend written, academic texts, especially in textbooks widely used in higher educational settings (Grabe, 2009; Hudson, 2007). In fact, it has been demonstrated that there is a high correlation between learners' English vocabulary size and reading proficiency (Güngör & Yaylı, 2016; Milton, 2013; Schmitt, Jiang, & Grabe, 2011; Staehr, 2008). Researchers have also

identified that one of the pre-requisites for reading written texts is for students to possess a minimum receptive knowledge of the meanings of at least the first 3,000 most frequent word families in English (Hazenberg & Hulstijn, 1996; Laufer & Batia & Ravenhorst-Kalovski, 2010; Schmitt, 2010; Milton & Treffers-Daller, 2013; Nation, 2006, 2013). This should mean that students are more likely to recognise and understand the meanings of about 95% of the words in any given written text (Nation, 2013, p. 208), which in turn should enable sufficient levels of comprehension (Schmitt et al., 2011; Schmitt, Cobb, Horst, & Schmitt, 2017). This issue is of particular importance to students in higher education settings because of the number of academic texts they have to read in order to be successful on an EMI undergraduate degree course. Reaching this minimum level of receptive vocabulary knowledge is a particular challenge for students whose first language is not English (Schmitt, 2014), and who are likely to be “intimidated by the idea of studying their special fields in English” (Troudi, 2009, p. 208).

1.2 Research Problem

Despite the existence of targeted word lists as part of the curriculum in many English foundation programmes at universities in the UAE (Burkett, 2015 & 2017), many students do not reach the minimum goal of being able to recall the meaning of the first 3,000 most-frequent words from their written form. Previous research conducted at a HEI in the UAE showed that of 264 female students who were at the end of an English foundation programme and just about to start their degree course, only 36 or 14% demonstrated a receptive

vocabulary size of at least 3,000 word families (Bowles, 2017). About 50% of the students only knew the first 2,000 most frequent word families in English. In addition, other studies conducted on vocabulary learning in similar contexts in the UAE (Davidson, Atkinson, & Spring, 2011; Watts, 2011) have shown very limited vocabulary learning gains amongst students over the course of 16-week or 18-week semesters.

In order to bridge this gap, the field of second language (L2) vocabulary learning has focused on two aspects: what to learn and how to learn. In terms of the former, several recent general English word lists (Brezina & Gablasova, 2015; Browne, 2014) and general academic English word lists (Coxhead, 2000; Gardner & Davies, 2014) have been developed from vast corpora of billions of words. These lists focus on the highest-frequency words that appear in a range of written texts, including academic textbooks, and are therefore the most useful words for students to learn. In terms of how to learn, it is readily acknowledged that learning sufficient vocabulary in a second language is a huge undertaking (Schmitt, 2010; Thornbury, 2016; Tseng & Schmitt, 2008) and there are simply not enough contact hours for teachers to cover all the necessary material in class. As a result, students need to take on the main responsibility for this learning in out-of-class settings (Nation, 2013). There is also evidence that students with lower levels of proficiency, and who need to rapidly expand their vocabulary size in order to reach the minimum 3,000 word level, should devote a large percentage of their vocabulary learning time to deliberate, form-focused learning, rather than incidental learning through reading (Nation, 2013, p. 2).

One way for students to learn this vocabulary is through the use of technology, which is now increasingly normal and very much part of the student experience in higher education contexts (Selwyn, 2016). According to Means (2018), “digital technologies do have progressive functions and possibilities” (p. 122), especially for online and distance learning, where “adaptive learning systems might also prove useful for teaching basic foundational knowledge such as memorising the periodic table” (Means, 2018, p. 122) or indeed second language vocabulary. In particular, technology is seen as a more efficient and engaging way of organising and presenting this out-of-class vocabulary learning than paper-based materials (Stockwell, 2010, 2015). In the field of mobile-assisted vocabulary learning (MAVL), there have been numerous studies based around the development of bespoke, experimental vocabulary learning applications (Chen, Chen, & Yang, 2019; Lin and Yu, 2016; Wang, 2017; Wu, 2015), and the use of specific commercial, digital learning tools, such as Quizlet (Anjaniputra & Salsabila, 2018; Barr, 2016; Dizon, 2016; Duarte, 2019; Toy & Buyukkarci, 2019; Wright, 2016) and Duolingo (Loewen et al., 2019). These have highlighted the benefits of using mobile devices, in particular smartphones, in order to achieve greater vocabulary learning gains.

However, at present there have been few studies that have explored the effectiveness of digital, mobile vocabulary learning tools in out-of-class settings in terms of how well they have enabled students to increase their receptive knowledge of general academic vocabulary on English foundation

programmes in HEIs. In addition, few have done this within the framework of the theory of self-regulated learning, nor examined the mediating effects of different devices on self-regulated learning (SRL). Finally, there is little mention in the related literature of the negative effects of smartphone use on vocabulary learning, particularly in terms of digital distraction.

1.3 Research Topic

In this interdisciplinary study, I focus on the nexus between L2 vocabulary learning, SRL, out-of-class language learning, mobile learning, and device use in higher educational contexts. These areas have often been treated as academic silos in the literature, but as I describe below, there are synergies between all of them.

1.3.1 Second Language Vocabulary Learning

Vocabulary learning is very much a gradual and cumulative process that involves incremental gains in knowledge of different aspects of a word over a period of time through multiple encounters and retrievals of the same word in different settings and contexts (Nation, 2013; Schmitt, 2014; Watts, 2011).

Both breadth (vocabulary size or the number of words known) and depth (different aspects of a word) of vocabulary knowledge are important, although in this study the focus is limited to breadth of knowledge of the meaning-recall of words from their written or orthographic form. The actual processes of learning vocabulary within a second language have been well-documented

and include noticing new words (Schmidt, 1990), encoding and storing the words in the long-term memory (Kihlstrom, 2013), and retrieving or actively remembering and recalling the form and meaning of a word (Nation, 2013, p. 107). At the same time, the field of L2 learning has also produced a considerable amount of literature on the specific learning strategies that learners need to use to help them improve their vocabulary learning (Macaro, 2001; O'Malley & Chamot, 1990; Oxford, 1990 & 2017; Schmitt, 1997; Stoffer, 1995).

1.3.2 Self-Regulated Second Language Vocabulary Learning

According to Zimmerman (2008), “self-regulated learning refers to the self-directive processes and self-beliefs that enable learners to transform their mental abilities, such as verbal aptitude, into academic performance skill” (p. 166). This is a particularly important concept when it comes to informal learning outside the classroom where learners do not have the direct support and guidance of a teacher or instructor. Numerous studies show the importance of self-regulation in academic performance (Pintrich & De Groot, 1990) and academic achievement (Nota et al., 2004; Zimmerman & Kitsantas, 2014), in which “strategies, such as comprehension monitoring, goal setting, planning, and effort management and persistence, are essential for academic performance on different types of actual classroom tasks” (Pintrich & De Groot, 1990, p. 38).

Self-regulation is also now seen as an important concept in the field of L2 learning in general (Oxford, 2017) and a vital component in the systematic and cyclical process of L2 vocabulary learning (Tseng & Schmitt, 2008). Learning vocabulary in a second language is a lengthy and demanding task (Nation, 2013, Schmitt 2010), so it requires considerable self-motivation, self-direction and effort. In particular, because new words are learnt “incrementally through multiple exposures” (Tseng & Schmitt, 2008, p. 383), it is essential that learners possess the ability to manage and control this learning. Two models of self-regulated vocabulary learning have been developed which focus on students’ cognitive and behavioural actions to manage and control cognition, motivations and emotions (Şahin Kızıl & Savran, 2018; Tseng, Dörnyei, & Schmitt, 2006). The later model examines SRL within a technology context and will be used in this study.

1.3.3 Out-of-class Second Language Learning

Within the field of second language learning, there has been a long history of research that has focused on the importance and development of learner autonomy (Benson, 2011; Little, 2003; Holec, 1981) and the use of self-access materials (Benson, 2011) in order to help learners become more independent, life-long learners beyond the classroom, which overlaps with the theory of self-regulation. More recently, it is clear that technology is now the predominant means through which students in higher education learn a second language outside of class (Çelik, Arkin, & Sabriler, 2012; Eksi & Aydın, 2013; Jurkovič, 2019; Lai, 2013, 2017, 2019; Lai, Hu, & Lyu, 2018). Lai,

Hu, and Lyu (2018) have identified three distinct types of out-of-class language learning experiences with technology. The first is instruction-orientated, in which students primarily “enhance and expand their knowledge of vocabulary and grammar” (p. 119). The second is entertainment and information-orientated, which involves “learners’ use of technologies to access resources in the target language for daily life needs” (p. 120). Finally, students also engage in social-oriented technological experiences in order ‘to practice the language and to troubleshoot language problems” (p. 122). If self-regulated vocabulary learning is a task that needs to be mainly undertaken outside the classroom on an individual basis through the use of technology, then it is vital to consider these different student experiences.

1.3.4 Mobile Learning

Out-of-class, digital vocabulary learning nowadays invariably takes place on mobile devices in a variety of different spaces and locations at a variety of different times of the learners’ choosing (Lai & Zheng, 2018). This means that there is considerable overlap between out-of-class learning and mobile learning. There has been some debate about the term ‘mobile learning’ because it has often “been used unsystematically, and their meanings have been confused” (Grant, 2019, p. 362). While some researchers are quite strict about their definitions and only include mobile devices that can be carried in a pocket or a handbag (Keegan, 2005), other definitions are broader and more inclusive. There has been a focus on the mobility of the learner rather than the device (Sharples, Taylor, & Vavoula, 2005) which recognises that “learners

are continually in motion”, so that “they can learn across time and space” (Sha, Looi, Chen, & Zhang, 2012, p. 375). Other definitions emphasise the wireless, networked nature of mobile learning, so that users are always connected to the internet through Wi-Fi and/or data packages. Another aspect of mobile learning is the personal empowerment and autonomy that is enabled through ownership of an individual device that can be taken and used anywhere at anytime (Godwin-Jones, 2017).

There has also been an emphasis on the seamless nature of mobile learning that “encompasses both formal learning within the classroom, and informal and formal learning outside the classroom across myriad devices, in a variety of physical and temporal arenas” (Hockly, 2013, p. 80). This is increasingly enabled by the availability of the same digital tools in different formats, such as a mobile application for use on smartphones and tablets and a web-based version for laptops. In addition, mobile learning may encompass personalised and social learning, physical and digital worlds and “seamless switching between multiple learning tasks” (Wong & Looi, 2011, p. 2367). These can also constitute part of an individual’s learning ecology or “the accessed set of contexts, comprised of configurations of activities, material resources and relationships, found in co-located physical or virtual spaces that provide opportunities for learning” (Barron, 2004, p. 5). In the case of this study, I argue that mobile learning includes both hand-held devices, such as smartphones and tablets, as well as notebook and laptop computers, which are all part of a “rich repertoire or blend of technologies and medium” (Kukulska-Hulme, 2018, p. 6).

1.3.5 Mobile Assisted Vocabulary Learning

There have already been several studies that measured the learning gains and learning perceptions of students using vocabulary learning mobile applications in other higher educational contexts (Chen et al., 2019; Lin and Yu, 2016; Wang 2017; Wu, 2015). However, these have tended to focus on the use of experimental mobile applications used on smartphones in small-scale, pilot studies conducted over short periods of time with single classes, and often in East Asia. There have also been some studies that have explicitly investigated the effects of using commercial, digital learning tools, such as Quizlet, on vocabulary learning gains in high school settings (Toy & Buyukkarci, 2019) and higher education contexts (Anjaniputra & Salsabila, 2018; Barr, 2016; Dizon, 2016; Duarte, 2019; Wright, 2016). However, none of these have viewed vocabulary learning through the theory and lens of self-regulated learning and few have mentioned the devices used to access the digital tools, nor the negative aspects of these devices.

It should be acknowledge at this point that there has been some criticism of mobile-assisted language learning (MALL) and mobile-assisted vocabulary learning (MAVL) in terms of their failure to move beyond pedagogical approaches which are predominantly-based on cognitive and individual approaches to learning and emphasise a traditional transmission model of learning (Godwin-Jones, 2017). For some, “MALL is behaviourist and teacher-centred as drill and repetition type of activities are still largely present in the apps” (Cojocnean, 2016, p. 33). However, it can be argued that, based on the cognitive processes involved in vocabulary learning and the need for

deliberate and form-focused study, especially for lower-level learners (Nation, 2013), considerable repetition and memorisation is required, which means that a large part of out-of-class, digital vocabulary learning will be based on drill and repetition-type activities.

1.3.6 Self-Regulated Mobile Assisted Vocabulary Learning

Self-regulated vocabulary learning has strong conceptual links to mobile learning (Sha, Looi, Chen, Seow, & Wong, 2012; Sha et al., 2012). If mobile learning encourages learners to “extend their studies beyond the traditional or virtual classroom” (Kukulski-hulme, 2018, p.6) then they have to be able to self-regulate their use of digital devices and digital tools when their teachers are no longer around. A second key conceptual link is device ownership because “a perception of personal autonomy in owning and controlling learning tools (physical and intellectual) plays a prominent role in motivating students to engage in mobile learning activities” (Sha et al., 2012, p. 370). Increasing ownership of smartphones and laptops is only more likely to increase this sense of autonomy and the need to self-regulate learning.

Within the field of second language acquisition, technology-enhanced, out-of-class learning has been framed by the theory of self-regulation by several researchers (Lai & Gu, 2011; Li, Flanagan, Konomi, & Ogata, 2018). In addition, the theory and concept of self-regulated learning has been applied to the development of a survey for investigating technology-enhanced vocabulary learning within self-regulation (Şahin Kızıl & Savran, 2018),

although this does not make any mention of the specific devices used. In terms of vocabulary learning, the need for learners to be able to self-regulate their learning is likely to be even stronger because of the need to access and use digital learning activities on a regular and consistent basis.

1.3.7 Device Use in Mobile Assisted Vocabulary Learning

Several studies have focused on the use of different devices in higher education contexts when accessing digital language learning materials (Andrew, Taylorson, Langille, Grange, & Williams, 2018; Viberg & Andersson, 2019), self-directed language learning beyond the classroom (Lai & Zheng, 2018) and vocabulary learning in a second language (Cojocnean, 2016; Stockwell, 2010; Stockwell & Liu, 2015). However, only one of these (Viberg & Andersson, 2019) was framed by the theory of self-regulation. These studies have all highlighted a strong student preference for using laptop computers rather than smartphones due to the physical limitations of the device, such as a small screen and an onscreen, virtual keypad, rather than a physical keyboard that is separate from the screen (Stockwell, 2010; Stockwell & Liu, 2015). What they do not do, however, is make connections to other more recent negative issues related to device use, such as digital distractions and social media addiction.

For example, it should now be recognised that smartphones and mobile applications have been deliberately designed to compete for our attention and provide “dopamine escapes” (Means, 2020, p. 269), especially through the

use of push notifications and pop-ups (Pedro, Barbosa, & Santos, 2018, p.7). Indeed, in higher education contexts, the “allure of social networking applications” (Ibid) has led to “habitual distraction” (Aagaard, 2018), increased multitasking amongst undergraduate students (Judd, 2013; 2015) and in some cases, nomophobia or fear of being without a mobile telephone (Gonçalves, Dias, & Correia, 2020; Qutishat, Rathinasamy Lazarus, Razmy, & Packianathan, 2020; Rodríguez-García, Belmonte, & Moreno-Guerrero, 2020) and even smartphone addiction (Chiu, 2014). This has negatively impacted academic achievement (Aaron & Lipton, 2018; Junco, 2012) and academic performance (Lepp, Barkley and Karpinski, 2015) “in homeworking tasks and in the overall quality of time spent studying” (Pedro et al., 2018, p. 7). It has also led to negative effects on psychological well-being (Siebert, 2019), including increased anxiety (Nie, Wang, & Lei, 2020). However, students often lack the necessary self-regulation to overcome these distractions (Mahapatra, 2019). The connection between self-regulation and device use within the domain of second language vocabulary learning has been neglected in the literature and is a gap that I aim to address in this study.

1.4 Research Context

This study was conducted in the United Arab Emirates, which has been through rapid economic development and social change since its formation in 1971. It has seen wide-spread adoption of technology in all areas of society and it now has one of the highest mobile telephone penetration rates in the world at 228% (Arabian Business, 2017). Smartphones are also widely used

by students in higher education. Indeed, the rate of smartphone ownership at one particular HEI was found to be 99% (Andrew et al., 2018, p. 320). As part of its Vision 2021 policy, the UAE government is currently placing a significant emphasis on the importance of education and the development of a “first rate education system” and “a competitive knowledge economy” (UAE Government, 2010). A key component of this is the “successful implementation of educational technology” which is seen “as a key element in modernisation and reform of education” (Lightfoot, 2016, p. 1). This includes the higher education sector, which is predominantly made up of foreign-based universities that have opened branch campuses in the country, and locally-based private universities. The state-funded sector is very small and is comprised of just three institutions, which provide access to free higher education to UAE citizens.

While Arabic is the official language in the UAE, English is now widely used as the medium of instruction (EMI) in all three state-funded HEIs (Troudi, 2005). However, this development is contested and is often seen as an unnecessary effect of a colonial legacy. The area of the Arabian Peninsula that is now the UAE came under British control in the mid-19th century, and it was the British who largely introduced English as the language of trade and business (Martin, 2003). As the country developed and became an independent nation state, it attracted guest workers from around the world. These workers now represent over 200 different countries, particularly India, Pakistan, Bangladesh, the Philippines and Nepal and constitute 90% of the workforce (Boyle, 2011, p. 144). As these workers rarely speak or write Arabic, English is widely used as

a lingua franca in the workplace and business (Hopkyns, 2014, p. 2). Thus using English as the medium of instruction in the state higher education sector is seen as a way to enable local Emiratis to become bi-lingual graduates who can successfully operate in the workplace (Zayed University, 2019). Another reason is that English is seen as the language of science, medicine and technology within the UAE (Al-Issa, 2017, p. 14).

On the other hand, EMI in the UAE is seen by some as an unnecessary imposition on students whose first language is Arabic and who should be able to complete a degree course through the medium of Arabic (Troudi, 2009). While not homogenous by any means, many Emirati students have usually attended Arabic-medium schools, in which English language instruction and exposure to the language is very limited. This means these students are at a distinct disadvantage when they enter higher education. In contrast, students from more affluent backgrounds often have had the privilege of attending fee-paying, English-medium schools where they develop much stronger English language skills. This highlights issues of linguistic power, privilege and disempowerment of certain students in the higher education sector.

1.5 Researcher Motivation

As an instructor within an English foundation programme at an HEI in the UAE, I often teach students who attended Arabic-medium schools, and who possess a level of English proficiency and a receptive knowledge of general and academic English vocabulary lower than that required to be successful on

an EMI degree course. I am motivated to support these students in trying to enlarge their English vocabulary and as a result, enable them to become more empowered during their time in higher education.

In terms of learning materials, I have used a range of paper-based and digital tools for enabling vocabulary learning in a range of teaching contexts over the last 24 years. In particular, I have used several off-the-shelf, digital tools, such as Spelling City and Quizlet, which are now used by millions of learners around the world. Indeed Quizlet now claims to be “the largest user-generated consumer learning platform in the United States (US)” (Stevens, 2019, p. 1). It currently has 50 million active users in 130 countries who have access to 350 million user-generated sets and 10.6 billion terms (Stevens, 2019, p. 1). Many of these digital tools now have both web-based and mobile applications which, in theory, enable students to switch between different devices depending on space and time, and provide the link between in-class and out-of-class learning in a seamless mobile learning model.

At the same time, I am increasingly concerned about the way in which smartphone usage amongst my students, particularly in order to access social media, is taking over both classroom and out-of-class time, to the detriment of learning and academic achievement. As mentioned in Section 1.3.7, studies are increasing showing that the compulsive and addictive use of smartphones is having a negative impact on classroom engagement and interaction (Siebert, 2019) and students often lack the necessary self-regulation to overcome these distractions (Mahapatra, 2019). Thus, I am also motivated to

find out whether the learning of vocabulary through a digital tool on a smartphone is detrimental to learning or not.

1.6 Researcher Position

In this study, I have taken a pragmatic approach to research, which is “essentially practical rather than idealistic” (Cohen, Manion, & Morrison, 2018, p. 23). As a result, my ontological position is that reality is based on both realism and an emergent social and psychological world. Rather than there being one single, stable truth, “reality is constantly renegotiated, debated, interpreted in light of its usefulness in new and unpredictable situations” (Patel, 2015). In addition, I agree with the statement that “there may be both singular and multiple versions of the truth and reality, sometimes subjective and sometimes objective, sometimes scientific and sometimes humanistic” (Cohen et al., 2018, p. 23). Following this, my epistemological position is that knowledge is “both constructed and based on the reality of the world we experience and live in” (Johnson & Onwuegbuzie, 2004, p. 18) and so it is important to study both sides of this knowledge. At the same time, I believe knowledge creation involves examining multiple factors and the “active, interactive and dynamic processes that involve unique constellations of human beings, and that are located in particular contexts, each of which is also unique in some important ways” (Greene, 2005, p. 211).

Methodologically, this means that I believe a mixed methods approach to research is best. One in which quantitative data is collected along the lines of

the scientific method, where hypotheses are identified, variables isolated, numerical scores collected and analysed, and generalisation made (Cresswell, 2014, p.27). But it is also one in which individual human interpretations of their reality should be sought out through interviews to provide depth and meaningful explanations for research findings. Together this enables “rich data to be gathered which afford the triangulation that has been advocated in research for many years” (Cohen et al., 2018, p. 26). At the same time, I acknowledge, that despite this triangulation, it is inevitable that I bring a certain amount of bias to this study and view data through a specific lens that is WEIRD (Western, Educated, Industrialised, Rich and Democratic) (Henrich, Heine, & Norenzayan, 2010).

1.7 Research Questions

Considering the importance of acquiring a sufficient breadth of general academic vocabulary in English for academic success on EMI degree courses in higher education, the wide-spread use of mobile technology in the higher education sector in the UAE and the conceptual links between self-regulated learning, out-of-class mobile learning, and vocabulary learning in a second language, the following research questions were formulated to investigate the effects of using one particular digital vocabulary learning tool:

Effects

RQ1: What are the effects of using Quizlet on students' receptive English vocabulary knowledge?

RQ2: What are the effects of using Quizlet on students' capacity for self-regulated vocabulary learning through technology?

RQ3: What is the relationship between students' receptive English vocabulary knowledge, their capacity for self-regulated vocabulary learning through technology and the number of completed Quizlet activities?

Mediating Factors

RQ4: How have the activities and features of Quizlet mediated these effects?

RQ5: How has the choice of device mediated these effects?

1.8 Research Design

In order to answer these research questions, I used an exploratory / explanatory case study methodology (Grix, 2010, p. 50) "that investigates a contemporary phenomenon within its real-life context" (Yin, 1994, p. 13). Research into L2 learning, and especially the field of applied linguistics, is frequently underpinned by a positivist research paradigm and conducted using predominantly quantitative research methods. However, in this more interdisciplinary study, I used quantitative data collection tools to measure vocabulary learning gains and students' capacity for self-regulated vocabulary learning through technology, and qualitative methods to explore the students' own experiences and perceptions of each of these. The former involved the creation of a meaning-recall vocabulary test and the use of an online self-regulation survey (Şahin Kızıl & Savran, 2018), while the latter was achieved through semi-structured, paired depth interviews (Wilson, Onwuegbuzie, &

Manning, 2016). Such a mixed methods approach (Johnson & Onwuegbuzie, 2004; Yin, 2006) can provide richer results and allows for greater triangulation of the data.

1.9 Contribution to Knowledge

I intend to make four main contributions to the field that intend to fill various gaps that I have identified in the literature. Firstly, I will measure learning gains, in terms of receptive vocabulary knowledge, amongst a significant proportion of the population on an English foundation programme in higher education after using a popular, digital vocabulary learning tool (Quizlet).

Previous studies have identified vocabulary learning gains in similar contexts, but they have either been conducted in non-higher education settings (Toy & Buyukkarci, 2019), in non-technology contexts (Davidson et al., 2011) or not specified the digital vocabulary learning tool used (Watts, 2011). In addition, they have usually been small-scale with fewer than 50 participants in one or two classes (Anjaniputra & Salsabila, 2018; Barr, 2016; Dizon, 2016; Duarte, 2019; Wright, 2016) or used experimental mobile applications that were only used with small numbers of participants (Chen, Chen & Yang, 2019; Wang, 2017; Wu, 2015; Wu & Huang, 2017) and conducted in East Asian higher education contexts (Lin & Yu, 2017; Yen, Chen, & Huang, 2016).

Secondly, I will explore the effects of using the same digital vocabulary learning tool on students' capacity for self-regulated vocabulary learning in out-of-class settings. While previous studies have measured this construct

with sizeable numbers of university students, these have either been undertaken in non-technology contexts (Mizumoto & Takeuchi, 2012; Sentürk, 2016) or in general technology contexts (Khezrlou & Sadeghi, 2011; Lai & Gu, 2011; Tasnimi & Ravari, 2016), rather than specifically mobile-learning contexts. In addition, with the exception of Lai and Gu (2011), all have focused on in-class learning and none have compared the levels of self-regulation both before and after a digital technology intervention. I will use a slightly adapted version of a validated research survey tool for investigating technology-enhanced self-regulated vocabulary learning (Şahin Kızıl & Savran, 2018), which has not been used in any previously published studies. Finally, I will measure the correlation between vocabulary knowledge and the students' capacity of self-regulated vocabulary learning, which has only been undertaken previously by two researchers (Sentürk, 2016; Soleimani, 2018).

The third contribution is to examine different dimensions of self-regulated vocabulary learning through a mixed methods approach that aims to capture both quantitative and qualitative data in the form of the perceptions of the main users of the digital vocabulary learning tool. I also aim to identify the specific features and activities of Quizlet that students themselves perceive as supporting or depleting these different components of self-regulated vocabulary learning. Most previous studies have been restricted to purely quantitative data (Mizumoto & Takeuchi, 2012; Sentürk, 2016) or failed to analyse the different dimensions of self-regulation (Khezrlou & Sadeghi, 2011; Tasnimi & Ravari, 2016).

Finally, I aim to make a unique contribution in applying the theory of self-regulation to the use and control over the mobile devices that students use to access the digital vocabulary learning tool. In particular, I aim to examine the mediating effects of laptops and smartphones on five different dimensions of self-regulated vocabulary learning. Within the field of mobile vocabulary learning there have been some studies that have considered students' preference for the device used (Cojocnean, 2016; Stockwell, 2010; Stockwell & Liu, 2015), but none of these were conducted within the framework of self-regulation, nor considered the more negative aspects of smartphone use.

Overall, I provide a synthesis of L2 vocabulary learning, out-of-class mobile learning and SRL on an English foundation programme in a higher education context in the Middle East. In particular, I aim to critically examine some of the current taken-for-granted understandings about mobile vocabulary learning. The findings of this study should make a valuable contribution to the growing body of empirical research being conducted into the use of digital vocabulary learning tools in higher education contexts. It will be of particular interest to teachers and program managers on similar English foundation programmes in higher education who are also concerned about improving the size of their students' receptive vocabulary knowledge and thereby increase their chances of academic success on EMI degree courses.

Chapter 2: Literature Review

I will draw on the literature from six related themes that fit the topic and focus of my study. The first is vocabulary learning requirements in higher education, specifically as they relate to academic reading on an undergraduate degree. Then I focus on what the literature says about the cognitive processes involved in vocabulary learning and examine empirical studies that relate to self-regulation in L2 learning and L2 vocabulary learning. Next I identify previous studies in MAVL, both in terms of custom-built applications and the use of off-the-shelf, commercial products, such as Quizlet, and examine the current state of research into self-regulation in relation to MAVL. This will lead into a discussion of research findings into the use of different mobile devices in second language and vocabulary learning, specifically in HEI contexts. Finally, I identify the gap in the literature that I aim to address in this study.

The literature was identified from three main databases: OneSearch (Lancaster University), Academic Search Complete and Google Scholar. 'Peer-reviewed' and 'Full text available on-line' were the filters used to focus on the highest quality and easily available literature. Different search terms were employed using Boolean operators (Blaxter, Hughes, & Tight, 2010, p. 112) and combinations of search terms were employed to identify relevant sources. In addition, specific journals were identified from the initial search, and the main websites for these journals were also searched for additional articles. The journals included Applied Linguistics, British Journal of Educational Technology, Computer Assisted Language Learning, Computers and Education, International Journal of Computer-Assisted Language

Learning and Teaching, Language Learning, Language Learning and Technology, and ReCALL.

2.1 Vocabulary Knowledge and Reading Skills in Second Language Learning

Being able to comprehend the meaning of written texts involves the use of highly complex and multiple component reading skills that interact continuously (Grabe, 2009). These skills include both *top down processing*, that involves background knowledge and discourse knowledge, and *bottom-up processing*, which involves morphological and syntactic knowledge (Grabe, 2009; Koda, 2005). One of the main bottom-up processes that enable text decoding is *word recognition efficiency* (Grabe, 2009, p. 22). According to Hudson (2007), this involves

detecting graphic features, determining the letter code associated with those features, identifying a spelling pattern across all letters and determining the visual word code. The visual word is then associated with the reader's phonological memory and then with the semantic memory. (p. 36)

For more efficient and fluent reading to take place, this process needs to become automatic, so that after multiple exposures to a word, "the visual code will be able to be associated directly with the word meaning" (Hudson, 2007, p. 36). Being able to recognise and recall the meaning of individual words (as well as lexical chunks and collocations) is thus a crucial process in reading and comprehending the message in academic texts.

This connection between vocabulary knowledge in a second language and reading comprehension has been established in several studies (Güngör & Yaylı, 2016; Milton, 2010; Schmitt, Jiang, & Grabe, 2011; Staehr, 2008). One study of 88 Danish students (Staehr, 2008) demonstrated that there was a high correlation of 0.83 between vocabulary size and reading proficiency and that “72% of the variance in the ability to score above average in the reading test could be explained by the variance in the vocabulary scores” (p.148). With a smaller number of participants (n = 30), Milton (2010) found a correlation of 0.70 between IELTS reading test scores and orthographic vocabulary test scores.

On the other hand, more recent studies with larger numbers of participants have shown a more moderate correlation. Schmitt, Jiang, and Grabe (2011) recruited 661 university students in twelve different countries to complete a battery of reading and vocabulary tests. Their findings showed a correlation of 0.41 between the percentage of vocabulary coverage of academic texts and reading comprehension. Güngör and Yaylı (2016) conducted a similar study with 178 Turkish university students and found an identical correlation of 0.41 between vocabulary size and reading comprehension. This perhaps suggests that larger sample sizes reveal lower correlations.

In terms of how many word families learners need to be able to decode in order to comprehend most kinds of academic texts, there is some variation depending on the required level of reading comprehension, the corresponding lexical coverage required, and the type of text being read (see Table 1).

Researcher	No. of Word Families	Text Coverage
Nation (2006, 2013)	3,000 – 4,000	95%
Nation (2006, 2013)	8,000 – 9,000	98%
Laufer & Ravenhorst-Kalovski (2010)	8,000	98%
Schmitt, Jiang & Grabe (2011)	8000 – 9,000	98%
Hazenberg & Hulstijn (1996) / Milton & Treffers-Dallar (2013)	10,000	98%

Table 1 Vocabulary learning goals for higher education.

Many researchers have identified a knowledge of the 3-4,000 most frequent word families in English as a minimum target (Hazenberg & Hulstijn, 1996; Nation, 2006, 2013; Schmitt, 2010; Schmitt, 2014). This number will enable readers to recognise 95% of the words in most written texts, with instructional support from the teacher. However, in order to read and understand most texts independently of a teacher, learners need to know 98% of the words in a text, which is equivalent to knowledge of 8-9,000 word families (Nation, 2013, p. 208). Indeed, for academic texts, that are often more lexically dense and diverse, the target of 98% coverage has been shown to lead to higher levels of reading comprehension. According to Schmitt, Jiang, and Grabe (2011), in their study involving university students with relatively high levels of English proficiency, knowledge of 95% of the words in two academic texts resulted in an average level of comprehension of 60.5%. In contrast, those students who knew 98% of the words demonstrated comprehension of 68.3% (p. 34). Overall, they argue that there is “a remarkably consistent linear relationship between growing vocabulary knowledge and growing reading comprehension” (p. 35).

Laufer and Ravenhorst-Kalovski (2010, p. 15) also identified 8,000 word families as an optimal size for reading comprehension, and in terms of studying for an undergraduate degree course through English, Hazenberg and Hulstijn (1996) state that learners require knowledge of around 10,000 word families, which is supported by Milton and Treffers-Daller (2013). While there is some disagreement about the vocabulary size required, it would seem that receptive knowledge of the 3,000 most frequent word families is an absolute minimum to reach 95% text coverage and therefore enable students to have some comprehension of academic texts in an EMI context.

When considering vocabulary knowledge, it is clear that “the mental lexicon is a complex phenomenon, and the exact nature of lexical knowledge has always perplexed researchers and teachers” (Schmitt, 2014, p. 914). One common way to make sense of this knowledge is to distinguish between “size or *breadth* (how many words are known) and *depth* or quality of vocabulary knowledge (i.e., how well these words are known” (Schmitt, 2014, p. 914). The different aspects of depth of knowledge have been categorised by Nation (2013) in terms of form, meaning and use (see Figure 1). They can also be divided into aspects related to spoken and written form. For the purposes of this study, the focus is mainly on the breadth of knowledge in terms of the written or orthographic form of words and the meaning signalled by this form.

Form	Spoken	R	What does the word sound like?
		P	How is the word pronounced?
	Written	R	What does the word look like?
		P	How is the word written and spelled?
	Word parts	R	What parts are recognizable in this word?
		P	What words parts are needed to express meaning?
Meaning	Form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	Concepts and references	R	What is included in the concept?
		P	What items can the concept refer to?
	Associations	R	What others words does this word make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	collocations	R	What words or types of word occur with this one?
		P	What words or types of words must we use with this one?
	Constraints on use	R	Where, when and how often would we meet this word?
		P	Where, when and how often can we use this word?

Note. R= receptive, P= productive

Figure 1 What is involved in knowing a word? (Nation, 2013, p. 48).

Another important issue to consider is the learning burden of a word or the amount of effort required to learn it (Nation, 2013, p. 10). More abstract nouns with more complex meanings, for example, will obviously have a heavier learning burden than short, easily-spelt concrete nouns. A learner's first language also performs a vital mediating role in vocabulary acquisition because those who have an L1 with a non-Latin-based alphabet have far more difficulties than those with a Latin-based alphabet, such as French. Indeed, according to Smith (2001), "the acquisition of vocabulary is particularly difficult for Arab learners" (p. 209) due to the completely different writing script and alphabet, text direction and extremely few shared cognates.

Several studies have been conducted within English foundation programmes at HEIs within the UAE to identify English vocabulary learning gains amongst students whose first language is Arabic. Overall, these gains have been

modest at best. Watts (2011) conducted pre- and post-vocabulary tests, using the Vocabulary Levels Test for the second thousand-word band (Schmitt, Schmitt, & Clapham, 2001) with 295 students on a 16-week English foundation course. The results showed that on average, students only increased their receptive vocabulary knowledge by 11.3% (p. 21). This translated into average, estimated learning gains of 80 words over the period or about five words per week. Significantly, 113 (38%) of the students demonstrated no change in their scores, but 55 (19%) students showed learning gains in their vocabulary size of over 150 words. One significant limitation of this study was that students already knew 70% of the 36 words in the vocabulary test prior to the intervention.

Another study, also conducted in 2011 but at a different HEI in the UAE, measured vocabulary learning gains from the use of paper-based learning materials (Davidson et al., 2011). These materials consisted of 50 lessons of various activities that focused on both recognition and production of 500 words drawn directly from the 1,500-2,000 band of the most frequent words in the British National Corpus (BNC). A total of 86 students at the mid-point of a two-year English foundation programme used the materials over an eight-week period. Pre- and post-tests were administered, and they showed that in terms of meaning recall, scores increased by 11.3% on average. This was equivalent to learning gains of 59 words over the whole period or just over seven words per week.

A more recent study conducted by Bowles (2017) with Emirati students on an English foundation programme showed that of 264 students using a commercial digital vocabulary learning tool, Spelling City, to learn 600 words over a 12-week learning period, only 37% of the students saw increases in their receptive vocabulary knowledge. Nearly 50% saw no change. Admittedly, these results were obtained using a cruder online vocabulary size test, which matched students to bands of 500 words, so inevitably some students were unlikely to move beyond their initial band. These three studies show the limited vocabulary learning gains amongst the same target population that will be focused on in the current study.

2.2 Vocabulary Learning Processes

Learning vocabulary in a second language is complex and involves numerous cognitive and psychological processes (Tseng & Schmitt, 2008). However, research in second language acquisition and educational psychology shows there are five important processes that may better enable this to happen.

The first process is *noticing* a new word. This refers to conscious attention being given to a particular word or lexical item and is the essential starting point to acquisition (Schmidt, 1990). It could involve deliberately studying a word, or looking up a word in a dictionary (Nation, 2013, p. 103). The second process is *encoding*, in which a new trace of a word is laid down in the memory. According to Kihlstrom (2013) this involves elaborative rehearsal in which we “process an item deeply, connecting it to our rich fund of pre-

existing knowledge” (p. 3). This means that learning activities need to ensure both *cognitive depth* of processing, in which learners make mental decisions about a word (Thornbury, 2002, p. 25) and *affective depth* of processing, where learners can make a personal connection with a word (Thornbury, 2002, p. 26). Encoding also involves the *organisation principal* because “memory is best when we relate the things we are trying to learn to each other, to see how they are connected together or share certain features” (Kihlstrom, 2013, p. 3).

Even though vocabulary is then stored in the long-term memory, *decay theory* argues that the memory traces of words can gradually fade away unless they are activated fairly regularly (Kihlstrom, 2013, p. 3). Thus, a fourth process is required - *retrieving* - which involves actively remembering and recalling the form or the meaning of a word at different points after it has been noticed, encoded and stored (Nation, 2013, p. 107). For developing receptive knowledge of the form-meaning relationship of a word, learners require at least three opportunities to retrieve the word (Vidal, 2011), although the number of individual encounters may need to be as high as twenty (Waring & Nation, 2004). In addition, the first retrieval should happen fairly quickly after the first encounter with a word, because 80% of vocabulary is forgotten within 24 hours of the initial learning unless there is some retrieval (Thornbury, 2002, p. 26). Finally, the gap between when retrievals take place should follow the principal of spaced repetition, rather than mass repetition (Nation, 2013, p. 451). This means that each subsequent retrieval should be increasingly spaced further apart, with larger gaps between later meetings in order to

ensure that the memory of the previous meeting still remains. Although not referring specifically to vocabulary learning in a foreign language, Pimsleur (1967) set out a clear schedule for spaced retrieval (see Table 2).

Retrieval	Time spacing before the next retrieval
1	5 seconds
2	25 seconds
3	2 minutes
4	10 minutes
5	1 hour
6	5 hours
7	1 day
8	5 days
9	25 days
10	4 months

Table 2 Pimsleur's memory schedule (Nation, 2013, p. 455).

The final process mentioned in the literature is *creative processing* in which “previously met words need to be subsequently met or used in ways that differ from the previous meeting with the word” (Nation, 2013, p. 10). These new meetings force learners to reconceptualise and strengthen their knowledge of that word within their long-term memories. Creative processing can be both receptive or productive, but for the purposes of this study, receptive creative processing is more relevant and is related to meeting the same orthographic form of a word again in a different context from the original meeting (Nation, 2013, p. 11).

In terms of pedagogical approaches to vocabulary learning, it has been shown that the deliberate learning of specific and targeted words is far more efficient and effective than purely relying on incidental learning from reading (Nation,

2013, p. 437). This is especially true for lower-level language learners attempting to reach a receptive vocabulary knowledge of the first 3,000 most frequent words in English as quickly as possible. Incidental learning from reading is considerably slower with vocabulary growth of only about 3-6 words per hour of reading (Waring & Nation, 2004). In addition, decontextualised learning of words using definitions and/or L1 translation through the use of word cards or flashcards has been shown to be an effective way to learn the initial and most common meanings of new words (Nation, 2013, p. 447).

Overall, vocabulary learning is very much a gradual and cumulative process (Nation, 2013; Schmitt, 2014, 2019; Watts, 2011) that involves incremental gains in knowledge of different aspects of a word over a period of time through multiple encounters and retrievals of the same word in different settings and contexts.

2.3 Self-Regulated Second Language Vocabulary Learning

Within the field of L2 vocabulary learning, SRL is a relatively new concept. Until 2005, much of the research into the processes of language learning focused on related concepts, such as learner autonomy (Benson, 2001 & 2011), language learning strategies (Macaro, 2001; O'Malley & Chamot, 1990; Oxford, 1990; Schmitt, 1997), and motivation (Dörnyei, 2001). Language learning strategies were and still are a particularly rich field of studies, and several instruments have been developed to measure learners' use of different strategies. These include the Strategy Inventory for Language

Learning (SILL) (Oxford, 1990) and the Vocabulary Learning Strategies Inventory (VOLSI) (Stoffer, 1995). Oxford (1990:18-21) identified a wide range of general language learning strategies, which she divided into six main categories (see Table 3).

Direct	Indirect
1. Memory Strategies	4. Metacognitive Strategies
2. Cognitive Strategies	5. Affective Strategies
3. Compensation Strategies	6. Social Strategies

Table 3 Language learning strategy categories (Oxford, 1990).

However, these instruments only measured “the frequency of use of specific strategic behaviours” and “fail to reflect how well individuals can use the language learning strategies, either in general or in a more specific language domain” (Tseng & Schmitt, 2008, p. 365), such as vocabulary. In other words what was missing was a focus on the quality of use of learning strategies.

Another problem identified with these frequency-based measures was that they were either psychometrically unproven, as in the case of SILL (Dörnyei, 2005) or based on “incoherent factor categories” (Tseng, Dörnyei, & Schmitt, 2006, p. 85) in the case of VOLSI.

There were two responses to this problem. One was to focus more on self-regulation as an innate ability of learners that “fuels their efforts to search for and then apply personalised strategic learning mechanisms” (Tseng, Dörnyei, & Schmitt, 2006, p. 79). Another was to position self-regulation as more of a central concept in explaining the “qualities necessary for effective L2 learning” (Oxford, 2017, p. 85), and for explaining the development of vocabulary

knowledge (Tseng & Schmitt, 2008), but still retaining learning strategies as a key component.

In their model of Motivated Vocabulary Learning (see Figure 2), Tseng and Schmitt (2008) make an important distinction between the underlying, innate Self-Regulating Capacity in English Vocabulary Learning (SRCvoc), Strategic Vocabulary Learning Involvement (SVLI) and Mastery of Vocabulary Learning Tactics (MVLT).

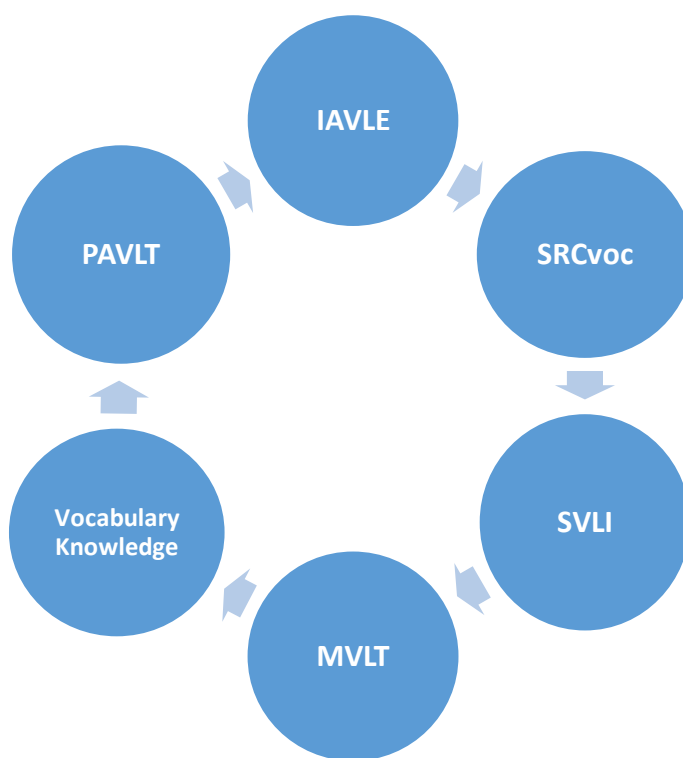


Figure 2 Model of Motivated Vocabulary Learning (Tseng & Schmitt, 2008, p.381).

- IAVLE = Initial Appraisal of Vocabulary Learning Experience
- SRCvoc = Self-regulating Capacity in Vocabulary Learning
- SVLI = Strategic Vocabulary Learning Involvement
- MVLT = Mastery of Vocabulary Learning Tactics
- PAVLT = Post Appraisal of Vocabulary Learning Tactics

While SRCvoc is the underlying capacity to manage and control learning (Tseng et al., 2006), SVLI is focused on “the quantity dimension of strategy

use, which concerns effortful covert or overt acts to discover or improve the effectiveness of particular tactics” (Tseng & Schmitt, 2008, p. 364). MVLT “refers to the quality dimension of strategy use, which concerns mastering specific or special covert or overt learning methods to acquire vocabulary knowledge” (Tseng & Schmitt, 2008, p. 364).

Testing of their model showed that SRCvoc was an important bridge between initial motivational states (IAVLE) and the actual use of learning strategies. In particular, it had a close relationship with SVLI. In turn, SVLI affected MVLT, which then influenced vocabulary knowledge. In other words, SRCvoc only had an indirect, but vital effect on actual vocabulary learning gains, both in terms of size and depth. However, any direct correlation between SRCvoc and vocabulary knowledge or vocabulary learning gains was not measured as part of this model, so it is still just an assumption. In addition, the effects of a vocabulary learning intervention, such as the use of a digital, vocabulary learning tool were not measured.

Another more recent model of self-regulated vocabulary learning - SRLvocICT - has been developed by Şahin Kızıl and Savran (2018). Like the SRCvoc, it consists of five dimensions of SRL, but within Information and Communication Technology (ICT) contexts, and focuses on the role of technology. The five dimensions within each model have some overlap, but there are a few differences (see Table 4).

SRVoc (2006)	SRLvocICT (2018)
1. Commitment Control	1. Commitment Control
2. Metacognitive Control	2. Metacognitive Control
3. Satiation Control	3. Affective Control
4. Emotion Control	4. Resource Control
5. Environment Control	5. Social Control

Table 4 Dimensions of self-regulated vocabulary learning.

While it has been acknowledged that there is a scarcity of empirical studies conducted on self-regulation in the field of L2 vocabulary learning (Bilican & Yesilbursa, 2015), the SRCvoc survey tool has been used in several subsequent studies in higher education contexts. Three of these did not have a focus on using technology (Mizumoto & Takeuchi, 2012; Sentürk, 2016; Soleimani, 2018) and two did (Khezrlou & Sadeghi, 2012; Tasnimi & Ravari, 2016). So far, no studies have used the SRLvocICT survey tool.

In a validation study of the SRCvoc instrument in a Japanese EFL setting, Mizumoto and Takeuchi (2012) administered the survey to 443 learners studying humanities or engineering at four different universities. They found that overall levels of self-regulation were low with an average score for the five different dimensions of just 3.2 out of 6. Environment control, which refers to the ability to “eliminate negative environmental influences and to exploit positive environmental influences” (Tseng et al., 2006, p. 86) showed the highest level (3.94) (Mizumoto & Takeuchi, 2012, p. 84). Satiation control, “which helps to eliminate boredom and to add extra attraction or interest to the task” (Tseng et al., 2006, p. 86) showed the lowest score (2.93) (Mizumoto & Takeuchi, 2012, p. 84).

Sentürk (2016) also used the SRCvoc with 179 Turkish university students to investigate their levels of self-regulation and to identify any possible correlations with vocabulary size. Students were selected from three different levels of language proficiency; Pre-intermediate, Intermediate and Advanced. Overall, the Turkish students demonstrated a moderate level of self-regulated vocabulary learning with a mean score of 3.76 (out of 6) (p. 95), which was slightly higher than the Japanese study. However, the higher the students' language proficiency, the higher the scores for each of the five different dimensions of self-regulation. The mean score for commitment control, for example, was 3.57 for the pre-intermediate group, but 4.56 for the advanced group (p. 95). In addition, there was a moderate positive correlation between vocabulary size and self-regulation ($r = 0.316$, $n = 178$, $p > .005$) (p. 95).

On the other hand, Soleimani (2018) used the SRCvoc scale with 116 Iranian EFL university students to see if there was a relationship between learners' self-regulation and vocabulary size, as measured by the Vocabulary Levels Test (Schmitt et al., 2001). He concluded that there was no statistically significant correlation between the two variables (p. 14).

Overall, while the theory and concept of self-regulation has been applied within the domain of second language vocabulary learning, the field is still relatively new. In addition, previous studies have predominantly involved quantitative research methods, employing statistical surveys. What is lacking are more qualitative studies that give voice to the students' experiences and perceptions.

2.4 Mobile Assisted Vocabulary Learning

The benefits of mobile learning have been described by numerous researchers (Kukulska-Hulme, 2012 & 2018; Kukulska-Hulme & Traxler, 2013; Passey, 2010; Sharples, 2005 & 2009; Traxler, 2007, 2009 & 2010). These are particularly relevant in higher education settings, where students are required to undertake considerable out-of-class learning, and for independent, self-regulated vocabulary learning using personal mobile devices. One of the most frequently-cited benefits is the ubiquity of learning, whereby learners can take advantage of the portability, mobility and flexibility of their devices to access learning materials and learn in a variety of different spaces and locations at a variety of different times (Lai & Zheng, 2018). This creates opportunities for students to make productive use of “fragmented time” (Hu, 2011, p. 147) or “dead time” (Wu, 2015, p. 177), between classes or when commuting that enables vocabulary learning to be undertaken in bite-size chunks of time more frequently. It also means that “learning may occur on the move, or in a fixed location such as the classroom” (Sharples, 2009, p. 18).

Another benefit cited in the literature is that because smartphones are now very affordable due to significant reductions in their retail price over the last decade, mobile learning is now very accessible (Godwin-Jones, 2017) and most learners now possess their own device (Ahmad, Sudweeks, & Armarego, 2015, p. 28). This personal ownership enables greater freedom and autonomy for students to access learning materials without the need of a teacher. There is also the potential for greater personalisation of learning because students can navigate their own pathway through the materials

without being forced to use them in a certain way. They can also change the settings in both language learning applications and on their mobile device (Kukulska-Hulme, 2012). This sense of control overlaps very strongly with the concept of self-regulation since learners have to be able to plan, manage and control their use of the device, the digital learning tools, as well as the actual learning content.

It has also been argued that mobile learning better enables seamless learning (Wong & Looi, 2011) that links together and “encompasses both formal learning within the classroom, and informal and formal learning outside the classroom across myriad devices, in a variety of physical and temporal arenas” (Hockly, 2013, p. 80). In other words, it allows learners to more easily “extend their studies beyond the traditional or virtual classroom” (Kukulska-Hulme, 2018, p. 6). This is particularly true when online digital tools are available in a variety of different formats, including web-based interfaces that can be accessed on laptops, and mobile applications that learners can use on smartphones and tablets.

In terms of L2 learning in out-of-class settings, Kukulska-Hulme (2012) identified three main dimensions of mobile language learning based on a survey and interviews with university students (see Figure 3). The first is the characteristics of the learning activities, such as the degree of difficulty and challenge and whether it is more individually-based or involves social interaction. The second dimension is time, in which she identified two main modes – a regular, habitual pattern of activity and a spontaneous, unplanned

way (p. 6). Finally, place can include fixed or static locations, such as at home or work, as well as “out and about” learning on public transport or in leisure spaces. This model was extended to include a fourth dimension by Lai and Zheng (2018), which was the actual mobile device used and “their normal circumstances of use in daily life” (p. 313) which they argue can also influence the way in which students use mobile learning.

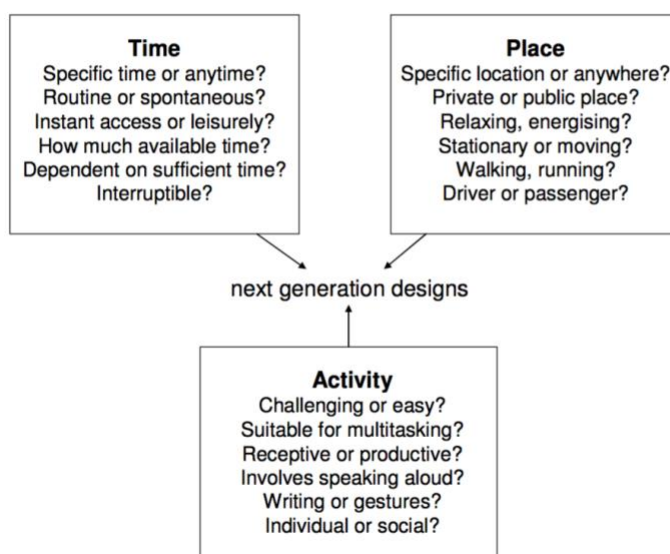


Figure 3 Conceptual framework of next generation designs for mobile-supported language learning in informal settings (Kukulska-Hulme, 2012, p. 9).

As for specific research on mobile vocabulary learning, there have been two meta-analyses that reviewed studies in MALL over the period 1993 to 2013 (Burston, 2015; Sung, Lee, Yang, & Chang, 2019), but only one meta-analysis that examined the effectiveness of MAVL (Lin & Lin, 2019). However, Lin and Lin’s (2019) overall findings show that there was an overall positive and large effect size (ES = 0.94) from mobile vocabulary learning (p. 30).

There have also been a number of small-scale, experimental studies involving the development and use of bespoke vocabulary learning applications in higher education contexts. Wu (2015), for example, reported on the development of a Basic4Android smartphone application to help college students in China improve their English vocabulary. She showed that the students who used the app “significantly outperformed those in the control group in acquiring new vocabulary” (p. 170). Similarly, Wang (2017) designed an Android application that presented 720 lexical items taken from the New General Service List (NGSL) of the most frequent words in English to her class of university students in Taiwan. Feedback from her students suggested that for the vast majority, the app gave them more opportunities for learning English and allowed them to learn every day although specific learning gains were not highlighted.

Since the launch of Quizlet in 2005, there have been several studies that have researched the effects of using this tool in terms of both vocabulary learning gains and student perceptions about vocabulary learning. Quantitative studies have shown some learning gains amongst students who used Quizlet. The largest study was experimental and took place in Turkey with 200 Grade 8 students, who were divided equally into an experimental group and a control group (Toy & Buyukkarci, 2019). The experimental group used Quizlet both inside and outside the class for an 8-week period, while the control group received traditional, teacher-led instruction (p. 49). A 50-item vocabulary achievement test showed that while the pre-test scores were very similar for each group, the post-test scores were statistically significantly different ($t =$

4.97). The mean vocabulary score for the control group went from 70 to 66 (a decrease of 6%), while the mean score for the experimental group increased from 71 to 82 (an increase of 15%) (p.50). Although the study did not describe in detail the two different interventions and exactly how much time students spent on Quizlet outside the classroom, it certainly suggests that using Quizlet for vocabulary learning is superior to traditional class-room based instruction.

Another quantitative-based study was conducted with 32, first-year Japanese university students on a foundation English course in Japan (Barr, 2016).

Again, there was a control group of non-Quizlet users and an experimental group of 20 students who were told to access the Flashcard activity. All the students completed four different gap-fill vocabulary tests during the semester. Quizlet users scored better than the non-users in all but the first test, and this difference was statically significant (p. 43). In another study over a longer 10-week period but with only nine Japanese university students, Dizon (2016) found that there was a statistically significant increase in the students' average vocabulary scores between a pre- and post-test using the Vocabulary Levels Test for Academic Vocabulary (p. 49). As the author himself admits, the very small sample size and lack of control group limit the generalisations of these findings (p. 52).

Two qualitative-based studies have also been conducted in higher education contexts and these have found positive student perceptions towards Quizlet. Anjaniputra and Salsabila (2018) used Quizlet with a class of 30 fourth-year students at a university in Indonesia and conducted interviews with a small,

but unspecified number of students. The findings suggest that Quizlet provided students with an enjoyable learning experience due to the variety of activities and the fact that they “felt like playing and learning at the same time” (p. 9). Secondly, it promoted learner autonomy with many of the students doing the activities on Quizlet and checking their progress at home on their smartphones (p. 9). Thirdly, Quizlet helped generate learner persistence in vocabulary learning mainly due to the competitive element of the tool (p. 9). Finally, it was found to increase learner engagement both inside and outside the classroom as students spent more and more time on Quizlet (p. 10). While the findings seem very positive, the time-frame was not specified.

Two other studies conducted in Japan found that the use of Quizlet supported most students' vocabulary learning and led to an increase in collaboration with other students. Duarte (2019) used Quizlet with 25, Japanese, female students who were enrolled in a 15-week English class at a university in Western Japan. Survey data collected at the end of the course showed that 22 (88%) of these students strongly agreed with the statement that “Quizlet was useful for vocabulary learning” (Duarte, 2019, p. 14), while 15 (63%) of the students strongly agreed with the statement that “Using Quizlet made vocabulary study more fun” (Duarte, 2019, p. 14). Finally, Muthumaniraja (2020) used Quizlet Live with 20 Japanese university students for vocabulary review sessions. Findings from a survey administered after using the tool showed that 100% of the students said that it motivated them and helped them to enjoy vocabulary learning. It also led to increased collaboration with classmates.

Overall, this review has shown that mobile vocabulary learning has led to some positive effects in terms of increases in vocabulary knowledge. However, most of these studies have been with small groups of students in East Asian contexts over short periods of time. What is lacking in the literature is studies that employ large numbers of participants in Middle East contexts.

2.5 Self-Regulated Mobile Assisted Vocabulary Learning

There have been a few studies conducted around either self-regulation in language learning in mobile contexts (Viberg & Andersson, 2019), the effects of technology on self-regulation in vocabulary learning (Khezrlou & Sadeghi, 2012; Tasnimi & Ravari, 2016), or the use of self-regulation in language learning using technology in out-of-class settings (Lai & Gu, 2011). However, in the only meta-analysis that examined the effectiveness of L2 vocabulary learning in mobile learning contexts (Lin & Lin, 2019), none of the 33 studies focused specifically on self-regulation in MAVL, which suggests that this is an under-researched area.

In a study of 134 male and female students on an online, distance, foreign language learning course at a university in Sweden, Viberg and Andersson (2019) administered an online survey that aimed to measure the students' own perceptions of their level of self-regulation in a mobile learning context. There were 24 items in the survey which related to six separate categories: goal setting, environmental structuring, task strategies, time management, help-seeking and self-evaluation. The findings showed that on average, the

students rated themselves as weakly self-regulated: “the majority, 63 percent, rated themselves at between two and three” (on a 5-point Likert scale) (p. 52).

Khezrlou and Sadeghi (2012) employed the SRCvoc Scale (Tseng et al., 2006) to compare students’ self-regulation strategy use when learning new vocabulary items through printed textual definitions coupled with still pictures, and through multimedia glossing of the meaning and definition of the words on a desk-top computer screen. The participants were 179 Iranian students and the results showed that “the learners’ use of self-regulated strategies was much greater in computer-based environments than in paper-based environments” (p. 13).

Another study compared the impact of using an online crossword puzzle program with that of traditional teacher-led vocabulary instruction on learners’ self-regulation (Tasnimi & Ravari, 2016). The findings showed that those students who used the online crossword puzzle program “had a significantly better performance in terms of self-regulation” (p. 81). The average score on the SRCVoC survey for these students was 5.60 (out of 6), while for the control group the average score was 4.56, a significant difference. However, neither study analysed the results in terms of the five different dimensions of self-regulation.

Employing a slightly different research design, Lai and Gu (2011) conducted a study with 279 foreign language learners at a university in Hong Kong to investigate how students used technology to support out-of-class language

learning. They identified six main ways that students use technology to self-regulate their language learning experience; goal commitment regulation, metacognitive regulation, affective regulation, resource regulation, social connection regulation and culture learning regulation (p. 325). Of these six uses, students reported the strongest “positive perception of engagement with the use of technology for goal commitment regulation” (4.68 out of 6) (p. 325). Resource regulation, affective regulation and culture learning regulation all had mean scores of 4.50. Metacognitive regulation (3.78) and social connection regulation (3.17) received the lowest overall scores. This was supported by the interview data which “showed that the participants seldom used and were sceptical about using technology to create social learning opportunities and support beyond their immediate social network” (p. 326).

Overall, this shows the dearth of research into mobile vocabulary learning that focuses on the different dimensions of self-regulation in higher education contexts and is a clear gap that I aim to address in this study.

2.6 Device Use in Language and Vocabulary Learning

The smartphone has now subsumed all of the functions of previously separate mobile devices, such as digital cameras, Moving Picture Experts Group Audio Layer-3 (MP3) audio players, satellite navigation devices for cars and electronic dictionaries. It has also become “a powerful pocket computer” (Godwin-Jones, 2017, p. 13) and a “life partner” (Godwin-Jones, 2017, p. 3) that offers a huge variety of potential language learning opportunities. Several

studies have focused on student preferences for the devices they used when accessing digital language learning and vocabulary learning materials in higher education settings.

In terms of general language learning, Viberg and Anderson (2019) used two measures to identify device preference for accessing course materials in out-of-class learning amongst 69 language students at a HEI in Sweden. In an online questionnaire, 61 students (88%) stated that they used the web-based materials on their laptop/desktop computer and did not use the mobile application that was integrated with these materials (p. 50). Only eight students (12%) used both a handheld, mobile device and a computer while studying (p. 50). By contrast, the log data collected on the university's learning management system showed that 53% of students only used their desktop/laptop computer, 23% used both their desktop/laptop computer and their smartphone, while 24% only used their smartphone (p. 51). This suggests that while students under-reported their use of smartphones for learning purposes, the laptop was still the preferred device.

Another recent study, which was conducted in the UAE (Andrew et al., 2018), also found a lack of interest in using smartphones for learning amongst students on English foundation programmes in two different universities. Results from a survey administered to 1,086 students showed that smartphones were the least preferred device for learning on their particular courses. Only 10% of participants selected smartphones as the device on which they enjoyed learning the most and only 6% stated a general

preference for learning on their smartphone (p. 330). By contrast, 26% of participants enjoyed learning on their laptops the most and 47% stated a general preference (p. 310). However, the study did not make any distinction between in-class and out-of-class learning and vocabulary learning was not included as one of the specific academic activities.

In terms of self-directed language learning beyond the classroom, Lai and Zheng (2018) surveyed 256 university students in Hong Kong and identified more nuanced uses of devices within three different dimensions of mobile learning and according to different learning purposes. In the personalised learning dimension, 73% of the participants primarily used mobile telephones to consult dictionaries or translation tools, as opposed to only 22% who preferred laptops (p. 310). However, when it came to studying vocabulary and grammar of the target language, more students preferred using a laptop (50%) rather than a mobile telephone (40%) (Lai & Zheng, 2018, p. 310).

Interestingly, these results were reversed in terms of using flashcards for learning vocabulary. When asked in interviews about their reasoning, most students said that they associated laptops with serious study and better for academic multi-tasking, while mobile telephones are more for social communication, casual learning and for tasks that were quick and light (p. 309-311).

With a similar focus on online informal learning of English, but only through the use of smartphones, Jurkovič (2019) found that amongst 905 full-time Slovene undergraduate students at three Slovene public universities, most

used their smartphone for entertainment purposes, rather than for learning. When it is for learning purposes, participants in her study “still predominantly access online content for receptive rather than interactive/productive activities” (p. 27). In terms of vocabulary learning, the only related task mentioned was accessing an online dictionary, which 44% of students claimed to do (p. 34). This aligns with the findings of Lai and Zheng (2018) described above.

Focusing purely on digital activities for learning English vocabulary, Stockwell and Liu (2015) conducted a study with 160 Japanese and Taiwanese university students who completed various online vocabulary learning activities closely linked to in-class listening and vocabulary materials. Data from the university’s server logs showed that 129 students, or 83% of the total, accessed the activities from a personal computer (laptop or desktop) only, while just 26 students (17%) used their mobile or smartphone (p. 308). Of those 26 students, just two (1.3%) accessed 100% of the activities via their smartphones (p. 308), while the remainder presumably used a combination of both devices. In semi-structured interviews, students identified several reasons for the low usage of smartphones. Firstly, the small screen size and the corresponding small font size was an impediment to completing the activities properly (p. 315). Secondly, despite apparent student enthusiasm for using their smartphone, there was general resistance and “psychological barriers” to seeing their smartphone or mobile telephone as a device for learning purposes (p. 316).

Another study also showed that students did not value the use of mobile learning tools in their English vocabulary learning. Although conducted with high school students, Cojocnean (2016) found in her survey of 1,173 participants, that the vast majority (777 or 72%) “showed neutral attitudes towards the use of mobile assisted learning tools in their vocabulary learning” (p. 31). In the follow-up focus groups with 43 participants, many students indicated a low usage of digital tools and strategies in their vocabulary learning. This was due to multiple reasons, such as “the lack of a culture associated with the use of digital tools in the language classroom, personal learning style and a lack of teacher guidance” (p. 31).

In terms of device preference when using Quizlet, there was only one study (Duarte, 2019) that mentioned this. Although the sample size was very small (25), 14 of the students downloaded the Quizlet mobile application and 11 did not. What was relevant here was that “the frequent-user group had a higher proportion (73%) of students who downloaded the Quizlet smartphone application” (Duarte, 2019, p. 13) than the infrequent-user group (57%). This could indicate that “increased independent Quizlet usage hinges on whether or not students have downloaded the smartphone application” (Ibid).

Overall, despite the claims of mobile learning researchers that smartphones have a lot of potential for ‘ubiquitous learning’, and the high rates of smartphone ownership amongst students, research findings consistently show that students generally prefer accessing language learning and vocabulary learning materials on their laptop. Many students view their smartphone as a

source of entertainment and relaxation, rather than as a learning device. In addition, there are some more serious negative aspects of using smartphones for learning purposes that need to be considered.

2.7 Negative Issues Related to Mobile Devices

According to Pedro, Barbosa, and Santos (2018, p. 1), the “ubiquitous presence of digital devices and social media in students’ lives” has had a negative, as well as a positive impact on the academic lives of students in HEIs. It is well-known that smartphones and mobile applications have been deliberately designed to compete for our attention (Parkin, 2018), especially through the use of push notifications and pop-ups that enable “dopamine escapes” (Means, 2020, p. 269). Therefore, when they are within sight, the “magnetism” (Aagaard, 2018, p. 6) of social media encourages “habitual distraction in the pre-reflective attraction towards certain frequently visited, but educationally relevant websites, like Facebook” (Aagaard, 2015, p.90). Students are “drawn to distraction” through the “deeply sedimented relational strategies that have been built, maintained and solidified in the course of their everyday lives” (Aagaard, 2018, p. 6). This has led to numerous negative effects on learning and academic achievements.

Firstly, students are more likely to go-off task and not pay attention when learning independently in out-of-class settings. Research has shown that students are especially more susceptible to go off-task and use their mobile devices to access social media when the learning material is considered too

difficult or challenging (Aagaard, 2015, p. 94). Students seem to have a need for “episodes of downtime – listening to music, playing games and generally tuning out for brief periods” (Selwyn, Nemorin, Bulfin, Johnson, 2017), especially in out-of-class learning settings where there is no teacher present to guide and instruct students.

In addition, smartphone use has led to increased multi-tasking, which is now prevalent amongst undergraduate students (Judd, 2013; 2015). It is often claimed that students today, the so-called “digital natives” (Prensky, 2001) have grown up with technology to such an extent that they are able to use educational digital tools whilst at the same time maintaining conversations on social media. However, according to the APA (American Psychological Association) (2006), “doing more than one task at a time, especially more than one complex task, takes a toll on productivity”. In particular, “tasks performed concurrently require more time for completion and are conducted less accurately than tasks performed sequentially” (Pedro et al., 2018, p. 9). Furthermore, it can take up to 30 minutes to refocus and re-engage fully with an original task (Gazzaley & Rosen, 2017), which means that it actually takes longer to complete the same tasks simultaneously than sequentially.

Studies have also shown the negative effects of smartphone use on psychological well-being (Siebert, 2019), including increased anxiety (Nie et al., 2020) and an increase in nomophobia (Qutishat, Rathinasamy Lazarus, Razmy, & Packianathan, 2020; Gonçalves, Dias, & Correia, 2020; Rodríguez-García, Belmonte, & Moreno-Guerrero, 2020). It has also led to smartphone

addiction (Chiu, 2014; Mahapatra, 2019), in which 'addiction' is defined as an "overwhelming involvement with any pursuit whatsoever that is harmful to the addicted person and his or her society"(Alexander, 2008, p. 48).

As a result of these issues, there has been an increase in studies showing that the use of smartphones can be detrimental to learning and academic performance in both formal and informal settings (Siebert, 2019). In a study of 536 undergraduate students, Lepp, Barkley and Karpinski (2015) found that "increased cell phone use was associated with decreased academic performance" (p. 1). Similarly, Junco (2012, p. 2236) found that amongst 1,839 students in higher education, academic performance, as measured by actual overall semester grade point average (GPA), was negatively affected when they multitasked with social technologies such as Facebook and text messaging. In addition, according to an experimental study on digital distraction (Aaron & Lipton, 2018), students who admitted to using their mobile devices for non-class purposes while watching an instructional video had 6.2% less short-term retention of the information contained in the video than those who only focused on the video.

Multitasking has also been shown to negatively affect the other students nearby who are not multitasking and lead to poorer engagement and learning (Sana, Weston, & Cepeda, 2013). In addition, more qualitative studies into student views of mobile learning have also found that "the allure of social networking applications that were not being used for class, potentially threatened their concentration" (Gikas & Grant, 2013, p. 23).

These would not be such big issues if students could control their thoughts and actions, but students often lack the necessary self-regulation to overcome these distractions (Mahapatra, 2019; Zuboff, 2019, p. 307). Thus, it is my contention that much of the general literature on mobile learning and mobile-assisted vocabulary learning has often focused only on the benefits of mobile learning and the use of smartphones, and rarely critiqued many of these 'taken-for-granted assumptions'. In particular, the connection between self-regulation and device use within the domain of vocabulary learning is missing in the literature and is something that I aim to address in this study.

2.8 Summary and Justification for Study

While there have been several studies that have measured the learning gains amongst students using a custom-designed vocabulary learning mobile application (Lin & Yu, 2016; Wang, 2017; Wu, 2015) and commercial, off-the-shelf vocabulary learning tools, such as Quizlet (Dizon, 2016; Duarte, 2019) in other higher educational contexts, these have tended to be small-scale, pilot studies conducted over short periods of time with single classes in East Asia, especially Japan and Taiwan. There is a lack of studies conducted across a whole programme, particularly English foundation programmes, where vocabulary learning has been shown to be vital for students' future academic success.

In terms of self-regulation, studies have measured university students' levels of self-regulation when learning vocabulary (Mizumoto & Takeuchi, 2012;

Sentürk, 2016) and examined the impact of educational technology on learners' self-regulation in second language vocabulary learning (Khezrlou & Sadeghi, 2012; Tasnimi, 2016), as well as self-regulation in out-of-class, technology contexts (Lai and Gu, 2011). However, it appears that there have been no previous studies to date that have explored self-regulated vocabulary learning in mobile learning contexts. Neither have there been any studies that have tried to identify particular features or activities of a mobile, vocabulary learning tool that may facilitate or hinder self-regulation nor examined the relationship between self-regulation and device use.

Finally, what is particularly lacking in our current understanding of mobile vocabulary learning is how the different dimensions of learners' capacity for regulating their own vocabulary learning may be mediated through the use of different mobile devices. This is particularly important in light of the growing evidence of the negative effects of smartphone usage on concentration, attention and academic performance.

Chapter 3: Theoretical and Conceptual Underpinnings

As argued by Passey (2019) and Selwyn (2012), it is vital to engage with theory when researching the use of educational technology, as well as establish a clear theoretical foundation or underpinning (Passey, 2020). This study will be based on three related underpinning constructs (see Table 5), which will be discussed in this chapter.

Form of Underpinning	This Study
Theory	Self-regulated learning: Volitional view
Conceptual Framework	Five dimensions of self-regulated vocabulary learning
Model & Conceptual Framework	Self-regulated, mobile vocabulary learning

Table 5 Underpinning constructs.

In particular, I will describe and justify the selection of the volitional theory of SRL, especially in how it is relevant to out-of-class vocabulary learning, mobile learning and device use. Next, I show how this view of SRL has already been applied to the domain of second language vocabulary learning and describe the initial conceptual framework. Finally, I outline a model of self-regulated, mobile vocabulary learning that “identifies the major features of influence” (Passey, 2020, p.3) within this study. This model will also be used as the main conceptual framework throughout the remainder of the study.

3.1 Theory of Self-Regulated Learning

Self-regulation is complex, multi-faceted and incorporates other widely-researched constructs such as autonomy, learning strategies, metacognition, motivation, self-efficacy and self-directed learning. The term self-regulated

learning first emerged in the field of educational psychology in the mid-1980s and is strongly linked to several prominent researchers in the field of educational psychology, such as Bandura (1986), Boekaerts (1999; 2017), Corno (2001), Corno and Kanfer (1993), Pintrich (1990, 2000, 2005), Schunk (1995, 2008), Winne (1996, 2017, 2018) and Zimmerman (1986, 1990, 2000, 2001, 2008, 2014). The theory aims “to address the question of how students become masters of their own learning processes” (Zimmerman, 2001, p. 1) and to identify reasons for success in academic performance and achievement.

Overall, Zimmerman (2008) defines self-regulated learning (SRL) as

the self-directive processes and self-beliefs that enable learners to transform their mental abilities, such as verbal aptitude, into academic performance skill. SRL is viewed as proactive processes that students use to acquire academic skill, such as setting goals, selecting and deploying strategies, and self-monitoring one’s effectiveness, rather than as a reactive event that happens to students due to impersonal forces. (p. 166)

Although there are different underlying theories of SRL, there are several features that they all have in common. Firstly, students are “metacognitively, motivationally and behaviourally active participants in their own learning process” (Zimmerman (2001, p. 5). They are not passive learners sitting in the classroom merely listening to the teacher. Secondly, there is a “self-orientated feedback loop during learning... in which students monitor the effectiveness of their learning methods or strategies and respond to this feedback in a variety of ways” (Zimmerman, 2001, p. 5). For example, they could choose to adjust the way they use a particular strategy. The third feature is “a description of how and why students choose to use a particular self-regulated process,

strategy or response” (Zimmerman, 2001, p. 6). Finally, “student efforts to self-regulate their academic learning often require additional preparation time, vigilance and effort” (Zimmerman, 2001, p. 7). All of these features show how SRL overlaps with both self-directive learning and autonomous learning.

Zimmerman (2001, p. 274) has neatly summarised the seven main theories of SRL and examined the role of motivation and key processes in each of them (see Table 6).

Theories of SRL	Motivation	Key Processes
1. Operant	Reinforcing stimuli are emphasised	Self-monitoring, self-instruction and self-evaluation
2. Phenomenological	Self-actualisation is emphasized	Self-worth and self-identity
3. Information Processing	Motivation is not emphasised historically	Storage and transformation of information
4. Social Cognitive	Self-efficacy, outcome expectations and goals are emphasised	Self-observation, self-judgement and self-reactions
5. Volitional	A precondition to volition based on one’s expectancy/values	Strategies to control cognition, motivation, and emotions
6. Vygotskian	Not emphasised historically except for social context effects	Ego-centric and inner speech
7. Constructivist	Resolution of cognitive conflict or a curiosity drive is emphasised	Constructing schemas, strategies or personal theories

Table 6 A comparison of theoretical views in self-regulated learning (Zimmerman, 2001, p. 274).

The field of self-regulation has also produced numerous models and frameworks, which can be categorised as either component models or process models (Lai, 2017, p. 41). Two widely accepted component models are those of Boekaerts (1999) and Pintrich (1999), while the most well-known

process models are those devised by Winne and Hadwin (1998) and Zimmerman (2000). The latter is the most widely cited model (Panadero, 2017) and organises academic self-regulation into three cyclical phases: forethought, performance or volitional control, and self-reflection.

Numerous studies have been conducted which show the important role that self-regulated learning plays in academic performance (Pintrich & De Groot, 1990) and academic achievement (Nota et al., 2004; Zimmerman & Kitsantas, 2014). Pintrich and De Groot (1990), for example, demonstrated that of the many different cognitive variables, self-regulation in particular was a good predictor of actual academic performance and that “the use of self-regulating strategies, such as comprehension monitoring, goal setting, planning, and effort management and persistence, is essential for academic performance on different types of actual classroom tasks” (p. 38).

3.2 Volitional Theory of Self-Regulated Learning

As argued by Mizumoto and Takeuchi (2012), “researchers should carefully consider which theory of self-regulated learning is appropriate for L2 vocabulary acquisition” (p. 90). In this study, I am employing a volitional-based theory of self-regulation, which assumes “the existence of a covert psychological force or forces that control action” (Zimmerman, 2001, p. 23). It focuses on students’ cognitive and behavioural actions to manage and control cognition, motivations and emotions and is mainly associated with the work of

Corno (2001), Corno and Kanfer (1993) and Kuhl (1984, 1987). According to Corno (cited in Zimmerman, 2001, p. 23),

motivational processes mediate the formation of decisions and promote decisions, whereas volitional processes mediate the enactment of those decisions and protect them. Therefore, learners' decisions to use volitional control strategies are prompted by perceptions of such impediments to their learning goals as distractions or competing-action tendencies.

Self-regulation from this view also refers to "the process by which people attempt to constrain unwanted urges in order to gain control of the incipient response" (Baumeister & Vohs, 2007, p. 116). Thus, it overlaps with concepts such as resilience and persistence, which are used by learners in order to overcome negative cognitive and emotional urges, such as procrastination, distraction, boredom and stress.

Based on Kuhl's (1984, 1987) six volitional control strategies, Corno and Kanfer (1993) drew up a framework of volitional control that "individuals might use to facilitate the enactment of a decision or intention" (p. 310). It has two broad categories - *covert strategies* of self-control and *overt strategies* of self-control (see Table 7). The first covert strategy is *metacognitive control*, and, according to Kuhl (1987), this is made up of three aspects; *attention control*, *encoding control* and *information processing control*. Attention control "facilitates the processing of information supporting the current intention and inhibits the processing of information supporting competing tendencies" (p. 287), while encoding control "facilitates the protective function of volition by selectively encoding those features of a stimulus that are related to the current situation" (Kuhl, 1987, p. 287). Information processing control relates to the

use of stop rules because “the process of appraising action alternatives should be brought to a halt, especially if further processing may reveal information that undermines the motivational power of the current intention” (Kuhl, 1987, p. 288).

The second type of covert strategy is *motivation control* which obviously can help to “enhance or strengthen the motivational basis of intentions” (Corno & Kanfer, 1993, p. 311). Finally, there are *emotion control* strategies that “are posited to be useful in managing emotional states that might disrupt or inhibit action (such as anxiety)” (Corno & Kanfer, 1993, p. 311).

Covert Strategies	Example Strategy
A. Metacognitive control	Think of first steps to take and get started right away.
- Attention Control	
- Encoding Control	
- Information Processing Control	
B. Motivation control	Tell myself, “Concentrate; this is important because...”
C. Emotion control	Imagine being good at this and how exciting this is.
Overt Strategies: Environment Control	Example Strategy
D. Control of the task situation	Move away from noise and distractions.
E. Control of others in the task setting	Ask for help from friends.

Table 7 Volitional control strategies (Corno & Kanfer, 1993, pp. 312-313).

The main overt strategy is *environment control* which encompasses two main groups of strategies that can be used to manipulate the setting and the conditions in which a task is being performed. The first is *control of the task situation* and involves actions that could, for example, make the task simpler or allow it to be completed more efficiently (Corno & Kanfer, 1993, p. 313).

The second involves control of other people who could help with or who are

impeding task completion, by, for example, seeking assistance from a teacher or asking other students not to make too much noise (Corno & Kanfer, 1993, p. 313). These can be also used to help control both emotional and motivational states (Kuhl, 1987, p. 288).

Overall, the framework shows “the highly metacognitive quality of volitional accounts of self-regulation” (Zimmerman, 2001, p. 24) and the “focus on strategies that affect learners’ intentions rather than their learning per se” (Zimmerman, 2001, p. 25). In other words, there is an implied in-direct effect of SRL on learning gains, and academic performance and achievement.

3.3 Justification for Selection of Theory

There are several reasons for selecting a volitional theory of SRL as the underpinning construct to this study. As mentioned in Section 2.1, many students on English foundation programmes face a huge vocabulary learning burden in terms of the number of words they need to learn to meet the minimal vocabulary size deemed necessary to read academic texts and therefore increase their chances of academic success. Due to limited class time, most of this learning has to happen in out-of-class settings. Without the direct guidance of the teacher, the student must be able to manage and control their cognitive processes, behavioural actions and their underlying motivations.

In terms of mobile vocabulary learning within higher education, this argument is strengthened by the very essence of what mobile learning is. As Sha, Looi,

Chen and Zhang (2012) state, “students must acquire necessary domain knowledge, metacognitive and regulatory skills, so that they can monitor, control and regulate their own cognitive and motivational processes in mobile learning” (p. 370). Seifert and Har-Paz (2018) similarly propose that in a second language mobile learning environment it is vital that “students learn to become agents of their learning by means of mobile learning pedagogies and goals set by the school framework” (p. 791) and that they are encouraged to set their own goals, monitor and regulate their progress and make decisions to enhance their learning process by applying mobile-seamless learning” (p. 792). At the same time, students need to have some strategies for overcoming negative cognitive and emotional urges, such as procrastination, boredom and stress, when using different mobile devices.

The reliance on personal ownership of mobile devices in the BYOD policies of many HEIs adds another layer to the argument for self-regulation. The vast majority of students in the research context of this study possess multiple, wirelessly-networked devices, which are constantly connected to the internet, for both academic and personal use both on and off campus. Personal use includes continuous access to social media websites and applications. However, as technology companies have now admitted, social media applications are deliberately designed to be addictive based on the dopamine effects on human brains (Parkin, 2018). Thus the use of these applications on their smartphones often ends up distracting students from their academic activities and tasks, resulting in a reduction in self-control or ego depletion (Baumeister & Vohs, 2007). It has now become even more imperative that

students possess the ability to monitor and manage digital distractions and control their use of these devices through self-regulation, especially in out-of-class settings, to allow space for learning.

3.4 Use of SRL Theory In Second Language Vocabulary Learning

In second language learning, the theory of self-regulated learning has been strongly linked to motivation (Dörnyei, 2001), autonomy (Benson, 2011; Ehrman, 2002) and learning strategies (Oxford, 2017). Ehrman (2002), for example, argues that “self-regulation is foundational for learner autonomy” (p. 256), while Oxford (2017) says that “learner autonomy is foundational for self-regulation and that they are both an outgrowth of agency” (p. 81). There is also considerable overlap with language learning strategies because “many of the processes of self-regulation... are viewed as strategies or sets of strategies” (Oxford, 2017, p. 81) so that “self-regulation involves activating and sustaining relevant cognitions, affects and behaviours, essentially through strategies” (Oxford (2017, p. 81).

Within the field of L2 vocabulary learning, the volitional theory of SRL has already been positioned within the vocabulary learning process, as part of the Model of Motivated Vocabulary Learning (Tseng & Schmitt, 2008), which was described in Section 2.3. In addition, a specific survey instrument to measure the underlying capacity for self-regulated L2 vocabulary learning (SRCvoc) has been developed (Tseng, Dörnyei, & Schmitt, 2006). This survey consists of five dimensions of self-regulation (see Table 8), which were directly drawn

from the five classes of self-motivating strategies identified by Dörnyei (2001). These in turn were based on Kuhl's (1987) and Corno and Kanfer's (1993) taxonomies of volitional control strategies, which were outlined in section 3.2.

Dimension	Description
1. Commitment Control	Helps to preserve or increase the learners' original goal commitment.
2. Metacognitive Control	Involves the monitoring and controlling of concentration and the curtailing or any unnecessary procrastination.
3. Satiation Control	Helps to eliminate boredom and to add extra attraction or interest to the task.
4. Emotion Control	Concerns the management of disruptive emotional states or moods, and the generation of emotions that will be conducive to implementing one's intentions.
5. Environmental Control	Helps to eliminate negative environmental influences and to exploit positive environmental influences by making the environment an ally in the pursuit of a difficult goal.

Table 8 Dimensions of Self-Regulated Capacity in Vocabulary Learning (SRCvoc) (Tseng et al., 2006, p. 85-6).

As discussed in section 2.3, this instrument has been used in several subsequent studies that investigated self-regulated vocabulary learning (Khezrlou & Sadeghi, 2011; Mizumoto & Takeuchi, 2012; Sentürk, 2016; Soleimani, 2018; Tasnimi & Ravari, 2016).

The volitional view of SRL has also been applied within the domain of L2 vocabulary learning in technology-based learning environments. Similar to Tseng et al (2006), Şahin Kizil and Savran (2018) developed a model and survey instrument to measure the underlying capacity for self-regulated vocabulary learning, but this time within the specific context of using ICTs. Like Tseng et al. (2006), they identified five dimensions of SRL (see Table 9).

Dimension	Description
1. Commitment Control	Concerns the preservation or increase of learners' original goal commitment.
2. Metacognitive Control	Involves the SRL skills for managing concentration, procrastination, monitoring and controlling learning.
3. Affective Control	The use of SRL skills for coping with impediment feelings (e.g., boredom, stress, etc.) and replacing them with facilitating emotions (e.g., maintaining interest).
4. Resource Control	Relates to seeking, managing and expanding learning resources to increase learning opportunities.
5. Social Control	Involves building constructive environments by seeking social support.

Table 9 Dimensions of SRL used in SRLvocICT (Şahin Kızıl & Savran, 2018, p. 605).

It is clear that the dimensions within these more recent attempts at modelling self-regulated vocabulary learning can be traced directly to the original categories of volitional control identified by Corno and Kanfer (1993) (see Table 10). While one dimension - metacognitive control - features in all three frameworks, there are some differences in terms of the other four.

Corno & Kanfer (1993)	Tseng et al. (2006)	Şahin Kızıl & Savran (2018)
Metacognitive Control - Attention Control - Encoding Control - Information Processing Control	Metacognitive control	Metacognitive Control
Motivation Control	Commitment Control	Commitment Control
Emotion Control	Satiation Control Emotion Control	Affective Control
Environment Control - Control of the task situation - Control of others in the task setting	Environmental control	Resource Control Social Control

Table 10 Mapping volitional control strategies and dimensions of SRL.

Firstly, Corno and Kanfer (1993) refer explicitly to motivation control, while the more recent frameworks prefer commitment control. In terms of emotion

control, Tseng et al. (2006) make a distinction between that and satiation control in which strategies are needed to deal with a loss of novelty. On the other hand, Şahin Kizil and Savran (2018) have conflated both into affective control. Finally, all three frameworks focus on some aspect of resources and tasks, and involving other people as part of environment control. However, while Corno and Kanfer (1993) seem to emphasise controlling the task situation and others to reduce distractions, Şahin Kizil and Savran (2018) in particular emphasise the role of learners within ICT environments in “seeking, managing and expanding learning resources to increase learning opportunities”, as well as “building constructive environments by seeking social support” (p. 605).

Overall, this demonstrates that there is already a body of knowledge within the field of L2 vocabulary learning that directly connects to the existing SRL theories and theoretical frameworks from mainstream educational psychology.

3.5 Conceptual Framework: Five Dimensions of SRL

I will apply and develop the five dimensions of SRL identified by Şahin Kizil and Savran (2018) as the initial conceptual framework for this study. However, rather than refer to a general ICT context, I will relate each dimension to two different mobile devices - the laptop and the smartphone - which students rely on for their out-of-class, mobile, vocabulary learning. Since these two devices have different physical features, functionalities, architectures and embodiments, it is necessary to distinguish between them in order to identify

any differences between how they might affect students' self-regulated vocabulary learning and how students might use their capacity for self-regulation to control and manage their use of the devices. Thus, as Figure 4 shows, there are two-way relationships between the devices and the five dimensions of self-regulation, which I discuss in relation to vocabulary learning and device use below.

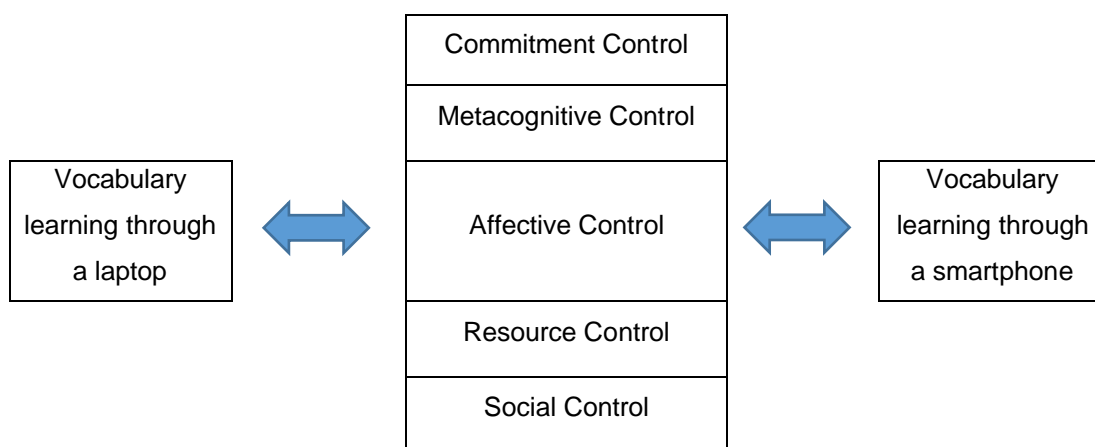


Figure 4 Conceptual framework: Five dimensions of self-regulated vocabulary learning through technology.

Commitment control is concerned with “the preservation or increase of learners’ original goal commitment” (Şahin Kızıl & Savran, 2018, p. 605). This includes “keeping in mind favourable expectations or positive incentives and rewards, and focusing on what would happen if the original intention failed” (Tseng et al., 2006, p. 85). In terms of my study, this refers to the ability to focus on learning a certain number of words and completing a certain number of activities on the digital vocabulary learning tool, as well as which device might be better to use at different times and in different spaces.

Metacognition control focuses on the ability to monitor and control cognitive aspects, such as the vocabulary learning processes outlined in Chapter 2, as

well as aspects of concentration and procrastination (Şahin Kızıl & Savran, 2018, p. 605). This fits with Baumeister and Vohs' view of self-regulation as "the process by which people attempt to constrain unwanted urges in order to gain control of the incipient response" (2007, p. 116). Procrastination in particular has already been identified as a major factor in lower academic achievement on computer-assisted language learning courses (Li et al., 2018). This aspect of self-regulation also involves "identifying recurring distractions and developing defensive routines" (Tseng et al., 2006, p. 85). As mentioned in Section 2.7, one of the main distractions of using mobile technology is the magnetism of social media (Aagaard, 2015, 2018; Pedro, Barbosa, & Santos, 2018), which can deplete levels of self-regulation. Therefore, in this study, I am interested to see how the choice of device could affect concentration and procrastination, but also how student urges might affect their use of different devices.

Affective control refers to the capacity of learners to cope with and manage "impediment feelings (e.g. boredom and stress) and replace them with facilitating emotions" (Şahin Kızıl & Savran, 2018, p. 605), especially those that are "more conducive to implementing one's intentions" (Tseng et al., 2006, p. 86). Vocabulary learning is often a time-consuming and lengthy process that inevitably results in periods of boredom, so in terms of self-regulated mobile vocabulary learning, I am interested in how the use of different devices may be involved, particularly when students who are "experiencing higher academic and interpersonal relationships stresses... are more vulnerable to smartphone addiction" (Chiu, 2014, p. 55).

Resource control “relates to seeking, managing and expanding learning resources to increase learning opportunities” (Şahin Kızıl & Savran, 2018, p. 605). In terms of mobile vocabulary learning, this could mean finding additional mobile applications or online resources, such as online dictionaries, that help support the main vocabulary learning tasks. It is also interesting to identify the role that device preference may play in this.

Finally, social control “involves building constructive environments by seeking social support” (Şahin Kızıl & Savran, 2018, p. 605). This support could come from face-to-face contact with classmates, friends and family, but in a mobile learning context it is more likely to come through various online communication tools and mobile applications, such as WhatsApp, Skype, as well as social media applications, such as Facebook, Snapchat and Instagram. If social media use is seen as a distraction from learning and affects both metacognitive and affective control, it will be interesting to find out if and how students can manage their communication as part of their self-regulated social control in vocabulary learning.

While this initial conceptual framework shows the two way relationship between SRL and mobile devices, it is slightly device-centric and ignores two other crucial aspects of the vocabulary learning process. The first is the actual virtual digital tool (in this case Quizlet) through which students will be interacting on the screens of their mobile devices. It also does not take into account the end goal of this interaction - the learning of words, their spoken

and written forms, and the meanings signified by these forms. Thus, I propose a model of self-regulated, mobile vocabulary learning (see Figure 5), which I will also use as my conceptual framework for this study.

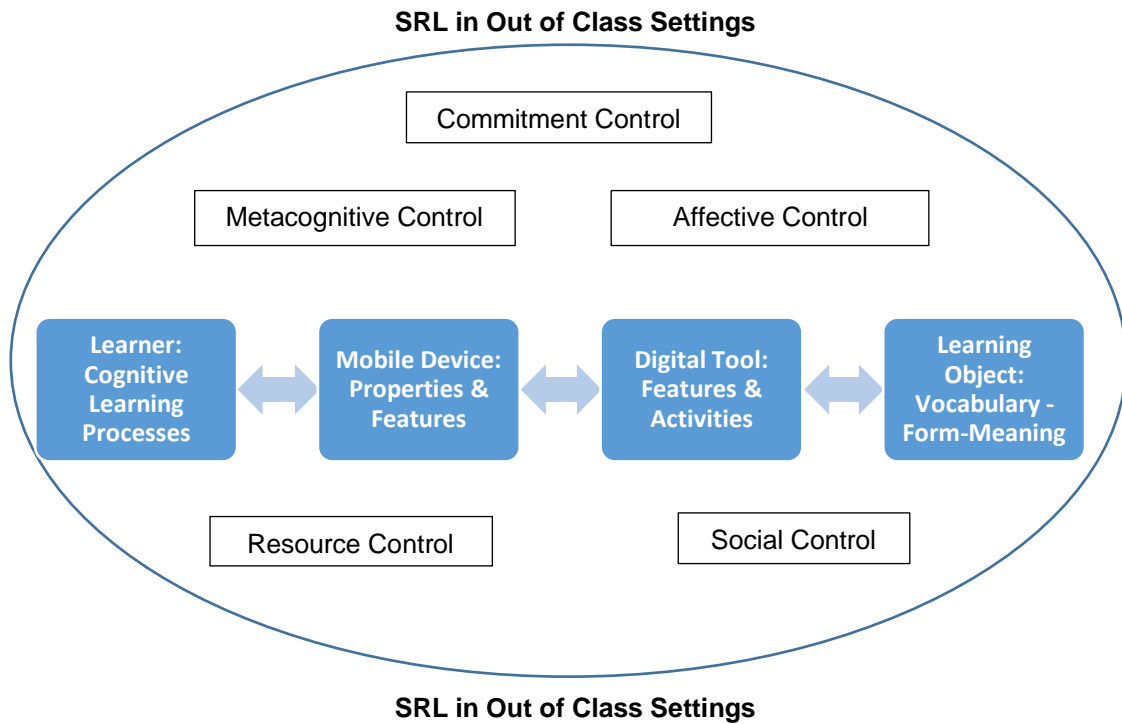


Figure 5 Model of self-regulated, mobile vocabulary learning.

This model shows that rather than there being a direct pathway between the learner and the object to be learnt (e.g., vocabulary), this interaction and potential learning is mediated by both the physical device being used (the laptop and smartphone), and the online digital tool (Quizlet) that delivers and presents the learning materials and activities to the learner. This is an example of what Ihde (1990) calls an *alterity relation* between humans and technology, in which “human beings interact with technologies with the world in the background of this interaction” (Verbeek, 2015, p. 29). At each point in these mediations, the learner has the potential to access the five dimensions of self-regulation in order to manage and control (or not) the potential learning.

In this study, I am interested to see whether these mediations have any effect on learners' capacity for self-regulated vocabulary learning and vocabulary learning gains, and also the extent to which learners are able to use their capacity for self-regulated vocabulary learning to manage and control their use of the online digital tool and the choice of mobile device.

3.6 Use of the Conceptual Framework

I have used this conceptual framework, and in particular the five dimensions of self-regulated vocabulary learning through technology, in several ways in this study (see Table 11).

Research Stage	Use of Framework
1. Research Questions	RQ2 refers explicitly to self-regulated vocabulary learning RQ3 refers to the mediating effects of Quizlet RQ5 refers to the mediating effects of the device
2. Research Design: SRL Survey	Use SRLvocICT scale
3. Research Design: Pair-depth interviews	Structure the interview Inform wording of initial questions
4. Qualitative Findings	Structure description of findings
5. Discussion	Distinguish between dimensions of SRL and identify relationship with both devices

Table 11 Use of conceptual framework.

Firstly, it helps inform the second research question that specifically focuses on the effects of using a digital vocabulary learning tool on students' capacity for self-regulated vocabulary learning. It also directly relates to the two research questions that focus on the mediating factors of the digital vocabulary learning tool and the mobile device. In terms of the research design, I use a modified form of the SRLvocICT survey as one of the main

data collection instruments to collect quantitative data on students' self-reported perceptions of their own levels of self-regulation. I decided to use this scale as opposed to the SRCvoc developed by Tseng et al. (2006) mainly because it is directly related to the use of technology for vocabulary learning, whereas the SRCVoc lacks a technology basis. The psychometric properties of the more recent instrument are also more statistically valid. For the SRLvoclCT the reliability coefficient was measured at 0.85 (Şahin Kızıl & Savran, 2018, p. 610), while for the SRCvoc it was 0.79 (Tseng et al, 2006, p. 90).

I will also use the same five dimensions of self-regulation to structure the pair-depth interviews and inform the specific questions asked to gather qualitative data about the students' perceptions of their self-regulation. This will help to ensure a greater integration of the methods, as argued by Yin (2006). In the findings chapters, I will use the five dimensions to organise the parts that refer explicitly to self-regulated vocabulary learning. For example, in the chapter on the quantitative results, the five dimensions will be used to structure the item analysis from the SRLvoclCT survey. Finally, I will use the five dimensions of SRL when discussing the results in relation to research questions 2, 4 and 5, and then make explicit reference to them in the conclusion.

Chapter 4: Research Design

In this chapter I explain and justify the overall research design, including the methodology and integration of methods. I then describe the research site, the participants and the intervention, before explaining the five data collection instruments in detail. Finally, I highlight the main data analysis processes and the ethical considerations.

4.1 Overview and Justification

This study is based on a mixed methods research design (Cohen et al., 2018; Johnson & Onwuegbuzie, 2004; Yin, 2006) that has been defined as “the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson & Onwuegbuzie, 2004, p. 17). I used a combination of the explanatory sequential design and the multi-phase design (Creswell & Plano Clark, 2011) in which the quantitative data were collected first within two separate, but related phases or stages, and then the qualitative data were collected to explain the quantitative data. A mixed methods approach is broadly underpinned by a pragmatic research paradigm in which the research is “eclectic in its design, methods of data collection and analysis, driven by fitness of purpose” (Cohen et al., 2018, p. 34). It also believes the selection of research methodology and methods should be based on the research problem in hand (Ling & Ling, 2017, p. 8).

The benefits of a mixed methods research design are numerous. Firstly, “epistemological and methodological pluralism” (Johnson & Onwuegbuzie, 2004, p. 15) enables more effective research to be conducted in a research world that is “increasingly inter-disciplinary, complex and dynamic” (Johnson & Onwuegbuzie, 2004, p. 15). There are rarely simple answers even to simple questions, especially in the case of educational research. Secondly, it is argued that a mixed methods approach enables the capture of a more complete picture of the phenomenon being studied than would be possible in a single approach (Denscombe, 2014, p. 147, cited in Cohen et al., 2018, p. 33) and “can increase the accuracy of data and reliability through triangulation” (Cohen et al., p. 33). Finally, it has been argued that a mixed methods approach “actively engages with difference and diversity” (Greene, 2005, p. 208).

The focus in this study is on the use of a widely-used, digital vocabulary learning tool in one particular English foundation programme at a higher education institute in the UAE. Therefore, I used an explanatory, single site case study approach (Grix, 2010, p. 50) which is “an empirical inquiry that investigates a contemporary phenomenon within its real-life context” (Yin, 1994, p. 13). It aims to test working hypotheses about the phenomenon (Grix, 2010, p. 50), which in this case are the effects of using the digital vocabulary learning tool on students’ vocabulary learning gains and their capacity for self-regulated learning. It also aims to “identify, uncover and unpick specific contextual factors” (Grix, 2010, p. 51) that might explain these effects. One of the main advantages of this methodology is that it will allow me to show the

complexity of the situation and enable generalisations to be made “from a specific instance to a more general issue” (Blaxter, Hughes & Tight, 2010, p. 74). On the other hand, one of the disadvantages of using case studies is that “the very complexity of a case can make analysis difficult” (Blaxter, Hughes & Tight, 2010, p. 74) because everything seems to be relevant.

4.2 Overview of Methods

In order to answer the research questions, both quantitative and qualitative methods - observation, test, surveys, and interviews - and five data collection instruments were used (see Table 12).

Method	Instrument	Purpose
Observation	1. Number of completed Quizlet activities	To identify extent of student engagement with digital tool
Test	2. Meaning-recall vocabulary test	To identify students' level of receptive vocabulary knowledge
Survey	3. Self-regulated vocabulary learning through technology survey	To measure students' perceptions about their capacity for self-regulation in second language vocabulary learning through smartphones and laptops
	4. Quizlet survey	To identify students' self-reported experiences and preferences using Quizlet
Interview	5. Semi-structured, paired depth interviews	To explore students' experiences and perceptions of how their vocabulary knowledge and their self-regulated vocabulary learning were affected by different Quizlet features and activities, and their use of different mobile devices

Table 12 Research methods and instruments.

There were two stages to the data collection. The first stage took place at the beginning of the study and the second stage took place 12 weeks later, after the intervention (see Figure 6).

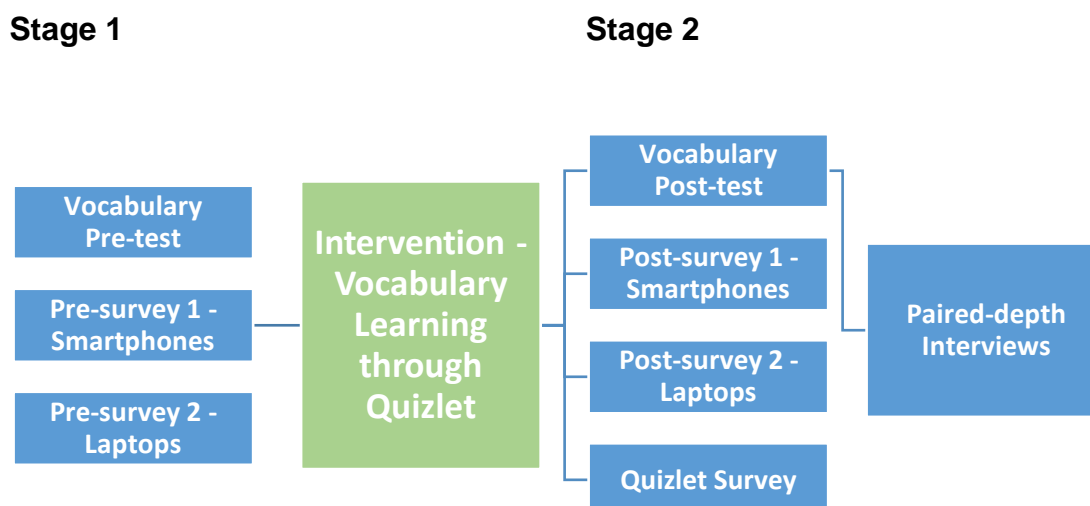


Figure 6 Stages of data collection.

4.3 Integration of Methods

As Yin (2006) argues, a truly mixed methods approach can only happen in a single study if the different methods used are integrated throughout the five main research procedures, which are the research questions, units of analysis, samples for study, instrumentation and data collection and analytic strategies (p. 42). Conversely, a lack of integration is more likely to lead to two or more parallel studies and a limited distinctive contribution (Yin, 2006, p. 41).

In terms of the research questions, I tried to ensure that they were addressed by as many of the different data collection instruments as possible (see Table 13). Secondly, the unit of analysis for all the data collection instruments was individual students who were all enrolled in and studying on one particular course. I only recruited participants from the same cohort of students taking the same course at the same time, and then only recruited from this group of students for the interviews, so that “the samples of each method may be

nested within that of the other” (Yin, 2006, p. 44). This meant that there was greater consistency and a reduced “threat to the integrity of a single study” (Yin, 2006, p. 43) across the different methods and instruments.

For the instrumentation and data collection, I tried to ensure that two or more of the methods and data collection instruments were addressing the same dependent, independent or descriptive variables (Yin, 2006, p. 45). So, for example, the five different dimensions of self-regulation were included in both the self-regulation surveys and interviews, while the variable of vocabulary knowledge was addressed in both the vocabulary test and the interviews. Finally, while data analysis was initially conducted separately for the results from each of the different research instruments, joint analysis of the quantitative results was also conducted later.

Research Question	Data Collection Instrument
RQ1: What are the effects of using Quizlet on students' receptive English vocabulary knowledge?	<ul style="list-style-type: none"> • Vocabulary Test • Semi-Structured Paired Depth Interviews
RQ2: What are the effects of using Quizlet on students' capacity for self-regulated vocabulary learning through technology?	<ul style="list-style-type: none"> • Self-Regulation Surveys • Semi-Structured Paired Depth Interviews
RQ3: What is the relationship between receptive vocabulary knowledge, capacity for self-regulated vocabulary learning through technology and the number of completed Quizlet activities?	<ul style="list-style-type: none"> • Vocabulary Test • Self-Regulation Surveys
RQ4: How have the features and activities of Quizlet mediated these effects?	<ul style="list-style-type: none"> • Semi-Structured Paired Depth Interviews • Quizlet Survey
RQ5: How has the choice of device mediated these effects?	<ul style="list-style-type: none"> • Self-Regulation Surveys • Semi-Structured Paired Depth Interviews • Quizlet Survey

Table 13 Research questions mapped to research instruments.

4.4 Research Site

Zayed University is one of only three federal higher education institutions in the UAE. It was initially founded for female students by the former leader of the country, Sheikh Zayed, in 1998 and is based on an American liberal arts model of higher education. There are currently over 10,000 undergraduate students who complete four-year degree courses through the medium of English (EMI) in seven different colleges across campuses in Abu Dhabi and Dubai (Zayed University Office of Institutional Research, 2016). Since there is no on-campus accommodation, all the students live at home and commute to the campus each day either by university buses or private car. In the first year, all students complete the same one-year, general education programme and then move on to discipline-specific colleges, where they study subjects such as business, education and information technology. The students are predominantly female, although there is a small group of male students on the Abu Dhabi campus.

University College hosts the compulsory one-year general education programme, as well as the Department of Academic Language and Literacies (ALL). Within this Department, all students with an English language score of below 1250, as measured by the Emirates Standardisation Test (EMSAT) - a specially-designed high school English exit test - are required to complete a compulsory, full-time (20 hours per week), 16-week Academic English Language and Literacies (ALL) course prior to taking the other courses in the general education programme. On this course they complete five, genre-based reading and writing modules that focus on developing their language

skills, such as academic reading and writing. Alongside this there is a general academic vocabulary strand composed of a word list of 500 restricted word-families. This list is based on four of the most recent vocabulary lists, including the New General Service List (NGSL) (Browne, 2014) and the Academic Vocabulary List (AVL) (Gardner & Davies, 2014). The list of 500 words has been carefully divided into 50 blocks of ten words and students are expected to study one block each day over a ten-week period outside of class on an independent basis. Overall, the aim is to help the students' develop their receptive knowledge of general academic English vocabulary in terms of both breadth and depth, in order to help them improve their ability to read and comprehend the academic texts they have to read on their degree programmes.

The use of technology at Zayed University has always officially played a large role in learning and teaching and has often been based around particular devices. From its founding in 1998, Lenovo laptops were distributed to teachers by the university for classroom use, although these were not compulsory for students. However, from August 2012 to May 2017, the university aggressively pursued a mobile learning strategy that was based around the mass distribution of Apple iPads and the widespread use of iPhone Operating System (iOS) applications for learning and teaching purposes (Hargis, Cavanaugh, Kamali, & Soto, 2014). All students in the English foundation programme were required to purchase and use their own iPad both in and out-of-class. In mid-2017, this strategy was phased out and a BYOD policy was introduced in which students are now officially expected to

purchase and use their own laptop or tablet computer for both in-class and out-of-class learning. Informally, smartphones are also widely used for online activities, such as educational quizzes and games.

4.5 Participants

The target group of participants were Emirati female and male students, aged between 17 and 20 years old, who had just graduated from high school and were enrolled in the ALL course by August 2019 on both the Dubai and Abu Dhabi campuses. As described in section 4.4, these students were required to complete the ALL course because their English language ability was measured at between 1000 and 1250 on the EMSAT. The vast majority of courses on offer in each College at the university are taught through the medium of English, so it is essential that students have a sufficient level of English language proficiency to understand academic lectures and written texts, and complete written assignments. As a result, these students did not have a choice about taking the ALL course. As per the university procedures, these students did not select their major courses until the end of the ALL course, but the most popular courses are generally business and IT-related.

As of 22 August 2019, there were 502 students enrolled on the ALL course and they were divided into 26 different classes. The initial objective was to recruit as many of these 502 students as possible through the teachers who were teaching this course. At the beginning of the course, teachers gave a short presentation and a participant information sheet, which was in both English and Arabic, to their students. Those students who agreed to take part

in the study signed a participant consent form. In addition, those students aged under 18 years at the time of the study were required to ask a parent to complete a parental consent form. Initially, there were 269 students who agreed to participate in the study - 147 on the Dubai campus and 122 on the Abu Dhabi campus. 252 were female and 17 were male. Recruitment for the interviews was undertaken using purposive sampling (Blaxter, Hughes & Tight, 2010, p. 170) to identify groups of students who demonstrated a range of increases in their vocabulary scores after the post-vocabulary test had been administered on both campuses. A total of 28 participants were recruited initially for the interviews.

4.6 Intervention

During the semester, all of the participants were asked to complete various digital vocabulary activities on Quizlet, an off-the-shelf, online digital tool, over a 10-week period. Quizlet has both a web-based interface for use on laptops and desk-top computers (see Figure 7), and a mobile application for use on smartphones and tablets.

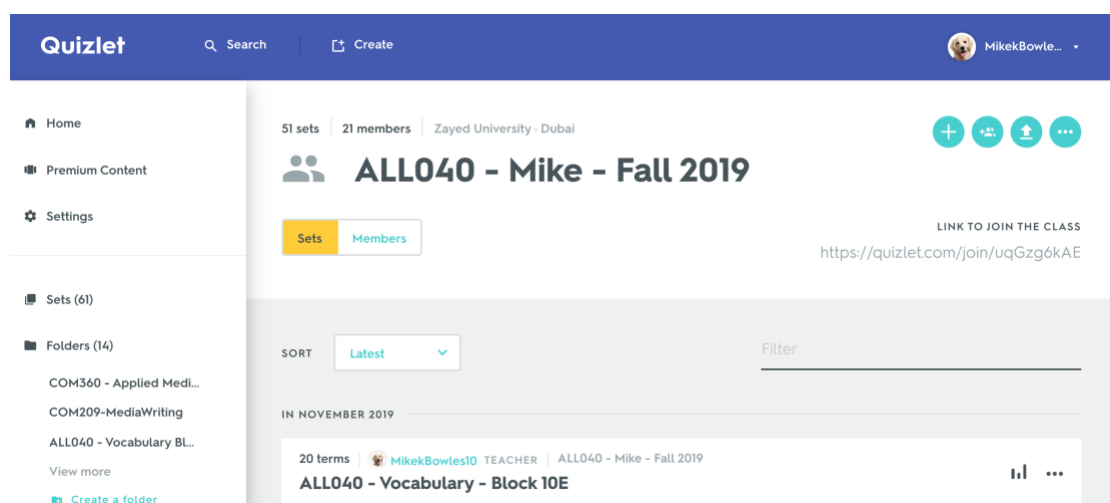


Figure 7 Quizlet web-based interface.

As outlined in Section 4.4, the vocabulary items that formed the content of the activities were taken from a word list of 500 restricted word families that itself was based on words within the 3,000 most frequent words in English. As this list is frequency-based, it was inevitable that the same words appeared in the classroom materials that teachers used, such as reading and listening texts, so students encountered many of the words again in the class, both only receptively.

The 500 words were divided into daily blocks of ten words and each block was added as a 'set' on Quizlet (see Figure 8).



Figure 8 Quizlet sets.

Each word was presented twice; once with an indication of its part of speech in brackets and a simple definition in English, and once with a gapped example sentence (see Figure 9). This was done to ensure students received some information about both the meaning and use of each word.

Terms in this set (20)		Original
anxiety (n)	fear or worry about something	★ 🔊 ✎
anxiety	Exams can cause a lot of _____.	★ 🔊 ✎
architect (n)	a person who draws the plans for a new building	★ 🔊 ✎
architect	The building was designed by an _____.	★ 🔊 ✎
aspect (n)	a certain feature of a situation جانب	★ 🔊 ✎
aspect	Technology affects every _____ of our daily life.	★ 🔊 ✎

Figure 9 Example list of words and information about each word.

Within each set of 10 words, users had access to five different learning activities - Flashcards, Learn, Write, Spell and Test - and two games - Match and Gravity (see Figure 10).

Quizlet Search Create

ALL040 - Vocabulary - Block 1E

4.6 ★★★★★ 17 reviews

STUDY

- Flashcards
- Learn
- Write
- Spell
- Test

Play

- Match
- Gravity
- Live

afford (v)

1/20

Figure 10 Home page for example Quizlet set.

Each learning activity and game has a slightly different focus and action requirement (see Table 14).

Activity Name	Description	Required Action
1. Flashcards	<ul style="list-style-type: none"> • Word on the front • Definition or gap fill sentence on the back 	<ul style="list-style-type: none"> • Tap to turn card over to check definition or sentence
2. Learn	<ul style="list-style-type: none"> • Three activity types: <ul style="list-style-type: none"> - Two- and four-item Multiple Choice Questions (MCQs) - True or False - Type the word 	<ul style="list-style-type: none"> • Tap or click on correct option in MCQs • Type in spelling of word • In 'Options' user can select the question types
3. Write	<ul style="list-style-type: none"> • Shows the definition or sentence • Audio reads out the definition or sentence 	<ul style="list-style-type: none"> • Type in word exactly or close to the correct spelling • In 'Options' users can choose audio or not
4. Spell	<ul style="list-style-type: none"> • Shows the definition or sentence • Audio reads out the term 	<ul style="list-style-type: none"> • Type in the correct spelling
5. Test	<ul style="list-style-type: none"> • Four activity types: <ul style="list-style-type: none"> - 2 and 4 items MCQs - True/False - Matching - Type the word 	<ul style="list-style-type: none"> • Tap or click on correct option in MCQs • Type in spelling of word • In 'Options' user can select the question types
6. Match	<ul style="list-style-type: none"> • Presented with 12 cards - six words and six definitions / sentences • Timer measures how long it takes 	<ul style="list-style-type: none"> • Tap or click on two cards – 1 with word and 1 with matching definition or gap fill sentence
7. Gravity	<ul style="list-style-type: none"> • Definitions and sentences fall from the sky as meteors one by one 	<ul style="list-style-type: none"> • Type the correct word in a box that matches the definition or sentence

Table 14 Description and required response of Quizlet activities and games.

There is also a co-operative team game called Quizlet Live, which can only be initiated by the teacher. In this game, students work together in small teams to successfully complete similar quiz items as in the other activity types for one block of vocabulary. It was not a requirement of the intervention for teachers to use Quizlet Live, but anecdotally, many teachers used it in class, often at the end of a lesson, as a way to review the 10 words for the day and to provide some respite from more intense academic reading or writing tasks.

Prior to the start of the intervention, each class teacher gave their own students a short presentation about the importance of vocabulary learning and a brief guided tour of the Quizlet website and the mobile application, including how to access and use the different features and activities. All the students were shown how to register for a Quizlet account, and each student then created their own individual account. Students were told that they should try and access Quizlet and study one block of ten words each day for 20-25 minutes outside of class as part of their self-study time. The blocks were labelled using numbers to represent the weeks and letters to represent the days (see Table 15). This was done to help students quickly identify which blocks they needed to access each day.

Week	Sunday	Monday	Tuesday	Wednesday	Thursday
1	1A	1B	1C	1D	1E
2	2A	2B	2C	2D	2E
3	3A	3B	3C	3D	3E

Table 15 Quizlet suggested study schedule

In terms of device, students were not told whether they should use their laptop or smartphone to complete the activities.

Each teacher also set up a class page within Quizlet and then invited all their students to join, so that they could see how many activities and which activities each of their students had completed. Teachers made sure that all the students knew that their completion of activities on Quizlet were being monitored. In order to provide an additional incentive, students were told that 5% of their overall grade would be based on their completion of a minimum number of Quizlet activities, which each teacher could track through the teacher view in Quizlet.

4.7 Data Collection Instrument 1: Quizlet Activities

In order to check how much students used Quizlet during the semester, each classroom teacher who participated in the study was asked to record the number of Quizlet activities that their students completed. In the teacher accounts on Quizlet, it is possible to track the progress of each student who has joined a particular class. Each week, teachers looked at this view and for each student they counted the number of activities that had a green circle (see Figure 11). This number was recorded in a Microsoft (MS) Excel spreadsheet, and then at the end of the semester the weekly numbers were added up to provide a total for each student. Due to the fact that Quizlet has seven different activity types and there were 50 sets to complete, the maximum number of activities that could be completed was 350. Unfortunately, it was not possible to see which device - laptop or smartphone - students used to complete individual activities or individual learning sessions.

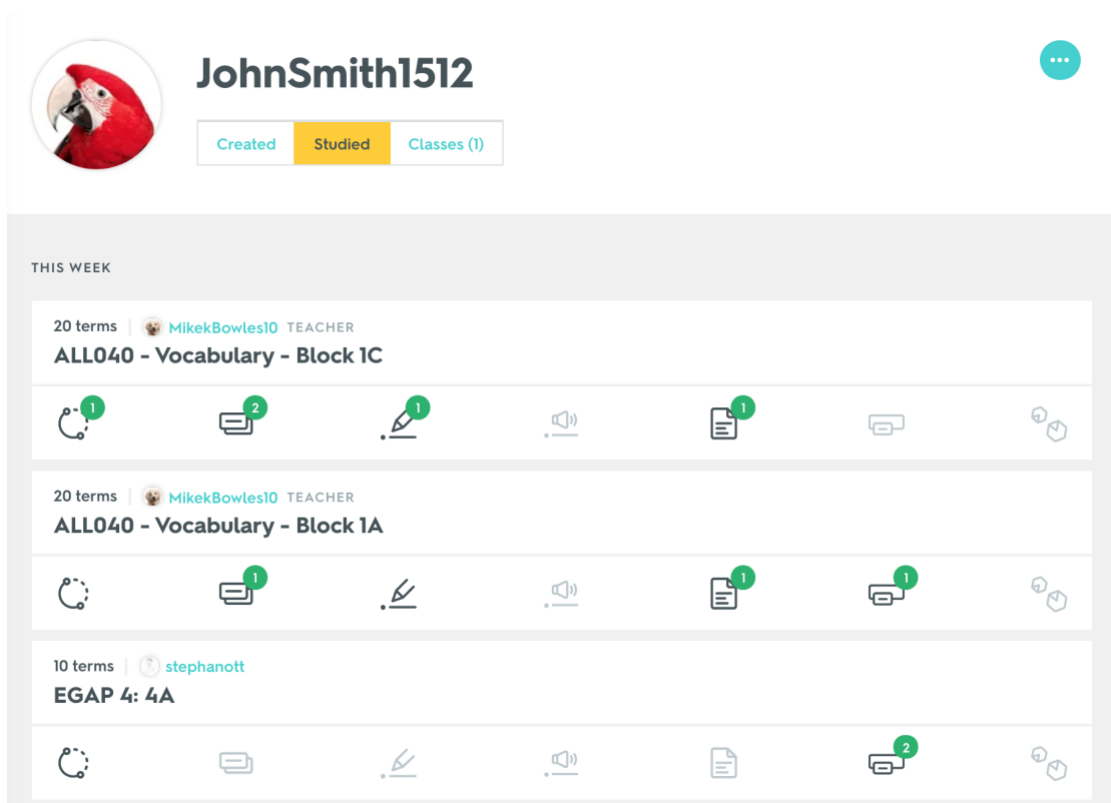


Figure 11 Quizlet progress chart.

4.8 Data Collection Instrument 2: Meaning-Recall Vocabulary Test

4.8.1 Overview

In order to measure any vocabulary learning gains by the students across the semester, I developed a 50-item receptive vocabulary achievement test (see Appendix A) that focused on students' breadth of vocabulary knowledge, which is the most common type to test (Gillway, 2005, p. 108). It was designed to measure participants' ability to recall the meaning of each word that was signalled by the orthographic form of the word as they read it (Nation, 2013, p. 49). I focused on the students' receptive knowledge of the vocabulary items because, as Schmitt (1994) argues, "it may be better to test newer words, to which the students have not yet had much exposure, with receptive

tests, since it is generally considered that accurate production requires more control over word knowledge” (p. 11).

4.8.2 Test Construct and Format

The content of the test was based on a sample of 50 different words from the 500-word list that forms part of the syllabus for the ALL course. Sampling was undertaken to ensure that the items chosen were “good representatives of the total list of words” (Nation, 2013, p. 516) and that the test contained “an equal number of items from each unit or week of the course” (Gillway, 2005, p. 1101). I selected one word from each of the 50 sets of vocabulary for inclusion in the test using random sampling (Read, 2000) and an online random generator. I also checked the class of words to ensure that the proportion of nouns, verbs and adjectives was the same as on the original list of 500 words (see Table 16).

Nouns	Verbs	Adjectives	Adverbs	Other
53%	25%	15%	6%	1%

Table 16 Percentage of word classes in word list.

The test assessed students’ knowledge discretely rather than in an embedded way (Read, 2000, p. 9). This means it involved testing students’ knowledge of a word as an *independent construct* (Coombe, 2011, p. 113) rather than as part of a larger construct, such as a reading or listening text. However, because nearly all words have multiple meanings and are part of larger word families with different parts of speech, it was necessary to present each word in a very short “non-defining sentence” (Nation, 2013, p. 526), but without

providing “obvious clues to help the test taker guess” (Schmitt, 1994, p.12). As a result the test can also be identified as *context-independent* (Read, 2000, p. 11).

In terms of task type, I only used one task type in this test, so that the participants would not have to get used to different task types during the test, which may influence their scores (Nation, 2013, p. 528). It is also generally accepted that any test should not utilise exactly the same task type as used in the learning materials, as this may lead to triggering students’ memory of the task rather than testing their memory of the meaning of the words. In this test, participants were presented with each word first, followed by the part of speech and then the same word in a short sentence, with the word to be tested in bold and underlined (see Table 17 and Appendix A).

No.	Word	Part of Speech	Example Sentence	Response
1	provide	verb	Can you please <u>provide</u> it?	
2	demonstrate	verb	John will <u>demonstrate</u> how it works.	

Table 17 Example of vocabulary test items.

When writing the short sentences, I followed detailed linguistic specifications to ensure any other barriers for the students’ understanding were minimised. For example, I only used other words that are in the first 1,000 most frequent word families to ensure that students should know them already (Read, 2000, p. 170). Two other professional English teachers gave their independent feedback on the simplicity and ease of understanding of each sentence, as well as the degree of context-independence. I then edited the sentences based on any feedback they gave.

The task of the students was to read the word and the sentence, try and recall the meaning of the underlined word and then demonstrate their knowledge of the meaning through one of four possible responses:

1. Write a one-to-one Arabic translation of the word
2. Write a short definition in Arabic
3. Write a synonym in English
4. Write a short definition in English

By giving the participants the option of how they can demonstrate their knowledge, it minimises the chances of not capturing this information.

Translation is a particularly good check of whether a person can recall the meaning of a word and it is also “extremely efficient in terms of construction and marking” (Gillway, 2005, p. 116).

4.8.3 Test Scoring

In order to increase the reliability of the test scores, I recruited two bilingual English teachers who were fluent in both English and Arabic to create a clear and accurate answer key that took into account any variations in possible answers. For each of the 50 items in the test, the two teachers drew up a list of possible responses that demonstrated meaning recall for each of the four response options. This answer key was then used to score each of the items on all of the test papers in the following way:

- 1 point if the response showed that the participant clearly knew the meaning of the word.
- 0 points if the response showed little or no knowledge of the meaning of the word or the cell on the test paper was left blank.

The total number of points was added up to give a score out of 50 for each participant. This was multiplied by two to give a percentage of the words known. Each test response was first marked by one of the teachers and then second marked by the other teacher. Any discrepancies or disagreements were discussed between the two markers and a satisfactory compromise reached. The same answer key and scoring procedures were used for both the pre- and post-tests.

4.8.4 Test Validity and Reliability

According to Fulcher and Davidson (2007 cited in Schmitt, 2019), validation is a continuous process and a test can never be completely validated. It is also “best to validate a test in as many ways as possible” (Alderson, Clapham, & Wall, 1995) and generate as much evidence as possible. In terms of *construct validity*, this vocabulary test has been designed to measure students’ meaning recall of English words from their orthographic form. It does this by asking students to demonstrate their knowledge in one of four different ways, which they can choose. It does not require written production of the words nor test their understanding of the phonological form. In order to prove this, I administered an earlier version of the test to an Emirati staff member and then conducted an interview asking them to explain whether the sentence presented each word clearly enough without giving any clues about the meaning. This led to some changes and the removal of some problematic items. To ensure *content validity* of the test, I only tested meaning recall of

words that were “on the curriculum and that were taught in class” (Davidson, 2019, p. 8).

In order to measure *concurrent or criterion validity*, it is usual to correlate the results of the test with that of another similar test that has the same purpose or construct. In this case, there was no previous vocabulary test that used the same words, so I developed a short reading test using the same vocabulary items with comprehension questions. The questions were worded in such a way that in order to answer them correctly, the test takers were required to demonstrate knowledge of the meaning of the same words. I administered the vocabulary and reading tests to another Emirati member of staff at a similar English language level to the main participants in the study. Overall, there was a correlation coefficient of 0.8 between the two test scores. I also conducted an interview to identify and revise poor statements and questions that were unclear or difficult to understand. I then administered the revised reading test and vocabulary test to 12 Emirati students, who were at a similar English language level to the main participants in the study. Overall, there was a 0.71 correlation between the two test scores, which is considered acceptable for most concurrent validity coefficients (Alderson, Clapham & Wall, 1995, p. 178).

To increase the *scoring validity or reliability* of the test, I tried to ensure that there was adequate *construct representation* by including at least 30 items in the test (Nation, 2008, p. 153). I also used the *Test-Retest procedure* (Weir, 2005, p. 25) with 12 Emirati students who were from the same context as the participants in the main study. I administered the vocabulary test on one day

and then again three days later. Both tests were scored and the values for each item on both tests compared. Overall, the correlation between the two tests was 0.9, which is considered a normal indication of reliability (Weir, 2005, p. 29).

4.8.5 Test Administration

For practical reasons and those of security and confidentiality, a paper-based version of the vocabulary test was administered by the individual class teachers to their own students who were participating in the study. To support the teachers and ensure greater reliability of the test scores, I devised detailed guidelines on all aspects of how to administer the test, including the oral instructions given to participants at the beginning and end of the test, and what questions could be answered by teachers (Davidson, 2019, p. 8). In addition, I created two versions of the test - A and B - which both had exactly the same test items, but in a different order. When classes of students sat down to take the test, the versions were distributed alternately (see Figure 12) so that participants with the same version were either not sat next to or directly behind each other. This reduced the opportunities for participants to share answers and helped to ensure greater validity and reliability of the test results. Each student was given a unique student code to enter at the top of their vocabulary test paper to enable their pre- and post-test scores to be matched.

A	B	A	B
B	A	B	A

Figure 12 Classroom configuration for administering vocabulary test.

4.8.6 Limitations

Although I followed standard language test development procedures, there were still some limitations with the test. Firstly, vocabulary knowledge is a very individual construct, so that students with the same English language proficiency level will have different vocabulary depth and breadth profiles. Therefore, just because one student could recall the meaning of more words in both the pre- and post-tests, it does not necessarily follow that their overall language proficiency level was higher. Secondly, the validation of the test was undertaken with only twelve participants, which is considered on the low side.

4.9 Data Collection Instrument 3: Self-Regulated Vocabulary Learning through Technology Survey

In order to identify students' self-reported capacity for self-regulated vocabulary learning through technology, I used a survey tool based on the self-regulated vocabulary through information and communicated technologies (SRLvociCT) scale developed by Şahin Kızıl and Savran (2018) as a self-report instrument. The scale presents 23 statements relating to five different dimensions of self-regulated vocabulary learning: commitment control, metacognitive control, affective control, resource control and social control. For each statement, participants are required to indicate the degree to which it is true of them on a 6-point Likert scale (Not at all true, Not true, Somewhat not true, Somewhat true, True and Very true). According to the instrument developers, the overall reliability of the tool was measured at 0.85 (Şahin Kızıl & Savran, 2018, p. 610) which means it is an extremely reliable tool.

For the purposes of my study, I adapted the statements in the original survey by replacing the use of the word 'ICTs' in the statements with 'smartphone' and 'smartphone applications' in Survey 1 (see Appendix B) and 'laptop' and 'the Internet' in Survey 2, in order to draw out any differences between the two devices and different Quizlet formats. However, the other wording related to self-regulation remained the same. The same response options were used as in the original scale. All of the statements and options were translated into Arabic by a professional translator and these translations were checked by the two bilingual teachers involved in the scoring of the vocabulary tests.

The survey was then added to the online Qualtrics survey tool and digital copies of the survey were created for each class. A separate URL link was then sent to each teacher for them to distribute to the students in their particular class. In order to protect the participants' identity, each student was given the same unique student code as for the vocabulary test which they entered at the beginning of the online survey. Once the participants entered the main section of the survey, they could select English or Arabic as the language to use when completing the survey. The reason for giving students the choice of languages was that some Emirati students are better able to operate in English than Arabic when reading and writing, so insisting on the use of one particular language might have limited their ability to understand and respond to the statements.

4.10 Data Collection Instrument 4: Quizlet Survey

The main purpose of this survey was to collect additional quantitative and qualitative data regarding students' perceptions about their experiences of using Quizlet, the usefulness of the digital tool for the vocabulary learning and their preferences for the device they used to access it. The survey contained 18 items and used three types of questions: multiple choice questions, ordering questions and short answer questions. The questions asked participants about both their overall experiences and preferences with using Quizlet, including frequency of use and how much it benefitted or did not benefit their vocabulary learning. It also asked about their preferences and perceptions of the Quizlet activities and features. Following Cohen et al. (2018, p. 340), the order of the questions progressed from more general to more specific and from closed, multiple-choice to open-ended in order to give participants the chance to explain their answers. The questions were written in simple English to ensure all participants understood what was being asked. The survey was also distributed online using Qualtrics and the same procedures that were used with the self-regulation surveys were used to administer the Quizlet survey.

4.11 Data Collection Instrument 5: Paired Depth Interviews

4.11.1 Overview

As part of the mixed methods approach being taken in this study, I conducted interviews with a sample of participants in order to obtain rich, qualitative data

that triangulated the quantitative data from the other data collection instruments. I also hoped that conducting interviews would enable me to “engage, understand and interpret the key feature of the lifeworlds of the participants” and “elicit descriptions of specific situations and actions, rather than generalities” (Kvale, 1996, p. 30). For this purpose, I used semi-structured (Bogdan & Biklen, 1992) paired depth interviews (Wilson, Onwuegbuzie & Manning, 2016), in which “the topics and questions are given, but the questions are open-ended and the wording and sequence may be tailored to each individual interviewee and the responses given with prompts and probes” (Cohen et al., 2018, p. 511). As the name suggests, paired depth interviews involve the interviewing of two participants at the same time and in the same place by one interlocutor, which enables the two participants or interviewees to interact with each other during the interview (Wilson et al., 2016, p. 1551). On a continuum, this method can be placed half-way between one-to-one interviews and focus groups (Houssart & Evens, 2011; Morris, 2001).

4.11.2 Interview Questions and Protocol

In order to ensure that the data obtained from the interviews were relevant for my specific research questions and met Yin’s (2006) requirements for a single study using mixed methods, I developed initial interview questions that directly mapped onto the research questions (see Table 18 for a sample of questions that were used in relation to metacognitive regulation and concentration).

Main Research Questions	Initial Interview Questions
RQ2: What are the effects of using Quizlet on students' capacity for self-regulated vocabulary learning through technology?	1. What happened to your levels of concentration when learning new vocabulary using Quizlet? 2. What did you do to manage and control your levels of concentration?
RQ4: How have the features and activities of Quizlet mediated these effects?	3. What features / activities of Quizlet affected your levels of concentration? How? 4. What features / activities of Quizlet affected your ability to manage your levels of concentration? How?
RQ5: How has the choice of device mediated these effects?	5. How did the choice of device (smartphone or laptop computer) affect your concentration?

Table 18 Sample interview questions.

I developed similar questions for each of the five dimensions of self-regulated vocabulary learning that were used in the self-regulation surveys (see Appendix C). In terms of the questions types, I developed predominantly open-ended questions because they provide plenty of opportunity for the interviewee's voice to come through. I also asked unscripted questions because they "allow the interviewer to probe so that she may go into more depth if she chooses, or to clear up misunderstandings" (Cohen et al., 2018, p. 513). In many cases, the latter case involved asking *Why?* or *How?* questions. However, I tried to keep these to a minimum in order to avoid the possibility of increased bias in the content and direction of the interview (Fowler, 2009, p. 139).

I also developed an interview protocol that was designed to ensure a degree of consistency with the way that the interviews were set up and managed. The protocol included steps to be taken, and language to be used in the instructions and explanations given at the beginning of the interviews, during

the interviews and at the end of the interviews. Both the protocol and interview questions were piloted in a paired interview with two members of local staff.

4.11.3 Planning and Arranging Interviews

As described in section 4.5, participants for the interviews were selected based on the increase in their vocabulary test scores between the pre-test and post-test. Students were first divided into two groups based on the campus they were from. Within each of these lists, students were ranked according to the increase in their scores and then groups of eight students were selected randomly from three bands: those who demonstrated large increases in their vocabulary test scores, average increases and small increases. This resulted in six separate lists of students. Initially, six students from each list were then contacted by email and through their classroom teacher to invite them for an interview on their respective campus. If one of these students declined, then the next person on the list was contacted until there were 16 students on the Dubai campus and 12 students on the Abu Dhabi campus who agreed to take part in an interview (see Table 19). Four extra students were recruited on the Dubai campus just in case of any no-shows in any of the other interviews. Students with similar vocabulary gains were paired up for the interviews.

	Large Increase	Average Increase	Small increase	Totals
Dubai Campus	4	8	4	16
Abu Dhabi Campus	4	4	4	12
Totals	8	12	8	28

Table 19 Number of participants recruited for paired depth interviews by campus and vocabulary test score increase.

All the interviews were arranged over an eight-day period between the end of November and the beginning of December in order to ensure they were completed before the final examination period, which would have affected attendance at the interview.

4.11.4 Conducting and Recording the Interviews

All the interviews were conducted in English by me on the Dubai campus and a research assistant on the Abu Dhabi campus during the common lunch break in individual staff offices. The interviews were conducted in an informal, casual manner in order to put the interviewees at ease and to create a relaxed atmosphere, so that they “can feel secure to talk freely” (Cohen et al, 2018, p. 518). Each participant was given a pseudonym to use during the interview in order to protect their identify, and encourage them to be as open and honest in their responses as possible. All of the interviews were recorded using a digital audio recorder. The participants were informed about this at the beginning of the study when informed consent was sought and at the beginning of each interview. Each interview lasted between 30 and 45 minutes.

4.11.5 Benefits

The most obvious practical benefit of paired depth interviews is that they are much easier to schedule than focus groups with larger numbers of participants and there is therefore a lower attrition rate (Highe, 2003). They are also less

demanding for the interviewer to manage and allow “for frequent and sustained dialogue between participants” (Highet, 2003, p. 114). As a result, it is more likely that the two interviewees will stay on the same topic “or at least not stray too far, in comparison to when there are more than two interviewees who could take the conversation in any direction” (Wilson et al., 2016, p. 1554). In addition, paired depth interviews allow the interviewer to identify differences between interviewees and how (any possible) conflict is handled and addressed (Wilson et al., 2016, p. 1554). Beyond the collection of the data, paired depth interviews also facilitate more efficient data analysis than with focus groups, because it is easier “to determine what is being said and by whom” (Wilson et al., 2016, p. 1554).

4.11.6 Limitations

One limitation of paired depth interviews is that one participant may do more of the talking than the other participant, so it may be difficult to achieve significant two-way interaction (Wilson et al., 2016, p. 1555). This is more likely to occur when the participants’ levels of spoken English differ. The dominance of one person could also “cause the other interviewee not to be able to concentrate on accurately participating or interacting” (Wilson et al., 2016, p. 1555). This was addressed by the interviewers trying to ensure that each participant had an equal opportunity to speak and by specifically directing questions to quieter and less vocal participants first. Another limitation is that some participants may feel that they have to agree with each other, even though “they experienced and interpreted the situation differently”

(Wilson et al., 2016, p. 1555). Both interviewers raised this issue at the beginning of each interview and informed all the participants that it was perfectly fine to have different opinions from their partner.

4.12 Methods: Data Analysis

As this research was based on a multi-stage, explanatory sequential design (Creswell & Plano Clark, 2011), the data from the five different research instruments were first analysed separately and independently within the two stages or phases (Cohen et al., 2018, p. 45), and then compared within and across the two stages. For example, in stage one the results from the vocabulary test were correlated with the results from the self-regulation survey. In addition, the results from the data analysis of the two vocabulary tests were used to identify participants for the qualitative interviews, in an example of extreme case analysis (Caracelli & Greene, 1993) whereby “outliers found in one set of data are explored using different data and methods” (Cohen et al., 2018, p. 46). Overall, the data analysis process was iterative and “not necessarily a once-and-for-all event for each element or stage of the research” (Cohen et al., 2018, p. 46).

4.12.1 Meaning-Recall Vocabulary Test

Overall scores from each of the paper-based vocabulary tests were manually entered into a MS Excel spreadsheet, and then imported into SPSS Version 25.0 for data analysis. Descriptive statistics, such as the mean, range,

median, standard deviation and variance were generated. This process was repeated for the post-test results, ensuring that the scores for each student were matched using the student codes. The study variables were assessed for normality using the Shapiro-Wilk test, histograms and normal probability plots. It was discovered that the test scores were not normally distributed, so as a result, a Wilcoxon signed-rank test was used rather than paired t-tests to measure the difference between the pre- and post-vocabulary scores.

4.12.2 Self-Regulated Vocabulary Learning Survey

In order to allow quantitative data analysis, a numeric value (1 to 6) was assigned to each of the possible responses to the 23 statements as part of the online survey construction. After both the pre-surveys were completed, the results were downloaded from the Qualtrics website as MS Excel spreadsheets. As with the vocabulary test scores, these data were imported into SPSS Version 25.0 to generate descriptive statistics for the overall scores and the totals for each of the five separate dimensions of self-regulation for the two surveys. This process was repeated for the post-survey results, ensuring that the scores for each student were matched using the student code. Again, the study variables were assessed for normality using the Shapiro-Wilk test for normality, as well as histograms and normal probability plots. The survey scores were not normally distributed, so Wilcoxon signed-rank tests were used to measure the differences between the different overall survey scores, combined pre- and post-survey scores, as well as the five different dimensions of self-regulation. Cronbach alphas were computed to

assess the reliability and internal consistency of the four SRL surveys. A p-value of 0.05 was used to determine statistical significance.

4.12.3 Quizlet Survey

The same procedures were followed for downloading the results for the Quizlet survey from Qualtrics as MS Excel documents. The results were analysed question by question within MS Excel and the data represented either in bar chart or pie chart format.

4.12.4 Paired Depth Interviews

Each interview was transcribed professionally and stored as an individual MS Word document. I then employed a combination of *typological analysis* and *constant comparison* (LeCompte & Preissle, 1993) to analyse the data. Since all of the interviews were semi-structured and focused on the same dimensions of self-regulated vocabulary learning, it was relatively simple to identify and extract the responses related to one of eight broad categories that were “decided pre-ordinately” (Cohen et al., 2018, p. 602):

1. Vocabulary Knowledge
2. Commitment Control
3. Metacognitive Control: Concentration
4. Metacognitive Control: Procrastination
5. Affective Control: Boredom
6. Affective Control: Stress
7. Resource Control
8. Social Control

For each category, a logical sequence of steps was drawn up to code and group the responses from each of the interview transcripts. I used an open coding approach (Cohen et al., 2018, p. 671), and an iterative process of reading and re-reading responses, to expand or combine the initial themes. According to Cohen et al. (2018), “this method is economical in making comparisons across respondents, although the wholeness, coherence and integrity of each individual respondent is lost” (p. 602).

4.12.5 Inferential Statistical Analysis

In order to measure any correlations between different variables, Pearson correlation coefficients were used with the three main variables - vocabulary test scores, self-regulation survey scores and the number of completed Quizlet activities. In addition, linear regression models were used to assess the effect of different variables on vocabulary test scores and self-regulation survey scores. All regression diagnostics were satisfied and a p -value of 0.05 was used to determine statistical significance.

4.13 Ethical Considerations

4.13.1 Ethical Clearance and Informed Consent

Prior to commencing the research, I completed the necessary ethical clearance forms, applied for ethical clearance through the relevant committees at Lancaster University and Zayed University, and received clearance from both institutions. At the recruitment stage, I ensured that all potential

participants were fully informed about the project in a short oral presentation and through a written participants' information sheet that had been translated into Arabic. After reading this, and if they agreed to take part in the study, participants were given a participant consent form to sign. Students who were not yet 18 years old were also provided with a parental consent form that was then signed by one of their parents. Both consent forms were translated into Arabic to ensure there were no misunderstandings about any aspects of the study.

4.13.2 Confidentiality

I used various protocols to ensure the confidentiality of individual participants during the data collection and data analysis stages. In order to protect their identities, I assigned a unique code to each student which they wrote at the top of the paper-based vocabulary test and entered at the beginning of both the self-regulation surveys and the Quizlet survey. This code was required for matching up each students' scores, and for identifying and inviting participants to the pair-depth interviews. No individual student could be identified from their scores during the data analysis stage. In order to protect the participants' personal identity during and after the interviews, each student was given a pseudonym. This pseudonym was used throughout the interview by the interviewers and by the interviewees when they addressed each other. As a result, the resulting audio recordings and transcriptions only contained the pseudonym and no student could be individually identified.

4.13.3 Data Storage

All the results from the vocabulary test, self-regulation surveys and Quizlet survey, as well as the audio recordings and transcriptions from the interviews were downloaded and stored as encrypted files with a unique password on a password-protected external hard drive, which was stored in a locked cupboard. The original audio files from the interviews on the digital recorder were deleted as soon as they had been transferred to the hard drive. For the interview transcription process, the audio files were sent to a professional transcriber based in the United Kingdom (UK) by secure web transfer. The transcriber signed a confidentiality agreement that stated they would not share any of the information they heard and would delete all of the related files once transcription had been finished. As per the regulations at Lancaster University, copies of the audio file transcriptions and survey results will be kept on the password protected external hard drive for 10 years. This will be kept in a locked cupboard in a locked office.

Chapter 5: Findings – Statistical Data

5.1 Participants

Two hundred and sixty-seven participants were initially recruited for this study and they all completed the vocabulary pre-test and self-regulation pre-surveys prior to the intervention. However, due to withdrawals from the course and the university, the total number of participants who completed all the tests and surveys was 246. This number was spread across 18 different classes of the ALL course, which constitutes 60% of the total number of classes (see Table 20). It also constitutes 49% of the total student population who were taking this course. The vast majority of the participants (230 or 94%) were female with a small group of male students (16 or 6% of the total). In terms of location, 55% were based on the Dubai campus and 45% on the Abu Dhabi campus. The sample size of 246 students out of a total population of 502 produced a confidence interval of 4.47 for the mean scores from the vocabulary test and self-regulation surveys, if a confidence level of 95% is applied (Creative Research Systems, 2012). This means that we are 95% confident that the means scores for the entire population would be between 4.47% higher and 4.47% lower than the means score found for the vocabulary test and self-regulation surveys.

	Total No. of ALL Classes	No. of Classes in Study	Total No. of ALL Students	No. of Participants	% of Total No.
Dubai - Women	10	9	182	135 (55%)	74%
Abu Dhabi – Women	17	7	278	95 (39%)	34%
Abu Dhabi – Men	3	2	42	16 (6%)	38%
Totals	30	18 (60%)	502	246 (100%)	49%

Table 20 Number of classes and participants.

5.2 Completion of Quizlet Activities

At the end of the 10-week intervention, the mean number of completed Quizlet activities was just under 210 from a maximum number of 350 activities (see Table 21).

N	Max.	Min.	Range	Mean	Median	SD
246	346	0	346	209.67	242	72.51

Table 21 Number of Quizlet activities completed.

By categorising this data, it is clear that the largest number of participants (n = 123) completed between 61% and 80% of the total number of possible Quizlet activities (see Figure 13). The second largest was the group of participants who completed 41-60% of the activities.

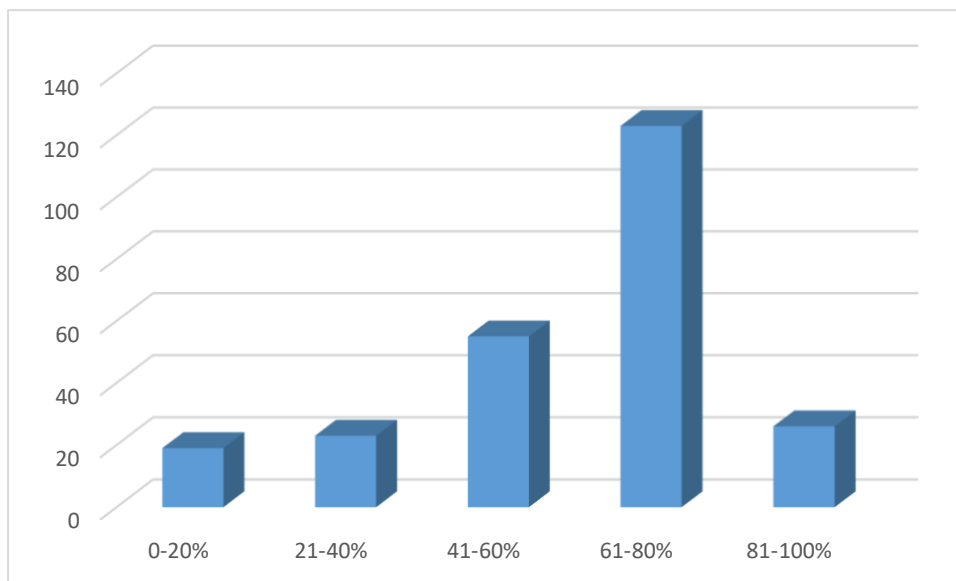


Figure 13 Percentage of Quizlet activities completed by participants.

5.3 Vocabulary Knowledge

5.3.1 Vocabulary Test Scores

In the vocabulary pre-test, the mean score was 46%, but in the post-test, the mean score had increased to just over 64% (see Table 22). This represents an increase of nearly 40% on the original score. A Wilcoxon signed-rank test indicated that the mean post-test vocabulary score was statistically significantly higher than the mean pre-test vocabulary scores ($Z = -12.653$, $p < 0.001$). A Pearson correlation test was also conducted and this showed a moderate correlation between the pre- and post-test scores ($r = 0.471$), which was highly statistically significant ($p < 0.001$).

	N	Max.	Min.	Range	Mean	Median	SD
Pre-Test	246	84	4	80	46.01	46	13.70
Post-Test	246	96	14	82	64.18	64	17.72
Difference	0	12	10	2	18.17	18	4.02
% Difference	0	14.28	250.00	2.50	39.49	39.13	29.34

Table 22 Vocabulary test scores.

In terms of changes in the score profile between the pre-test and post-test, the differences are very clear (see Figure 14). In the pre-test, the number of participants scoring 40% or less was 83 or 34% of the total number, but this decreased significantly in the post-test to just 19 or less than 8%. In addition, the number of participants scoring between 41% and 60% also declined – from 129 (52%) to 95 (39%). At the same time, the numbers scoring between 61% and 80% rose dramatically from just 31 (13%) in the pre-test to 87 (35%) in the post-test, and those in the highest band rose from just 3 (1%) to 45 (18%).

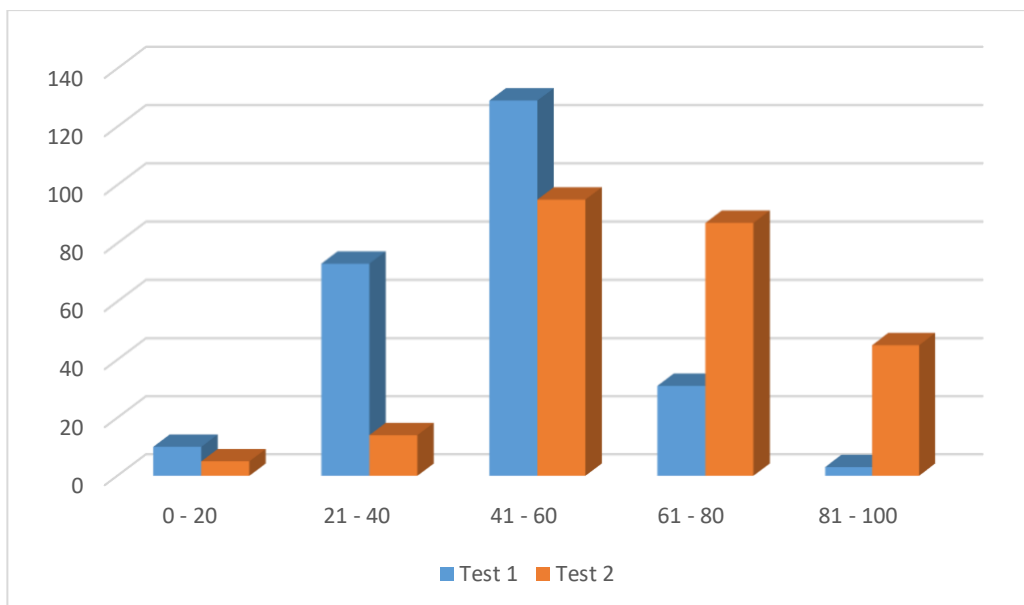


Figure 14 Profile of scores in vocabulary pre- and post-tests.

5.3.2 Vocabulary Test Score Changes

A deeper analysis of the changes in vocabulary test scores shows that there was a wide range of changes amongst participants (see Table 23). The largest positive change was +78, while the largest negative change was -38.

	N	Max.(+)	Max.(-)	Range	Mean	Median	SD
Score Change	246	+78	-38	116	+18.17	+16	+16.53
% Change	246	+950%	-68%	1168%	+51.63%	+37.50%	+82.69%

Table 23 Changes in vocabulary scores between pre and post-tests.

In terms of the profile of vocabulary score changes, there was also a wide spread of results (see Figure 15).

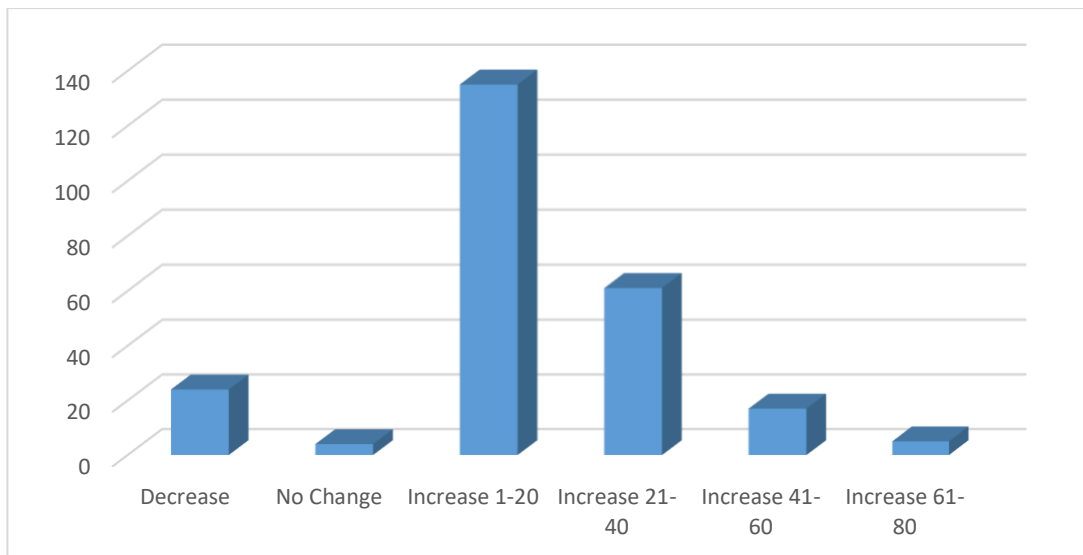


Figure 15 Profile of changes in vocabulary test scores.

Overall, 218 participants or 88.6% of the total saw an increase in their vocabulary scores between the pre- and post-tests. Four participants (1.6%) saw no change in their scores, while 24 (9.8%) saw a decline. The largest group of participants was those whose vocabulary scores increased by between one and 20 points (135 participants or 54.8% of the total number). A further 61 participants (24.8%) increased their scores by between 21 and 40 points. Finally, 17 participants (10.1% of the total) showed increases of between 41 and 60 points, and five participants increased their scores from between 61 and 80 points.

5.4 Self-Regulation

5.4.1 Self-Regulation Survey Scores: Overall

The combined mean pre-survey score was just over 105, while the mean score for the combined post-survey score was nearly identical (see Table 24). A Wilcoxon signed-rank test indicated that this difference was not statistically significant ($Z = -0.994$, $p = 0.320$).

	N	Max.	Min.	Range	Mean	Median	SD
Pre-Survey	246	138	23	115	105.29	108	18.63
Post-Survey	246	138	23	115	105.12	109.5	23.97
Difference	0	0	0	0	-0.17	+1.5	+5.34
% Difference	0	0	0	0	-0.16%	1.39%	28.66%

Table 24 Overall combined self-regulated vocabulary learning scores.

In terms of self-regulated capacity for vocabulary learning through smartphones, there was a slight decrease in the average scores between the pre- and post-surveys from 102.93 to 101.73 (see Table 25). A Wilcoxon signed-ranks test indicated that this difference was not statistically significant ($Z = -0.204$, $p = 0.838$).

	N	Max.	Min.	Range	Mean	Median	SD
Pre-Survey	246	138	23	115	102.93	104	18.46
Post-Survey	246	138	23	115	101.73	105	24.55
Difference	0	0	0	0	-1.20	+1.0	+6.07
% Difference	0	0	0	0	-1.18%	+0.96%	+32.88%

Table 25 Overall self-regulated learning through smartphones survey scores.

By contrast, when looking at the overall scores for self-regulated vocabulary learning through laptops, there was a small increase in the average score of 2.11 points or nearly 2% between the pre- and post-surveys (see Table 26).

However, a Wilcoxon signed-ranks test indicated that this difference was not statistically significant ($Z = -1.656, p = 0.098$).

	N	Max.	Min.	Range	Mean	Median	SD
Pre-Survey	246	138	28	110	107.30	111	18.49
Post-Survey	246	138	23	115	109.41	114	21.51
Difference	0	0	5	5	+2.11	+3.0	+6.07
% Difference	0	0	-17.86%	+4.54%	+1.97%	+1.8%	+22.53%

Table 26 Overall self-regulated vocabulary learning through laptops survey scores.

If the overall scores for the four separate surveys are compared, self-regulated vocabulary learning was higher for the use of laptops than the use of smartphones both at the beginning and end of the study (see Table 27). The difference was 4.37 points or 4.25% in the pre-surveys. A Wilcoxon signed-ranks test indicated that the overall pre-laptop survey score was statistically significantly higher than the overall pre-smartphone survey score ($Z = -4.572, p < 0.001$). In the post-surveys, the difference increased to 7.68 points or just over 7.55% and a Wilcoxon signed-ranks test indicated that the post-laptop survey score was statistically significantly higher than the post-smartphone survey scores ($Z = -5.916, p < 0.001$).

	Pre-Test	Post-Test	Difference	% Difference
Smartphones	102.93	101.73	-1.20	-1.18%
Laptops	107.30	109.41	+2.11	+1.97%
Difference	4.37	7.68	3.27	+65.51%
% Difference	4.25%	7.55%		

Table 27 Comparison of self-regulation through smartphones and laptops.

However, another Wilcoxon signed-ranks test indicated that the increase in this differential was not statistically significant ($Z = 1.073, p = 0.283$). In other words, the difference in the learners' capacity for self-regulated vocabulary

learning through a laptop and a smartphone was unaffected after using Quizlet.

5.4.2 Self-Regulation Survey Scores: Dimensions

A comparison between the combined scores for the separate dimensions of self-regulation shows that there was little difference between the pre- and post-survey results (see Table 28). The highest average score in the pre-surveys was for commitment control (4.71) and the lowest, by some distance, was social control (4.30).

	Commitment	Metacognitive	Affective	Resource	Social
Average Pre	4.71	4.58	4.57	4.66	4.30
Average Post	4.60	4.64	4.57	4.68	4.42

Table 28 Comparison of average item scores for five dimensions of self-regulation.

However, after using Quizlet, the range of average scores in the post-surveys narrowed with social control (4.42) and metacognitive control (4.64) increasing slightly. Social control showed the largest increase and a Wilcoxon signed-rank test indicated that the post-survey score was statistically significantly higher than the pre-survey score ($Z = -2.066$, $p = 0.039$). Metacognitive control also showed an increase, while the average score for commitment control actually declined. Neither of these changes were statistically significant, while affective control and resource control remained the same.

Cronbach alpha values were computed to assess the reliability of the combined self-regulation pre- and post-surveys. They showed that all of the dimensions in both surveys had high reliability and internal consistency, with Cronbach alpha values ranging from 0.768 to 0.869 in the pre-survey to 0.879 to 0.934 in the post-survey (see Table 29). The mean scale co-efficient in the post-survey was found to be 0.91, which is higher than the 0.85 calculated in the initial validation of the scale (Şahin Kızıl & Savran, 2018).

	Commitment	Metacognitive	Affective	Resource	Social
Pre-Survey	.831	.826	.869	.856	.768
Post-Survey	.890	.919	.934	.926	.879

Table 29 Cronbach alphas for five dimensions of self-regulation in combined surveys.

In terms of the average scores for each of the five dimensions of self-regulated vocabulary learning from the separate pre- and post-smartphone surveys and the pre- and post-laptop surveys, it is clear that these were higher in the laptop surveys than the smartphone surveys for all five dimensions (see Table 30).

	Commitment	Meta-cognitive	Affective	Resource	Social
Smartphone Pre	4.59	4.47	4.48	4.59	4.17
Smartphone Post	4.30	4.50	4.41	4.54	4.30
Laptop Pre	4.86	4.69	4.66	4.73	4.43
Laptop Post	4.89	4.77	4.72	4.81	4.54

Table 30 Mean scores for five dimensions of self-regulation in individual surveys.

This was the case both before the intervention and afterwards. For the smartphone survey, the mean score for three of the five dimensions of self-regulated vocabulary learning (commitment, affective and resource), decreased after the intervention. In fact, commitment control declined by

nearly 5%. A Wilcoxon signed-rank test indicated that the post-survey score was statistically significantly lower than the pre-survey score ($Z = -2.286, p = 0.022$). For the laptop surveys, the mean scores for all five dimensions increased slightly. The largest increase was for social control, which increased by 2.5%, but none of these were statistically significant.

A comparison of the scores for the five dimensions in the two pre-tests shows the differences between the two devices (see Table 31). Wilcoxon signed-rank tests were conducted for the average scores for all five dimensions in the two pre-tests and the results indicated that the mean scores for all five dimensions in the pre-laptop survey were statistically significantly higher than those in the pre-smartphone survey.

Pre-Survey	Commitment	Metacognitive	Affective	Resource	Social
Smartphone	4.59	4.47	4.48	4.59	4.17
Laptop	4.86	4.69	4.66	4.73	4.43
Difference	0.27	0.22	0.18	0.14	0.26
% Difference	5.88	4.92	4.02	3.05	6.24
Z	-4.133	-3.174	-2.907	-2.107	-3.229
Sig (2-tailed)	.000	.002	.004	.035	.001

Table 31 Comparison of pre-survey average dimension scores by device.

The largest and most statistically significant difference was for commitment control ($Z = -4.133, p < 0.001$), while the smallest difference and least statistically significant difference was in resource control ($Z = -2.107, p < 0.05$).

A comparison of the scores for the five dimensions in the two post-tests also shows that there were differences between the two devices (see Table 32).

The biggest difference was still for commitment control (0.59 or 13.72%), while the smallest difference was for social control (0.24 or 5.58%).

Post-Survey	Commitment	Metacognitive	Affective	Resource	Social
Smartphone	4.30	4.50	4.41	4.54	4.30
Laptop	4.89	4.77	4.72	4.81	4.54
Difference	0.59	0.27	0.31	0.27	0.24
% Difference	13.72	6.00	7.03	5.95	5.58
Z	-6.677	-3.624	-4.409	-4.419	-3.613
Sig (2-tailed)	.000	.000	.000	.000	.000

Table 32 Comparison of post-survey average dimension scores by device.

Wilcoxon signed-rank tests were conducted for the average scores for all five dimensions in the two post-tests and the results indicated that the mean scores in the post-laptop survey for all five dimensions were statistically significantly higher than those in the post-smartphone survey. As expected, the difference for commitment control was statistically significantly higher ($Z = -6.677, p < 0.001$) than the other components.

As the results in Tables 31 and 32 show, the differential between the pre-smartphone/pre-laptop scores and the post-smartphone/post-laptop scores for four of the five dimensions widened (The differential for social control declined slightly). The largest increase in the differential was in commitment control (0.27 in the pre-surveys and 0.59 in the post surveys). Another Wilcoxon signed-ranks test indicated that the increase in the differential was statistically significant ($Z = -2.868, p = 0.004$). This suggests that the learners' commitment control when learning vocabulary through a smartphone was affected after using Quizlet. The increase in the differential for the other three dimensions was not statistically significant.

Cronbach alphas were computed to assess the reliability of each of the five dimensions for each of the pre- and post-surveys (see Table 33). Overall, each survey had high reliability and internal consistency, with Cronbach alpha values ranging from 0.852 to 0.938 in the smartphone post-test, and 0.816 to 0.931 in the laptop post-survey. Generally, the internal consistency was greater in the post-surveys than the pre-surveys for all five dimensions.

	Commit.	Metacom.	Affective	Resource	Social	Mean
Smartphone Pre	.830	.801	.853	.876	.748	.822
Smartphone Post	.933	.925	.938	.926	.852	.915
Laptop Pre	.874	.874	.898	.914	.775	.862
Laptop Post	.930	.924	.931	.923	.816	.905

Table 33 Cronbach alpha values for five dimensions of self-regulation.

5.4.3 Self-Regulation Survey Scores: Item Analysis

Analysis of the four individual items that made up commitment control clearly shows that the average scores for all items were higher in both of the laptop surveys than the smartphone surveys (see Table 34). In addition, in all cases the average scores in the smartphone survey decreased and in all but one case, the average scores in the laptop survey increased. The largest decline for the smartphone survey was with item 1 which decreased by 11.4%.

Overall, in the post surveys, responses to all four items were closer to the 'True of me' responses for laptops and closer to the 'Somewhat true of me' response for smartphones.

Scale Item	Smart phone Pre	Smart phone Post	Laptop Pre	Laptop Post
1. When learning vocabulary, I believe <u>ICTs*</u> can help me achieve my goals more quickly than expected.	4.78	4.29	5.04	4.98
2. When learning vocabulary, I believe <u>ICTs</u> can help me persist until I reach the goals that I make for myself.	4.50	4.26	4.86	4.90
3. <u>ICTs</u> are important sources and tools to maintain my interest in achieving my vocabulary learning goals.	4.57	4.39	4.83	4.88
4. I believe <u>ICT applications</u> are effective in boosting willpower for learning vocabulary.	4.53	4.28	4.72	4.80

* The word ICT is a place holder here. In the actual surveys the words 'smartphones and smartphone applications' / 'laptops and the internet' were used.

Table 34 Commitment control item scores.

In terms of learner's self-reported metacognitive regulation, all the average scores for all items were again higher in both of the laptop surveys than the smartphone surveys (see Table 35).

Scale Item	Smart phone Pre	Smart phone Post	Laptop Pre	Laptop Post
5. I know how to use <u>ICTs</u> to effectively monitor myself to achieve my vocabulary learning goals.	4.72	4.58	4.93	4.85
6. I plan tasks & relevant materials to learn vocabulary outside of university that involve the use of <u>ICTs</u> .	4.17	4.48	4.49	4.69
7. I adjust my vocabulary learning goals in response to the information resources and communication venues I have access to via <u>ICTs</u> .	4.19	4.45	4.50	4.69
8. I believe <u>ICT tools</u> help me monitor my progress in learning vocabulary.	4.62	4.46	4.80	4.75
9. I know how to adjust <u>ICT tools</u> according to my learning styles.	4.64	4.54	4.72	4.86

Table 35 Metacognitive control item scores.

Overall, responses to all five items in the post-surveys were closer to the ‘True of me’ responses for laptops, while responses to three of the items in the smartphone survey were closer to the ‘Somewhat true of me’ response.

Table 36 shows the average scores for the individual items that made up affective control. Again, all the average scores for all items were higher in both of the laptop surveys than the smartphone surveys, but the scores were more stable than those shown for commitment control and metacognitive control, especially in terms of the laptop surveys. The only real big change was with item 10 in the smartphone survey which saw a 7.8% decrease in the average score. Overall, in the post-surveys, responses to all five items were closer to the ‘True of me’ responses for laptops, while responses to three of the items in the smartphone survey were closer to the ‘Somewhat true of me’ response.

Scale Item	Smart phone Pre	Smart phone Post	Laptop Pre	Laptop Post
10. During the process of learning vocabulary, I believe that <u>ICTs</u> help me overcome boredom.	4.67	4.35	4.74	4.79
11. When feeling bored with learning vocabulary, I use <u>ICTs</u> to regulate my mood in order to regain the interest and enthusiasm in learning.	4.45	4.46	4.67	4.66
12. When I feel stressed about vocabulary learning, I feel <u>ICTs</u> help to reduce the stress.	4.26	4.33	4.49	4.56
13. I feel satisfied with the way I use <u>ICTs</u> to reduce the stress of vocabulary learning.	4.37	4.39	4.63	4.74
14. I feel <u>ICTs</u> can make the task of vocabulary learning more attractive to me.	4.69	4.54	4.83	4.80
15. I feel <u>ICTs</u> effectively maintain my interest and enthusiasm in learning vocabulary.	4.41	4.39	4.61	4.78

Table 36 Affective control item scores.

In terms of resource control, there was a familiar pattern (see Table 37). The vast majority of scores were higher in the laptop surveys than the smartphone surveys. However, nearly all of the average responses in the smartphone survey were also closer to the 'True of me' responses. In the smartphone survey, item 16 showed the largest decrease (-4.4%), while item 19 showed an increase of 5.1%.

Scale Item	Smart phone Pre	Smart phone Post	Laptop Pre	Laptop Post
16. When I feel I need more learning resources in vocabulary learning, I use <u>ICTs</u> to expand my learning resource.	4.80	4.59	4.69	4.78
17. I use <u>ICTs</u> to create and increase opportunities to learn and use vocabulary.	4.62	4.57	4.77	4.85
18. I use <u>ICTs</u> to seek learning resources and opportunities to help achieve my vocabulary learning goals.	4.60	4.51	4.77	4.82
19. I seek engaging vocabulary learning materials and experiences delivered via <u>ICTs</u> .	4.35	4.57	4.63	4.77
20. I believe <u>ICT tools</u> are effective in expanding my resources for vocabulary learning.	4.57	4.49	4.80	4.84

Table 37 Resource control item scores.

Finally, the average scores for the three items that made up learners' self-reported social control were generally very stable (see Table 38). The only item that showed significant change was item 23 for which the average score in the smartphone survey increased by 13%. This was the largest change for any item in the whole survey. The same item also saw a 6.5% increase in the average score in the laptop survey.

Scale Item	Smart phone Pre	Smart phone Post	Laptop Pre	Laptop Post
21. When learning vocabulary, I use <u>ICTs</u> to seek encouragement and support from other learners.	4.61	4.50	4.74	4.74
22. When learning vocabulary, I use <u>ICTs</u> to connect with native speakers of the language.	4.23	4.25	4.36	4.42
23. When learning vocabulary, I use <u>ICTs</u> to connect with peer learners all over the world.	3.67	4.15	4.17	4.44

Table 38 Social control item scores.

5.5 Quizlet Survey

5.5.1 Frequency and Effects

In terms of frequency of use, a majority (61%) of participants said that they used Quizlet at least 3 times a week, with just over 27% saying that they used it every day. A very small percentage of participants (4.9%) confessed to only using it less than once a week (see Figure 16).

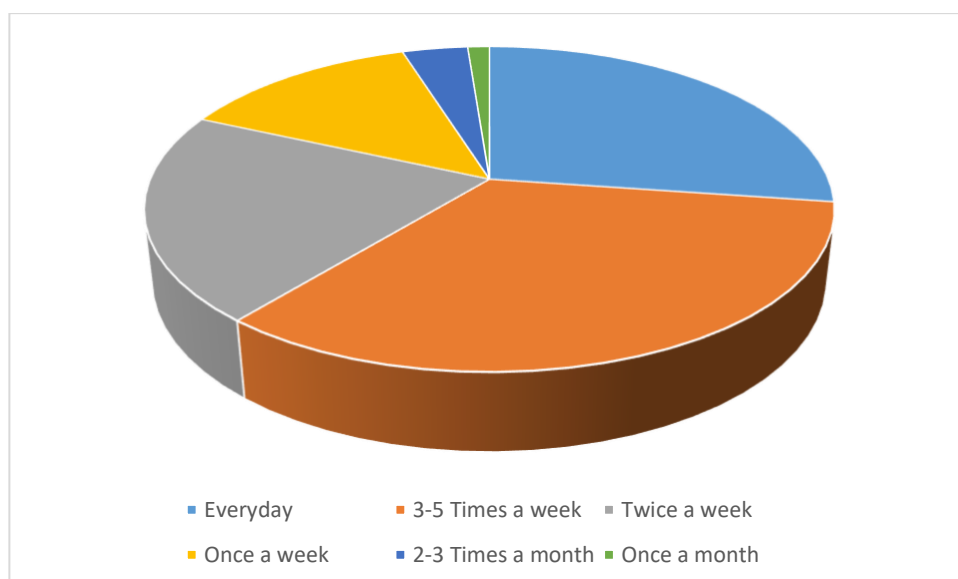


Figure 16 Frequency of Quizlet use.

The participants' perceptions were that Quizlet had a big effect on their levels of receptive vocabulary knowledge. Results from the survey showed that 87% of participants said that Quizlet helped improve their English vocabulary knowledge a lot (46%) or quite a lot (41%). Only 1.2% of participants said that Quizlet did not help at all (see Figure 17).

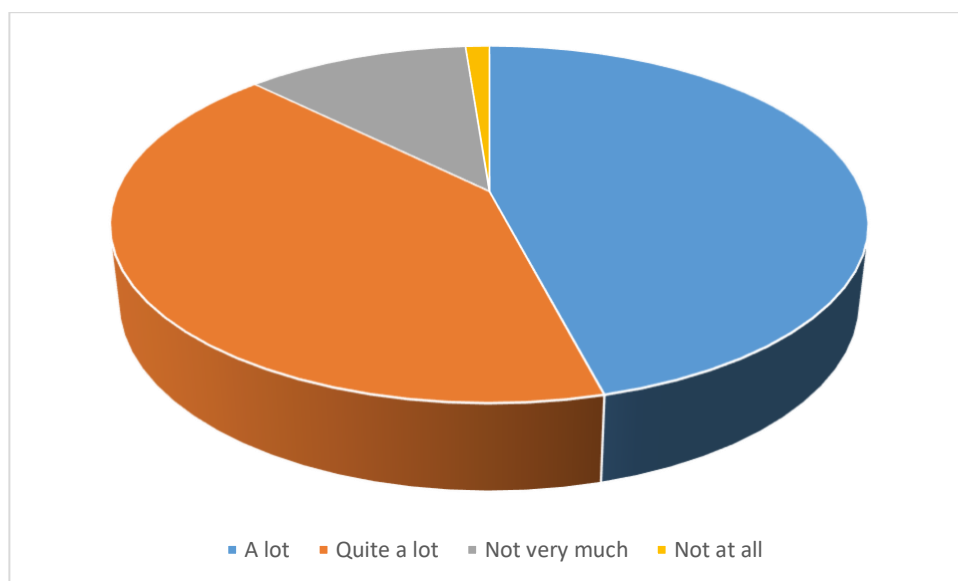


Figure 17 Perceived contribution of Quizlet to improvements in vocabulary knowledge.

5.5.2 Quizlet Activities

The seven individual activities were ranked by participants (1 = Best; 7 = Worst) in terms of how helpful they were in improving their knowledge of English vocabulary. Flashcards was perceived as the most useful activity type with an average score of 2.45, closely followed by Learn (2.78). Write (3.54) and Spell (3.59) were perceived as being similarly helpful. Gravity (6.18) was clearly perceived as the least helpful activity for improving vocabulary knowledge (see Table 39).

Activity	Total Score	Average
1. Flashcards	602	2.45
2. Learn	684	2.78
3. Write	872	3.54
4. Spell	883	3.59
5. Test	1142	4.64
6. Match	1184	4.81
7. Gravity	1521	6.18

Table 39 Ranking of Quizlet activities in relation to improvements in vocabulary knowledge.

Participants were then asked to give the reason(s) why they selected their number one ranked activity. For Flashcards (see Figure 18), by far the most frequently given reason was that it provided the definitions or meanings with each word. This accounted for over half of all responses (51%). A distant second was that it supported learning processes, such as helping to memorise and revise words (12.5%). A further 11.5% of the participants cited issues related to the functionality of the activity, which included the ability to flip the card over.

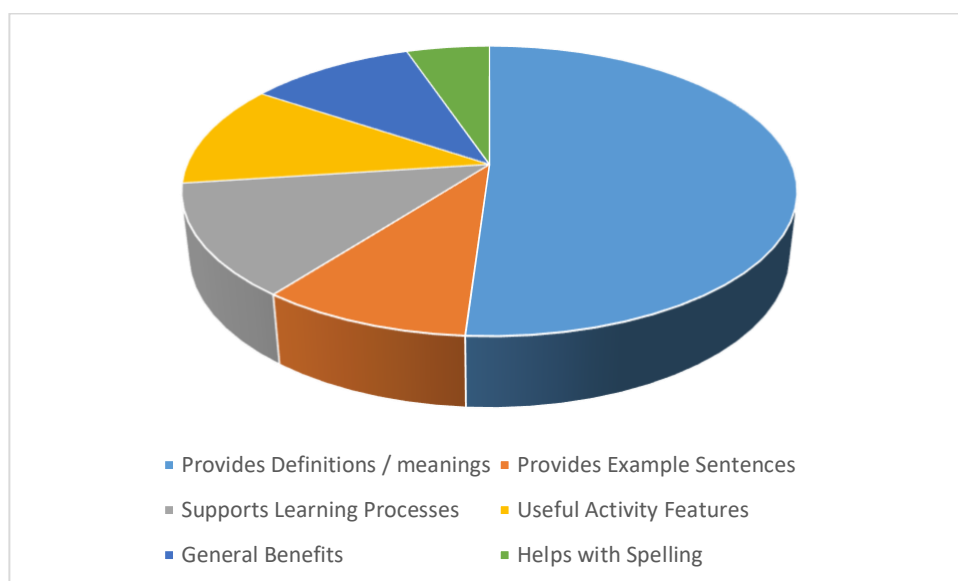


Figure 18 Reasons for selecting 'Flashcards' as the most helpful Quizlet activity.

For the Learn activity, the most frequently cited reason (35%) was that when they got a question wrong, it would be repeated until they got it correct (see Figure 19). The second most frequently mentioned reason (30%) was the variety of question types, which included multiple choice and gap fills where users have to type in the correct answer.

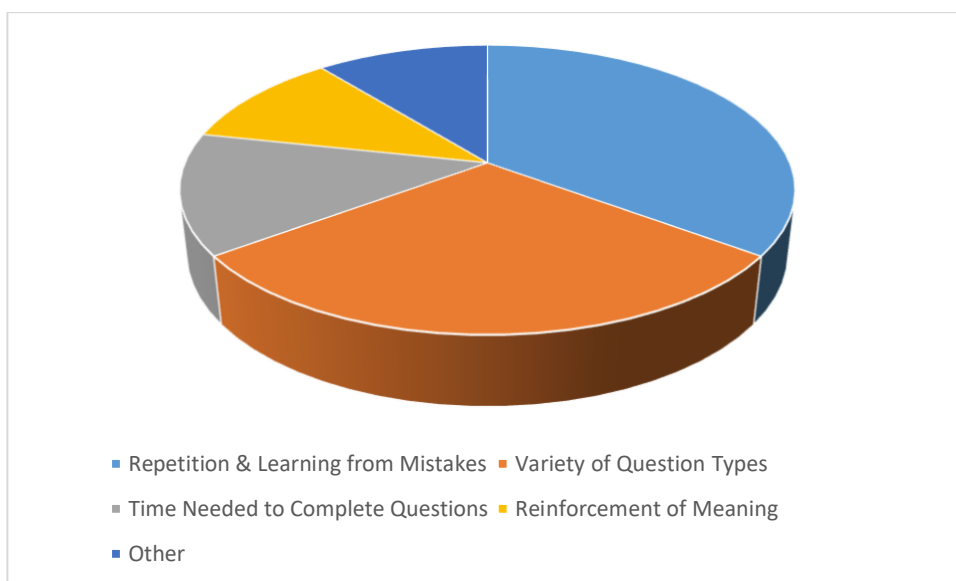


Figure 19 Reasons for selecting 'Learn' as the most helpful Quizlet activity.

In terms of the Write activity, there were three main reasons why it was seen as the most helpful activity for vocabulary learning (see Figure 20). Firstly, it aided memory of the word and its associated meaning (13 responses or 45%). Secondly, it supported written production of the word (38%). The final reason was the internal features of the activity, such as the repetition of the item if the word was spelt incorrectly.

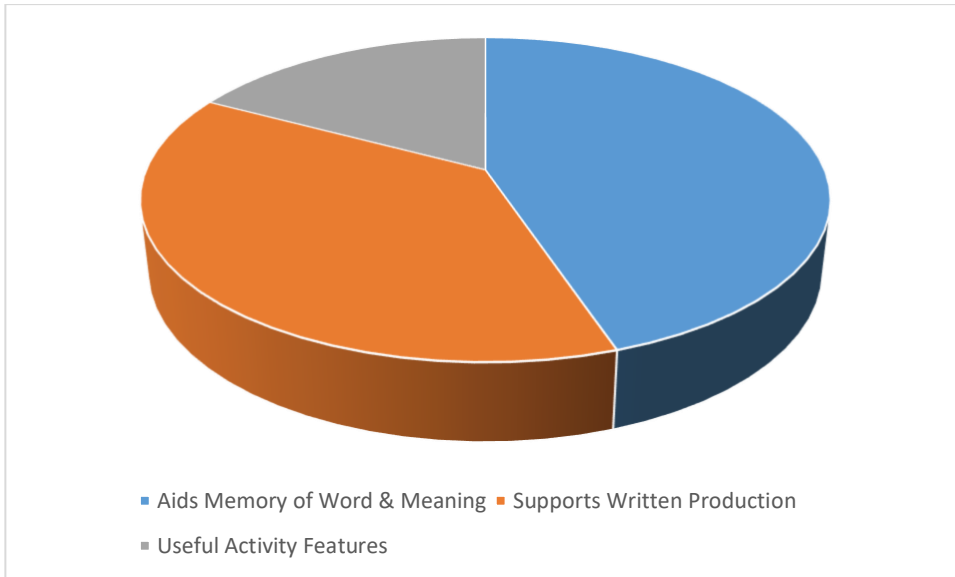


Figure 20 Reasons for selecting 'Write' as the most helpful Quizlet activity.

Finally, the most frequent reason for ranking Spell as the number one activity was that it improved the spelling of words (15 out of 34 responses or 44%) (see Figure 21). Connected to this was that it showed users how to write the word (23%) and connects learning of the written and spoken form of the words, thereby reinforcing both the spelling and pronunciation (18%).

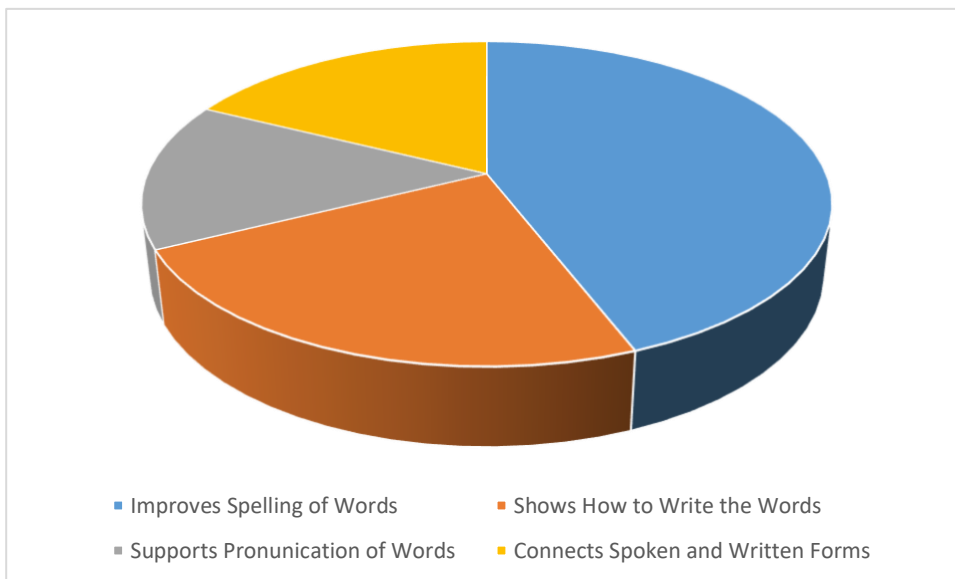


Figure 21 Reasons for selecting 'Spell' as the most helpful Quizlet activity.

As for frequency of use, on a scale of 1-5 (1 = Never; 5 = Always), participants reported that they used six out of the seven activities at least most of the time, with an average score greater than 4 (see Table 40).

Activity	Average Score
1. Test	4.66
2. Write	4.49
3. Flashcards	4.45
4. Learn	4.39
5. Match	4.13
6. Spell	4.10
7. Gravity	2.07

Table 40 Frequency of use of Quizlet activities.

Test had the highest score, closely followed by Write, Flashcards and Learn. The only activity below a score of 4 was Gravity, which was only used sometimes by participants.

5.5.3 Quizlet Features

Five of the main features within Quizlet were also ranked by each participant in terms of how much they helped improve their vocabulary knowledge (1 = Best; 5 = Worst). The definitions of each word was perceived as the most useful feature by far, with the daily sets of 10 words coming second (see Table 41).

Activity	Total Score	Average
1. Definitions of Words	475	1.93
2. Daily Sets of 10 Words	652	2.65
3. Audio Option	745	3.03
4. Gap fill Sentences	787	3.20
5. Progress Charts	1031	4.19

Table 41 Ranking of Quizlet features in relation to improving vocabulary knowledge.

The progress charts was clearly perceived as the least helpful feature for improving vocabulary knowledge.

Participants were then asked to give the reason(s) why they selected their number one ranked feature. For Definitions, by far the most frequently given reason was that it helped them learn the meaning of the word (see Figure 22). This accounted for 58% of responses. A distant second was that it aided understanding when reading (14.5%). A further 11% said that the definitions were clear and simple or aided memorisation of the meaning.

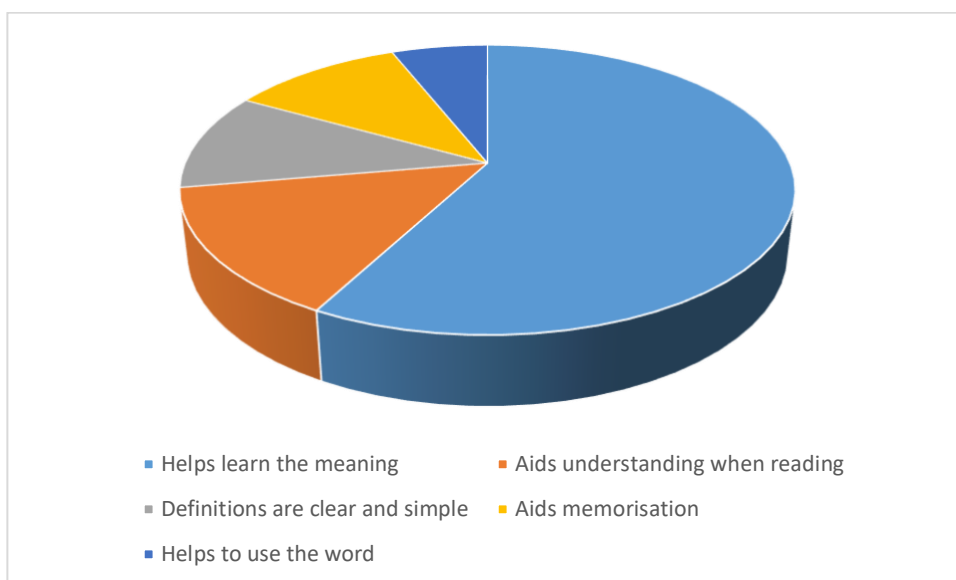


Figure 22 Reasons for selecting 'Definitions' as the most helpful Quizlet feature.

For sets of words (see Figure 23), the most frequent reason given for ranking it as the most helpful feature was that it provided a clear daily goal of how many words to focus on and try to learn (11 responses or 43% of the total). The second reason was that it helped learn words quickly in a short amount of time (38%).

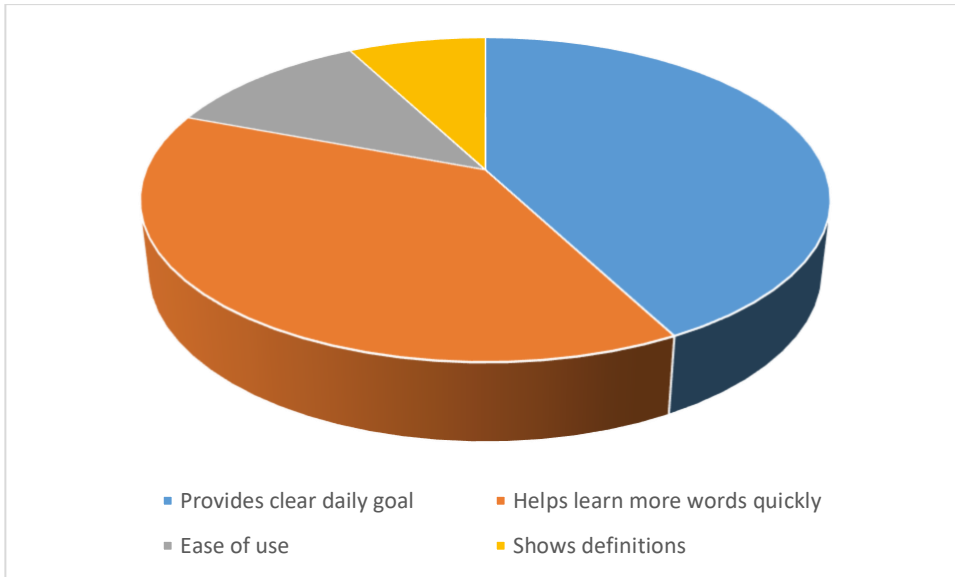


Figure 23 Reasons for selecting 'Sets' as the most helpful Quizlet feature.

Finally, the most frequent reason given by participants for selecting the audio option was that listening aids memory (43%) (see Figure 24).

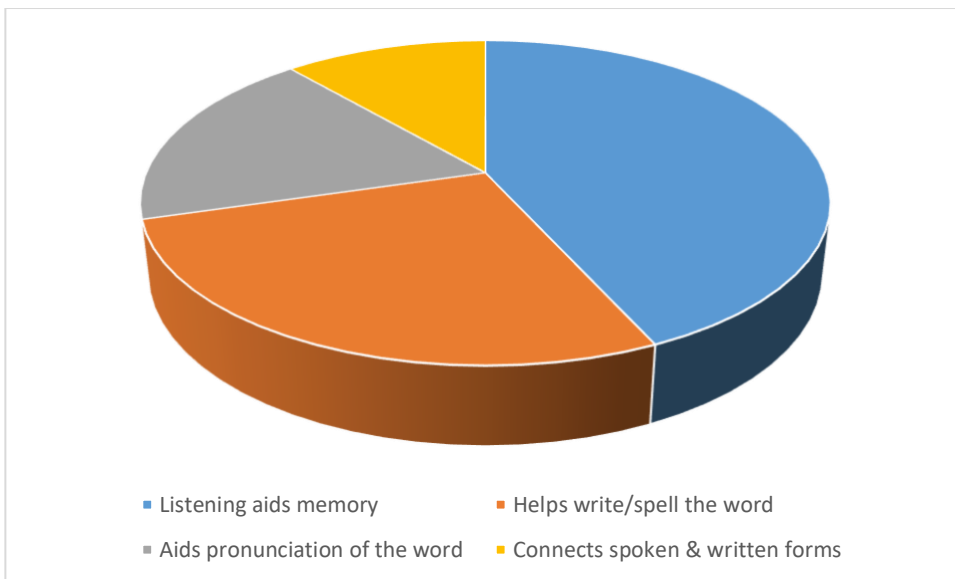


Figure 24 Reasons for selecting 'Audio Option' as the most helpful Quizlet feature.

These students said that they learn by listening and when they hear the word, they can memorise it more quickly than by reading the word. The second reason was that it helps them to write and spell the word (12 or 27%). Thirdly, the audio option aids their pronunciation of the word when trying to use it in

speaking. Finally, it helps learners to make a connection between the spoken and written forms of each word.

5.5.4 Device Preference

When asked on which device they preferred to use Quizlet, over three-quarters of students (76%) stated that they preferred using a laptop computer (see Figure 25). Eighteen percent stated a preference for their smartphone and just 6% preferred using a tablet computer.

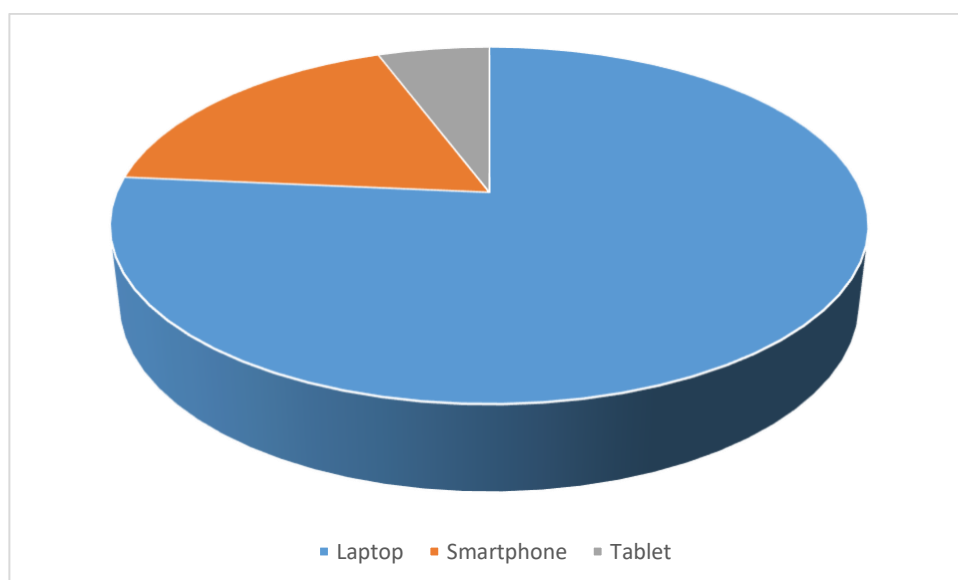


Figure 25 Device preference for using Quizlet.

Of the six possible advantages of using Quizlet on their laptops, participants were allowed to select up to three of these. The two related to the physical characteristics of the device were the most frequently chosen by participants (see Figure 26). The large screen size (204) and the availability of a physical keyboard (180), which made it easier to type, were more frequently cited than the other advantages. The third most common advantage was the lack of social media applications.

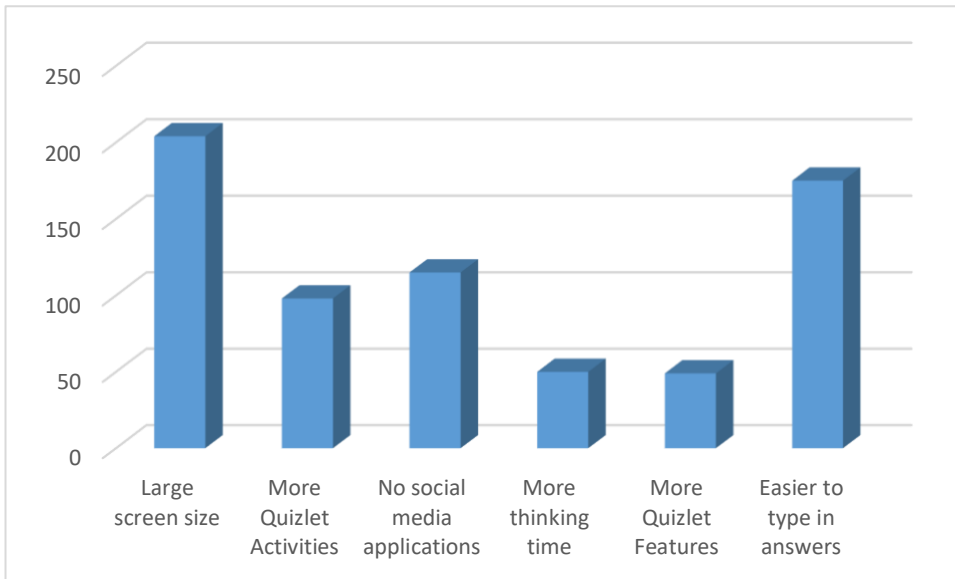


Figure 26 Advantages of using Quizlet on a laptop.

The main disadvantages of using Quizlet on laptops was that it could not be used when moving around (182). This was closely followed by the fact that it was not easy to carry around (150). The third most frequently cited disadvantage was that you cannot tap on the screen (97) (see Figure 27).

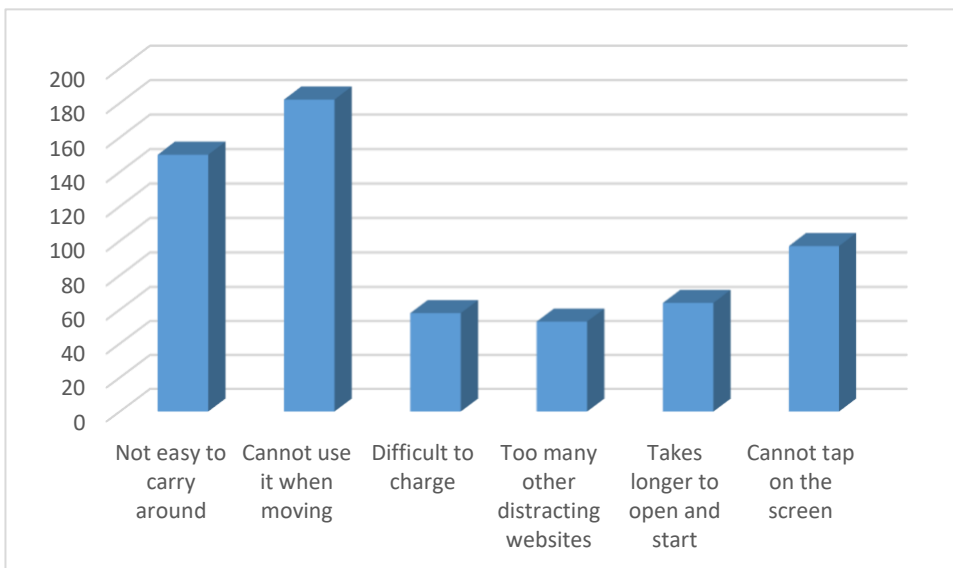


Figure 27 Disadvantages of using Quizlet on a laptop.

For smartphones, it was very clear that the theme of mobility was the most important (see Figure 28). In particular, a smartphone is easy to carry around

(214) and allows learners to use Quizlet anywhere (175). It is also more accessible because it is easy to open and start (121).

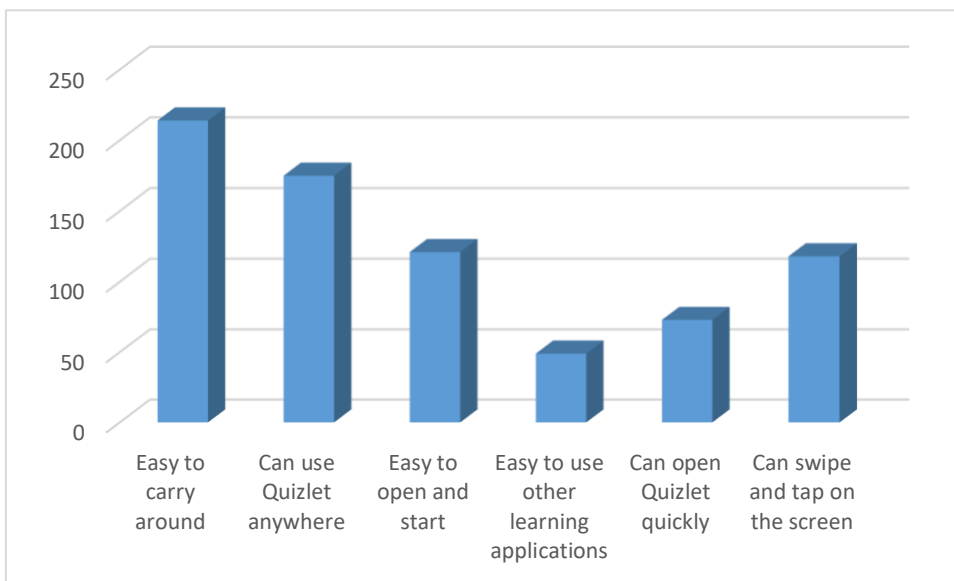


Figure 28 Advantages of using Quizlet on a smartphone.

In terms of the disadvantages of using Quizlet on smartphones, the most frequently cited was the social media notifications (203) (see Figure 29). This was closely followed by the small screen size (190). The third most cited disadvantage was the interruptions from mobile phone calls (147). Factors directly related to Quizlet itself, were cited less often.

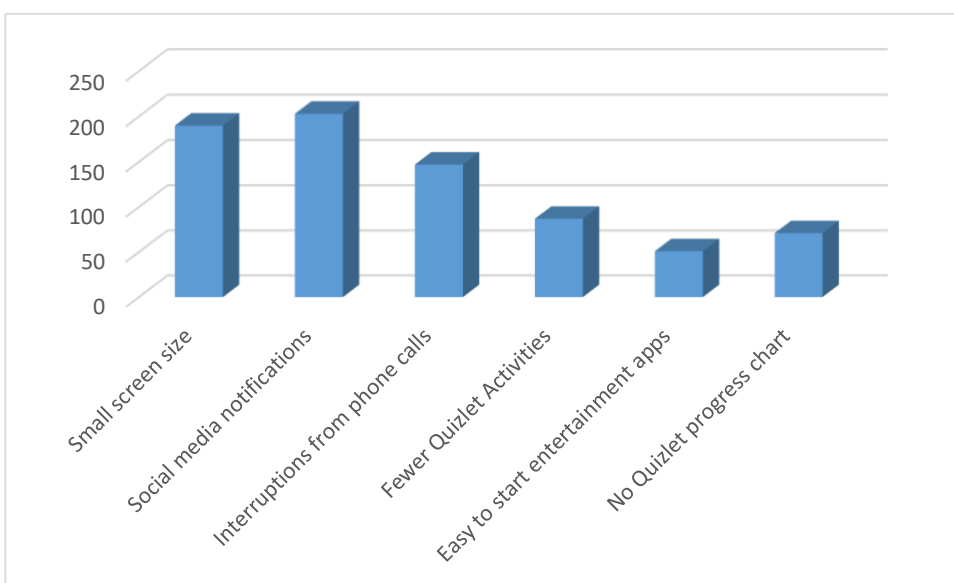


Figure 29 Disadvantages of using Quizlet on a smartphone.

5.6 Relationship Between Variables

5.6.1 Vocabulary Knowledge and Self-Regulation

According to the Pearson correlation coefficient, there was no effect size and no statistically significant correlation between learners' self-regulated capacity for vocabulary learning through technology and receptive vocabulary knowledge (see Table 42).

	Vocabulary Pre-Test		Vocabulary Post-Test		Vocabulary Change	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Pre-Survey	.011	.859	.029	.653	.021	.738
Post-Survey	.059	.358	.083	.196	.040	.533
Change	.050	.433	.061	.344	.023	.715

Table 42 Correlations between vocabulary test scores and combined self-regulation survey scores.

In terms of the separate surveys related to vocabulary learning through laptops and smartphones, there was also no effect size and no statistically significant correlation between learner's capacity for self-regulated vocabulary learning and receptive vocabulary knowledge (see Table 43).

	Vocabulary Pre-Test		Vocabulary Post-Test		Vocabulary Change	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Phone Pre-Survey	-.012	.848	-.014	.830	-.005	.943
Phone Post-Survey	.020	.755	.095	.138	.085	.184
Laptop Pre-Survey	.032	.613	.064	.315	.042	.510
Laptop Post-Survey	.085	.182	.049	.446	-.018	.775

Table 43 Correlations between vocabulary test scores and individual self-regulation survey scores.

By examining the correlations between the average scores for the five individual dimensions of self-regulated vocabulary learning and vocabulary test scores and changes, there was also no effect size and no statistically

significant correlation (see Table 44). The correlations were marginally greater in the post-survey scores for four out of the five dimensions. In other words, there was no apparent relationship between receptive vocabulary knowledge and capacity for self-regulated vocabulary learning through technology.

	Vocabulary Pre-Test		Vocabulary Post-Test		Vocabulary Change	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Commitment Pre	.028	.664	-.024	.711	-.049	.448
Commitment Post	.051	.426	.082	.200	.046	.477
Metacognitive Pre	.017	.785	.017	.787	.004	.949
Metacognitive Post	.071	.268	.071	.267	.017	.786
Affective Pre	-.024	.709	.011	.869	.031	.627
Affective Post	.094	.143	.108	.090	.038	.548
Resource Pre	-.009	.884	.063	.328	.075	.242
Resource Post	.055	.387	.076	.238	.035	.584
Social Pre	-.098	.126	-.091	.155	-.016	.797
Social Post	-.016	.809	-.002	.978	.011	.864

Table 44 Correlations between vocabulary test scores and dimensions of self-regulation.

5.6.2 Vocabulary Knowledge and Quizlet Activities

Using the Pearson correlation coefficient, there was an insignificant effect size and no statistically significant correlation found between the number of Quizlet activities completed and the three measurements related to receptive vocabulary knowledge (see Table 45).

	<i>r</i>	<i>p</i>
Vocabulary Pre-Test	.085	.184
Vocabulary Post-Test	-.021	.742
Change in Vocabulary Test Score	-.093	.146

Table 45 Correlations between vocabulary test scores and number of completed Quizlet activities.

Linear regression modelling was used to assess the effect size of different variables on the vocabulary post-test scores. The results show that vocabulary

pre-test scores and the number of completed Quizlet activities (whether defined as a raw score or number of groups) explained approximately 23% of the variation in post-test vocabulary test scores. However, the number of Quizlet activities was not significantly related to the post-test score and explained only 1% of the variation in the change in vocabulary test scores (see Table 46). These findings suggest that number of completed Quizlet activities did not have an effect on the receptive English vocabulary knowledge of the participants.

	t	p
Vocabulary Pre-Test Scores	8.399	.000
Number of Quizlet Activities Completed	-1.086	.280

Table 46 Linear regression for vocabulary post-test scores

5.6.3 Self-Regulation and Quizlet Activities

A Pearson correlation coefficient was also used to see whether completion of Quizlet activities was associated with scores in the combined pre- and post-surveys that measured self-regulated vocabulary learning (see Table 47). Prior to the intervention, there was a small effect size ($r = 0.208$) and a statistically significant correlation ($p = 0.001$) between the post-survey scores and the number of Quizlet activities completed. After the intervention, the correlation between the post-survey and the number of Quizlet activities completed was slightly stronger, but still with a small effect size ($r = 0.256$) and a statistically significant correlation ($p = 0.000$) (see Table 47). A Fisher r -to- z transformation test was used to assess the significance of the difference between these two correlation coefficients. The results showed that the difference was not statistically-significant ($z = -0.56$, $p = 0.576$). In other

words, completing Quizlet Activities was not related to the students' capacity for self-regulated vocabulary learning.

	<i>r</i>	<i>p</i>
Pre-Survey	.208	.001
Post-Survey	.256	.000

Table 47 Correlation between combined self-regulation survey scores and completion of Quizlet activities.

Table 48 displays the linear regression results examining the effect of the number of completed Quizlet activities on combined post-survey mean scores. Together the average combined pre-survey test score and number of Quizlet activities raw score explained 18.4% of the variation in the combined post-survey score. Overall, the number of completed Quizlet activities explained less than 1% of the variation in the change in the combined survey average score.

	<i>t</i>	<i>p</i>
Pre-Survey Scores	5.936	.000
Number of Quizlet Activities Completed	3.075	.002

Table 48 Linear regression for combined post-survey scores.

When analysing the correlations between the number of Quizlet activities completed and the four individual surveys, the strongest correlation was with learners' self-regulated capacity for vocabulary learning through laptops in the post-survey (see Table 49). Although the correlation was statistically significant ($p = 0.000$), the effect size was still small ($r = 0.268$). For the smartphone post-survey there was a slightly smaller effect size ($r = 0.183$) and a statistically significant correlation ($p = 0.004$).

	<i>r</i>	<i>p</i>
Smartphone Pre-Survey	.139	.030
Smartphone Post-Survey	.183	.004
Laptop Pre-Survey	.225	.000
Laptop Post-Survey	.268	.000

Table 49 Correlation between self-regulation and completion of Quizlet activities.

A Fisher r-to-z transformation test was used to assess the significance of the difference between each set of correlation coefficients (see Table 50).

Correlation Coefficient Results Compared	<i>z</i>	<i>p</i>
Smartphone Pre-Survey v Smartphone Post-Survey	-.50	.617
Laptop Pre-Survey v Laptop Post-Survey	-.51	.610
Smartphone Pre-Survey v Laptop Pre-Survey	-.98	.327
Smartphone Post-Survey v Laptop Post-Survey	-.99	.322

Table 50 Significance of difference between correlation coefficients.

It is clear from the results that none of the differences were statistically-significant. The correlation between the number of completed Quizlet activities and the students' capacity for self-regulated vocabulary learning did not change for each device prior to the intervention and after the intervention. In addition, there was no change in terms of using a smartphone or laptop. Overall, the change in both the smartphone and laptop SRL scores were not significantly related to the number of completed Quizlet activities.

When examining the correlations between the five individual components of self-regulated vocabulary learning and the number of Quizlet activities completed, there are more statistically significant correlations in relation to learning vocabulary through laptops than through smartphones (see Table

51). For example, there was a small effect size (correlation coefficient $r = 0.293$) and a statistically significant correlation ($p = 0.000$) between affective control in the post-survey and the number of Quizlet activities completed.

Dimension of Self-regulation	Smartphone Pre-Survey		Smartphone Post-Survey		Laptop Pre-Survey		Laptop Post-Survey	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Commitment	.167	.009	.174	.006	.163	.010	.204	.001
Metacognitive	.062	.333	.199	.002	.162	.011	.274	.000
Affective	.100	.118	.143	.025	.159	.012	.293	.000
Resource	.180	.005	.183	.004	.169	.008	.219	.001
Social	-0.50	.432	.070	.275	.015	.812	.091	.153

Table 51 Correlation between self-regulation components and completion of Quizlet activities.

In nearly all cases, the effect size of the correlations were slightly larger in the post-tests after using Quizlet, but still very small. Social control showed the lowest score for effect size across all four surveys and there was no statistically significant correlation.

Finally, a linear regression model was created with vocabulary post-test scores as the dependent variable and the number of completed Quizlet activities and laptop post-survey and smartphone spot-survey total scores as independent variables (see Table 52). The number of completed Quizlet activities and post-survey scores explained less than 2.5% of the variation in post-test vocabulary scores, and none were significantly associated with post-test vocabulary scores.

	t	p
Laptop Post-Survey Scores	0.091	.930
Smartphone Post-Survey Scores	1.299	.200
Number of Quizlet Activities Completed	-0.618	.520

Table 52 Linear regression for laptop post-survey.

These findings suggest that there is no relationship between receptive vocabulary knowledge, capacity for self-regulated vocabulary learning, and the number of completed Quizlet activities.

5.7 Summary of Results

5.7.1 Receptive Vocabulary Knowledge

- The average scores in the vocabulary test increased by nearly 40% from 46 in the pre-test to 64 in the post-test.
- 89% of students saw an increase in their vocabulary scores.
- 88% of the 246 participants reported that Quizlet helped improve their English vocabulary a lot or quite a lot.
- Flashcards, Learn, Write and Spell were reported to be the most useful Quizlet Activities.
- Definitions, daily sets of words and the audio option were reported to be the most useful features of Quizlet.

5.7.2 Capacity for Self-Regulated Vocabulary Learning

- There was no change in the overall capacity for self-regulated vocabulary learning through this use of the technology.

- There was a slight decrease in overall capacity for self-regulated vocabulary learning when using smartphones and for three of the five dimensions.
- There was a slight increase in overall capacity for self-regulated vocabulary learning when using laptops and for each of the five dimensions.
- The differential between the overall capacity for self-regulated vocabulary learning when using laptops and when using smartphones was statistically significant both prior to the intervention and after using Quizlet.
- The differential increased from 4.25% in the pre-surveys to 7.55% in the post-surveys, and the widening of the differential was statistically significant.
- Commitment control showed the largest decline in the smartphone survey (5%) and this was statistically significant. This meant that it had the largest differential difference between the smartphone and laptop survey (13.72%) and the widening differential was statistically significant.
- Social control showed the smallest differential (5.58%).

5.7.3 Device Preference

- 76% of participants preferred to access and use Quizlet on the laptops.

- The main advantages of the laptop were the larger screen size and the existence of a physical keyboard, as opposed to a virtual keypad on the screen.
- Only 18% preferred using their smartphone.
- The main disadvantages of the smartphone were interruptions from social media notifications and mobile phone calls, and the small screen size.

5.7.4 Relationship between Variables

- There was no statistically significant correlation between the learners' capacity for self-regulated vocabulary learning through laptops and smartphones and their level of receptive vocabulary knowledge.
- There was no statistically significant correlation between learners' level of receptive vocabulary knowledge and the number of Quizlet activities completed.
- There was a small effect size and a statistically significant correlation between learners' overall capacity for self-regulated vocabulary learning through laptops and the number of Quizlet activities completed.
- The largest correlation was with metacognitive and affective control when using a laptop and the number of Quizlet activities completed.
- Overall, there was no relationship between receptive vocabulary knowledge, capacity for self-regulated vocabulary learning, and the number of completed Quizlet activities.

Chapter 6: Findings – Student Voices

A total of 28 interview participants were initially recruited. However, six participants failed to appear for the interviews, so that 22 participants were actually interviewed in 12 separate interviews. A total of ten interviews were conducted in pairs and two interviews with single participants. Eight interviews were held on the Dubai campus and four were held on the Abu Dhabi campus.

6.1 Vocabulary Knowledge and Language Skills

According to the interview data, all of the students felt that their receptive vocabulary knowledge had improved over the semester. This was reflected in their awareness of improvements in their test scores: “From Quizlet we learn and write vocabulary, so when you give us the same paper as the test in September, you give us at November, it’s really developed” (Kim). Students also acknowledged learning gains: “So in the past I know the word, but I don’t know the meaning. So now I know the meaning and in the test I do it in September, maybe I do 50%, but now I did it, only two words I didn’t know the meaning” (Jill). All aspects of vocabulary knowledge had improved, especially “knowing new words and the meanings of them” (Mary).

Productive knowledge also improved. One student stated that before using Quizlet, “I don’t know how to put it in sentence, but now I know” (Jo) and that they “have learned how to use the word in many situations” (May). In addition, they “learned to spell the word because in the app we repeated more than one time and used in different sentences” (Alice) which made sure “it was easy to

write the words” (Ruby). Finally, some students “know how to pronounce some words that it was difficult for me to pronounce before” (Ruth).

As a result of learning more words, several students mentioned how they experienced improvements in three of the four language skills – reading, writing and speaking. Students claimed that they “can read more faster now than before. Before I feel like I have to stop after (each) word, but now I can read it more clear, more easier” (Clare). In addition, “because I have learned core words, I will understand the text in front of me better” (May). Thus, reading has become more fluent and some students do not have to look up new words as frequently as before because they “know the meaning of it without search or anything” (Sam). In terms of the productive skills, Quizlet has helped expand students’ vocabulary so that they can “communicate with others more and in a group and I am confident to communicate” (Jill). This was true in writing because it “help me with my vocabulary and when I write or use the word” (Sam). In addition, “it help me also by spelling, for writing paragraphs” (Clare). Speaking skills have “changed a lot and I’ve been using some words in my daily life to communicate with others” (Rachel2) and greater confidence is apparent in their speaking abilities as well: ‘I wasn’t confident when I speak, but now I am, I’m confident” (Monica).

6.2 Self-Regulation

6.2.1 Commitment Control

From using Quizlet, there was a keen awareness of vocabulary learning goals amongst students, varying from modest goals - "I want to learn 150 words maybe" (Ann) - to much more ambitious ones - "I wanted to learn actually maybe 1,000 words" (Mary). All of the students were initially enthusiastic about and committed to their learning goals as evidenced by one student who said that she "stays in a break time, only focus on Quizlet, and do all the activities in it so today I will focus on this. And when I go back to home I revise it again" (Jill). Another student used Quizlet "after each lesson that we had, also on the weekend I just practice. When I'm back from the university, I just go and learn more each time. When I'm free I just do it" (Mary). Several students were aware of how Quizlet would help them to learn "new words for the upcoming semester, spring semester, and to learn the definition of some words that was hard for me to know as a new student, at a new university" (Rachel2). They could also see how it would help them to achieve their long-term academic goals, because "when I learn from Quizlet I use the words that I learn in the writing in other university course" (Monica), "so the vocabulary can help me to write more and more" (Jill).

However, for some students there were various factors that meant the initial commitment to their learning goals waned as the semester progressed: "At the beginning of the semester I was doing it regularly, but at the end, because I have projects and assignments, so I don't do it" (Alice). They often "got busy

with other courses and never have time for Quizlet” (Jo), so as a result, “I didn’t reach the goal I wanted” (Jo). This was especially true near the end of the course “because in last weeks (sic) we got in a pressure for the final exams, so we didn’t do it” (Ruth). Another factor that reduced their commitment to their learning goals was the repetition within Quizlet of the same words in some activities. This was especially true for the Learn activity because “It was repeating the words and it doesn’t show for us if we did it like the other features” (Ruth) A third factor for some students was the overwhelming learning burden: “When I find that there’s many words, that I must do 50 words a week, I think yeah, I stopped doing it. like, I became lazy” (Nina). Finally, there was the initial novelty factor which wore off: “We enjoyed it, but after that it become boring” (Ruth).

6.2.2 Metacognitive Control: Concentration

Quizlet seems to have had some effect on students’ ability to plan for their learning. For example, “I have a specific time to learn a new word - 20 minutes spend every day on Quizlet” (Beth) and “I do Quizlet in my free time each day. I do it day-by-day (1 hour) to finish it by the end of the week” (May). Participants claimed that they spent from “30 minutes a day” (Rachel), up to “maybe for one hour” (Ruby) using Quizlet. Some also described how they monitored and controlled their concentration: “When I use it I try to focus on it, only on it. Like I didn’t, I don’t talk with my sisters or talk with anyone, just concentrate in the app” (Monica) and “we didn’t like lost our concentration. We know how to focus from one activity to another, we never get like un-

concentration (sic)" (Ruby). Another factor was the way that Quizlet "was clear and we know how to finish from each activity" (Ruby). As one student explained, "It's been like I'm being trained for where I will start and from where I will end; how I will start, how I will end" (Clare). Many students talked about how the explicit focus on vocabulary within Quizlet enabled them to concentrate beyond vocabulary learning because "when I read a book, or I read anything, like I concentrate on what word is... Like the hard word for me that I don't know, and I look for them" (Nina). It also "help me with the concentration like for writing" (Mary), so that "when I do my assignments I will use these words and concentrate more" (Sam). More specifically, "while writing and reading I concentrate on the words and the letters. Before, I was like, I write like without reading what I'm writing, but now no. I know sometimes I change between the E and the I, so now I know how to write it" (Ruth).

6.2.3 Metacognitive Control: Procrastination

There were varying experiences of procrastination during the semester when using Quizlet, with many students switching between non-use and focal use within a limited time: "Sometimes I don't want to do the Quizlet, so I keep it until midnight and then do it and sleep" (Jill). Highly-motivated interviewees said they faced no such issues with procrastination because "most time I just want to do because I have like goal and I want to reach it, so it's okay if it was also boring, but I want to do it" (Mary). Procrastination also changed because of other demands: "Sometimes I feel lazy because I'll have another subject to

learn; sometimes it will be, No, I can do it, because I don't have a lot of subject to learn" (Jo). It also increased as the semester progressed:

in the first weeks we was like very interested and we loved to do it because it was like a new thing for us, and we noticed that it will be helpful for us in this semester, so we did it. But in last weeks, no. We start to procrastinate (Ruth).

There were several reasons for procrastination. Some students "want to relax" (Ann) and told themselves "I'll do it tomorrow" (Beth) or simply "I forgot, because it's the weekend" (Jill). There was also the pressure of other assignments in other courses, "so if I have a lot of work, I feel like, 'Oh, I have to do my work and then Quizlet', and then I delay, delay" (Sue).

According to some interviewees, Quizlet was a motivating tool, so that even when they admitted to procrastination they took steps to try and overcome it "so now if I want to do something I don't say, 'Okay I will do it next time'. or something else, I will just do it" (Mary). In addition, the positive feeling of learning also helped to reduce procrastination "because when I feel to do the Quizlet, I think I will get more improved and it will increase my learning more. I do it, I repeat it always day-by-day, I will feel less procrastination" (Kim).

6.2.4 Affective Control: Boredom

Students in all interviews expressed some degree of boredom while learning vocabulary through Quizlet. For many of the participants there was initial enthusiasm for a new digital learning tool, "but in the middle I feel bored a little bit. At the end, I feel happy because we are finished" (Jill). Boredom set in "after doing it for maybe four weeks (when) we realized that we will still do the

same thing, learn, and these activities that take a long time from us, that's why" (Nina1). For others it did not set in until "The last time, like nine, eight and 10 Groups, I feel so bored" (Nina2). For some students, boredom often set in after about 20 minutes of using Quizlet each time, primarily because "maybe the first section it's easy and the second section is difficult, so when it's difficult we take it longer, so we get bored and we just look at other websites" (Kim). Boredom was also "not like a constant thing to do. It depends. Like if I'm doing it today, after two days I'm going to do another set, so yeah, sometimes it is boring and sometimes it's not" (Rachel2). Boredom was also related to the time of day. For one student, "Sometimes I'll do it in the morning, because I'll be awake, and I'll be energetic, I can do it and finish it" (Jo). While for another it was the opposite: "If I use it at morning I get bored. Because I feel sleepy, so I can't do it. But in the evening and night it's okay, for me" (Sue).

The most common reason for feeling bored was simply the number of words that students encountered because "When I see that it's hard to learn this amount of word, but nothing become for me easily. I think 50 words every week is too much" (May). In addition, "it's a little bit boring because it's long; when you do the write or spell or test, it's long. It take a long time" (Monica). Thirdly, there was the daily grind of having to complete the same activities - "I get bored sometimes because, as I said, repeating again and again makes me bored, it makes me lose interest" (Clare). This was especially true when students got behind with their learning schedule "because, like, I'm sitting on my laptop and I have to do maybe three or four blocks in one day, I will feel

bored. I want also to play with my phone” (Beth). Boredom also set in “if we knew like a word we became bored because we already know it, so why we are learning” (Nina1). At the same time, some students seems to be motivated by the desire to learn “so I can improve my vocab much better” (Kate) and because “It make me feel excited to learn more words. Every time when I learn new words. I feel I want to do more, I will do it more” (Jo), which overcome feelings of boredom.

6.2.5 Affective Control: Stress

Most students described experiences of stress at some point while using Quizlet. Some students mentioned the goal of completing one set of vocabulary each day as the cause of the stress – “Because I must finish all the sections in Quizlet and study 10 words in one day. I must do all the sessions, then I do the test and I make sure I know the words and understand it or not” (May). For other students, the learning burden of 10 words per day was too much so “We cannot do it in one week, we need more time. So, it (stress) goes up and down” (Clare). This seemed to vary according to how many words students already knew. Weaker students felt that stress was affected by the balance of new and known words because “the easy words that we know it already, it make us relaxed” (Jill) and “when I find it hard or there is a new word that I didn’t know from before, I was reading it and I found it so stressed to learn it more” (Nina2). As a result, they argued that “it’s better to have a balance between difficult and easy words, so, we can learn more” (Jill). While for those who either already had a high or medium level of

vocabulary at the beginning of the study were “chilled with it and didn’t feel any stress” (Jo). Stress caused by the learning burden increased as the semester progressed, so “when I start at the first stage to use the Quizlet I felt less stress because we know to use the new words, but when we reach the last week or a month of Quizlet, I felt more stress because many words that I memorize” (Kim).

As with procrastination and boredom, stress was sometimes related to the overall workload of students “because one week I have a lot of assignments and quizzes and I have to do Quizlet, so it’s makes me more stressed” (Jill). Stress increased mainly when “we have a lot of courses, like we learn math and other courses, so we have to do Quizlet and we have assignment, that make it stress” (Sam). In addition, there was the stress caused by the ALL course itself: “sometimes we have project, presentation, exams and we should do it (Quizlet) in each block in one week, because sometimes we don’t have time to do it” (Faye). Overall, “if I have too much things to do I feel stressed” (Mary).

6.2.6 Resource Control

Overall, for the majority of students, other learning resources were very much supplementary because “Quizlet was like the most application that helps me with my English vocabulary” (Mary) and “because like everything’s very clear, we have the information, they give us like example in the question, like in the sentence, so it was clear” (Ruby). In addition, “Quizlet didn’t let me go

anywhere. Honestly, after Quizlet I didn't do any resources for that. I have all my focus on Quizlet only" (Clare). Rarely did they have the need to go outside the digital tool to find other vocabulary learning resources, so that "when I use Quizlet I delete the other app. Because I learn from Quizlet" (Faye).

Despite this, many participants mentioned how they used two different applications on their smartphones as additional resources. Firstly they "used Google Translate to know the meaning in Arabic" (Rachel1), which helped "when I need more, like, explaining this word" (Sam). This was only undertaken "if I don't understand the meaning in English, or I want to know it in Arabic" (Sue). Students only "used it sometimes, I don't know the word" (Alice) and only "for some words" (Jill). The second application was Dictionary Plus Plus which also provided an Arabic translation, so that when "the word's hard and I can't understand the definition correctly, I go to translate it, so I can, I know" (Ann). This helped "see the meaning, to understand it and to know what the meaning of the word" (Nina2). Another student extended her depth of word knowledge by searching for additional example sentences through Google Chrome or Safari, which helped her "put it in many sentences, and how to use it" (May).

6.2.7 Social Control

All students mentioned at least one social aspect of using Quizlet. The most frequently mentioned was "doing it (Quizlet) with my classmates" (Nina1), "with my friends in my class, maybe in the break-time" (Nina2) or "together in

the break, in the lunchtime” (Jill). Students were not virtually connected through Quizlet, rather they “were sitting around together and all of us was doing it alone” (Nina2) and doing different activities: “some of my friends was doing the spell and the write, I was doing the match” (Nina2). In some cases, the students were doing the same activities at the same time:

We do it in the class. We sit in groups and we do it together. Like one of us read the word and one of us answer, so we do it. Yeah, the same activities but each word for each student to know (Ruth).

Some of the benefits of this approach were that “I found it helpful because like it helped me to finish faster and to get the word faster” (Nina1). Also, “when I don’t know the meaning of the word, maybe she know so she tell me” (Jill). A final reason was “because I’m an auditory person, so I like to hear. So, because it’s different voices so it’s fine, it’s good for me” (Ruth).

One student also described how she drew on a friend’s expertise and knowledge of the vocabulary: “If I don’t understand one word, if I translate it in Arabic and I did not understand it, I talk to my friend to teach me and tell me what the meaning of the word” (May). In addition, “if I have, like, problem Quizlet, how to solve it, or the setting, I think I have to go check with my friends” (Clare). The use of Quizlet Live in the classroom was also mentioned as beneficial because, “it helps me also to communicate with the people and at the same time we are learning new things, so it improve our learning” (Mary). Playing in groups “gives me a good feeling, like you’re having fun, enjoying the game... and exchanging the knowledge of the sentence” (Mary).

On the other hand, some participants stated that Quizlet made no difference to their social interaction and that they had no need to contact or communicate with other people while using Quizlet. The main reason for this was that Quizlet is done “by myself because I was doing it for myself to improve my vocabulary” (Mary). In addition, “because I have all the meanings of the word and I have Google Translate” (Beth) and “because everything it was clear” (Kate), students did not need to ask friends or classmates for help or have much need to interact.

6.3 Positive Influence of Quizlet

6.3.1 Quizlet Activities

Most of the activities on Quizlet were cited as having mainly positive effects on vocabulary learning and indirectly on different dimensions of self-regulation.

As the first activity in the list within each set of vocabulary on Quizlet, Flashcards was seen as playing a vital role in helping students to achieve their main goal, which was “to recognise the word and memorize it” (Mary). It does this because “it give us two meanings - it give us a definition and sentence for the word” (Alice). This allowed students to “see first the meaning, and then go back to the word to understand how the word fits to the meaning” (Nina). The design of the flashcards in particular helps “because it shows me the word and it flips to show me the meaning. So maybe if I revise the meaning, maybe I will know the word” (Rachel2).

The Learn activity appeared to support learning how words appear in context because it “taught us how to use it, like in which type of sentence” (Ruby). It also helped support students’ concentration: “it repeats a lot, that’s why I try to concentrate, because I don’t want to make a mistake, then I must repeat again more and more” (Nina).

The Test activity was seen as being mainly beneficial because students “can make sure if I understand the word well or not” (May). It also has a range of different question types that students valued – “It has everything, so for the matching, for the spelling, it match everything, and I learn from it so much and I realise that, where to put the word in the correct place” (Nina). In addition, “it shows my progress, if I’m learning the words or not, if I’m improving” (Rachel1).

Spell was seen as supporting the students’ commitment to their learning goals. This was because “I can listen and type it so I will note where’s my weakness in writing, so I can improve it” (Ruth) and “when I write the spelling in wrong way, I repeat it and repeat it until I get it until I get the right answer. I do it three or four times and then get the right spelling” (May). It was also something that motivated them to learn – “I have to know how to spell the word, so I have to be concentrated” (Monica).

Of the two game-like activities, Match proved extremely popular and was mostly cited in positive ways. Students “have to match each word with a sentence or the definition in a short time, if I want to finish it quickly” (Ann),

which helped maintain their concentration because “you have to focus on the meaning and matchings” (Ruby). The race against the clock helped students “because I have to write the word quickly and see how many times I get it” (Sam). In addition, many students commented on how Match “was fun, really, really fun” (Ruth) and “it make me more excited” (Jo). Match also helped to overcome boredom “because there’s a timer and there’s a high score between every student, and everyone want to be in the top” (Jo). As a result, students were encouraged to play multiple times – “I did it twice, or three times because I want to get a higher score” (Jane).

6.3.2 Quizlet Features

Sets of words, the progress chart, the range of activities and the audio option were the most frequently-mentioned Quizlet features in terms of their effects on both students’ vocabulary learning, and their commitment and metacognitive control. According to many students, the organisation of the words into daily sets of 10 words:

make it easy to watch my goal, I do it day-by day and it was good for me to watch achieve my goals. Because every day we have five sessions. Every day we do one: A, B, C, D, E. and I organise my time (May).

The sets feature also broke up the overall learning task into more manageable chunks because “step-by-step it’s like, okay, I can do it. I can learn more, I can learn more” (Clare).

The progress chart was also consistently mentioned as a useful feature because “when I look at it I know how much I did” (Jo) and “I see what I’ve

done” (Beth). This in turn helps “organise the words that I will learn, so I make a goal I will learn this today and it make it more organised” (Beth). In particular, “after every set I was checking it, so I know where I am” (Sue) and “it showed me how many times I do all of them, like twice or more” (Monica). This then meant “if I miss anyone, I can see the number and I go again and do it” (May). Seeing the green circles in the progress chart was particularly motivating because “When I saw that I completed, so I keep going to finish all the section and do another one” (Ruth) and as a result, “It make me excited to finish the others” (Alice). The progress chart also helped address procrastination because “I see what I have done and what I have not done, and complete what I haven’t. Sometimes I do maybe three from the activities and afternoon and evening I do three to finish my work” (May). Thus, it was always on students’ minds that they had activities to complete.

The variety of activities was also identified as helping to overcome a sense of boredom – “because, like, there’s Learn so we know what we can Match and do, and Spell, we can write the words and listen to the word, so we can write” (Ann). Some students highlighted the fact that the activities were clearly “organised in a good way, because first we see the Flashcard and we know the words and the definitions. Yeah, I think it’s very helpful because it take you from step to step” (Ruth). Furthermore, the sequencing of activities within each set of words “make me feel less bored, boredom because before I start my session, I read the definitions and the word, then I see if I know the word or not” (May).

The audio option within the Flashcards and Learn activities was considered an effective integrated feature that boosted students' resource regulation because it allowed students "to listen more than one time, so to stick in my mind and trying to pronounce it" (Ruth). In addition, "if I did not understand or I can't spell one word or something, I will open the audio and learn how to pronounce the word correctly" (May) or "know how they spell it" (Jane).

6.4 Negative Influence of Quizlet

6.4.1 Quizlet Activities

For some students, the Learn activity encouraged procrastination - it "makes me more lazy because it have a lot of words. Every time if I do a mistake it give me more; I didn't like it. Learn make me feel so lazy" (Jo). Similarly, the repetition in Learn contributed to greater levels of boredom "because it's repeat, I have to do it more than one, so it's repeating. Like I should do it again" (Sam). This repetition was particularly annoying for "the gap fill sentences, like when I was doing it sometimes I got it wrong, so I feel, 'Oh no, not one more time', so I have to repeat it" (Mary).

The Spell activity was seen as contributing to a sense of boredom primarily "because it takes a long time to finish, when I type, by mistake choose a wrong letter" (Kim). This meant students would get presented with the same words again, so "it was repeating, repeating. It was so boring" (Kate).

Similarly, for some students, the Write activity made some students feel frustrated because "I wasn't good at spelling so, like the writing killed me a lot

so I began to write with myself, so when I do wrong, it's repeated until I get it right" (Sue). In addition, "because they repeat the word maybe more than three times" (Alice), some students found it boring.

Finally, the Gravity activity was seen as being not very useful or beneficial because "it was a little boring" (Beth) and "I wasn't curious about it" (Rachel2). In addition, as one student stated, "at the beginning I was trying to do the gravity, but it was so stressful" (Nina2).

6.4.2 Quizlet Features

There were a few aspects of the some of the Quizlet features that had a negative influence on self-regulated vocabulary learning. The need to see the green circles in the progress chart caused some students stress. They thought they had completed all the activities in a set, but later they found out that, "I don't have the green circles" (Sue).

For some students the audio option was not popular "because it's like annoying. She's just repeating the same word" (Rachel2). Even when this option to automatically hear the words and definition being read out is turned off, the audio is still activated when a user moves the cursor over the word.

6.5 Positive Influence of the Device

6.5.1 Laptops

Many of the mentions of the positive influence of using laptops on self-regulated vocabulary learning centred around the physical characteristics of the device. Firstly, the larger screen size meant that “you can see everything” (Rachel2) so that you “can focus more” (Jill) and “can concentrate better because the phone is small, so yeah” (Nina1). In addition, the screen is seen as being “more brighter than the phone” (Rachel2). The second characteristic is the physical keyboard on the laptop, “so you can see all the alphabet in a good way” (Mary). This enabled students “to write faster, with no spelling mistakes” (Beth). In addition, it “give me the ability to like choose the correct spellings on the laptop” (Mary) and “when I type the word I concentrate on it, so I did not want to make a mistake” (Jill). Interestingly, some students also felt the physical keyboard better enabled learning to take place: “When we’re typing we learn more and we can concentrate more, but when we only tap we will not remember the words later” (Jill).

Another important factor was the perception that a laptop is a device for serious studying because “we only like do our work on the laptop, not play or do anything else” (Ann). This was “because it’s just we use the Quizlet, there’s no other websites or something so we have more concentration on the laptop” (Ruby). A key part of this is that on the laptop “there is no apps, no nothing, just Quizlet, so we focus on the vocabulary. I don’t use a lot of things in the laptop” (Ruby). In addition, “we don’t have a direct notification when you use

laptop” (Faye) and “nobody can call us” (May), so “it’s not distracting me to” (Mary). This lack of distraction also means that “the laptop is less stress” (Kim) and “decrease my stress” (Jill). Overall, “I prefer laptop because I can finish my work, and nobody can interrupt me, but I should do my work where I use the laptop” (May).

One student also identified the portability of the laptop as enabling them to overcome procrastination because “I do it in university and in home, but I think that I do it in the university more. Also, in the car I use the laptop also” (Jane). In terms of affective factors, for some students “it will make me excited to use it (Quizlet) on the laptop” (Ann). This seems to be a result of the physical characteristics previously mentioned, such as “the large size of the screen” (Ann) and “the voice it’s any more louder. Yeah, so I can hear well and write in the right way” (Ruth). Thus, it seems that using the laptop better enabled students to stay committed to their learning goals for longer and focus on their vocabulary learning more.

6.5.2 Smartphones

The positive mentions of how using a smartphone influenced self-regulated vocabulary learning centred around its mobility and portability. Several students mentioned how their smartphones enabled them to overcome procrastination by being able to learn in different locations outside the university and the home. These locations included “while I’m in the car for 25 minutes from the university” (Kim), “sitting outside the house” (Ruby), “sitting

in coffee shop or I have free time outside or in class” (Clare) and even “when my laptop is in my room and I sit in the living room” (Faye). The portability of the smartphone also gives it an edge over the laptop in many informal, out-of-class learning settings because “I carry it with me every time” (Sue) and “I can take my phone wherever I go, but the laptop is big, and I can’t take it everywhere” (May). In addition, “Quizlet have an app and we can do it without Wi-Fi” (Kim).

Another related benefit of the smartphone is that “when I feel bored and I am outside without my laptop I use Quizlet” (Sam). This is especially true for students at family gatherings: “Sometimes if the gathering is so boring, so you just put your phone on and do it (Quizlet)” (Mary). Thus, there was a sense that the smartphone is more accessible because it is always in the users’ possession. Many students also preferred playing one of the games on their smartphones. In particular, “match was better on the smartphone because I can just read fast and touch the word” (Mary). The ability to “tap on my screen, but on the laptop I can’t tap” (Ann) was seen as a key benefit of the smartphone for some of the Quizlet activities.

6.6 Negative Influence of Devices

6.6.1 Laptops

Using a laptop to access Quizlet appeared to have had some negative effects on self-regulated vocabulary learning, especially metacognitive control. It sometimes depleted students’ concentration and increased procrastination

through the lure of watching television series and films - "Also it have Netflix. So, when you open, and you see Netflix, like, oh let me watch one episode, then it's what come next, next, next. It will not end" (Sam). In addition, there were also some practical issues with the laptop because it can be "too heavy and it sometime don't have charge" (Sam). This prevented students from learning when and where they want to on occasion.

6.6.2 Smartphones

Many students spoke more negatively about accessing and using Quizlet on their smartphones and how this affected their self-regulated vocabulary learning. A lot of this was to do with the physical constraints of the devices. In contrast to the laptop, "the screen is small in the phone I find like everything is small" (Nina1), "so I can't see" (Ann) and "when it's small, I feel bored" (Rachel 1). In addition, using a smartphone "increased the stress because the patterns are too small, and you have like to focus more" (Mary). This had a knock-on effect on students' health as well: "Sometimes because of the screen and light maybe I have headache, and my eyes hurt me sometimes" (Alice). Related to this are the limitations of the onscreen keypad, "so I can't type the words" (Jill). Furthermore, "if I use the phone I will make mistakes because it's a small device" and "maybe it will tell us that it's the wrong spelling" (Kim).

For many students there was also an awareness that the distractions of social media applications, and notifications in particular, were a significant block to

using Quizlet on their smartphones. This was because “while I’m doing my Quizlet on my phone, maybe the notifications will disturb me, and the notifications tell me like, don’t do Quizlet and do chatting” (Beth) and “I check every second” (Sam). In many cases, messaging from friends proved too distracting, so that when “the notification pop from app and I am doing my Quizlet, I feel like I want to reply what my friend tell me or when they call me” (May). Many students admitted that “I can’t ignore them” (Nina1) and “you feel like, “I should check it because they’re always talking, and they’re all talking without me, so what they are saying, what they are doing” (Sam). Other students admitted that the lure and magnetism of social media was too much to resist so they “go to Snapchat and other stuff because I love using like Snapchat and I don’t get bored” (Ruby).

As a result, “there’s no concentration in phone” (Clare), and “sometimes I lose my concentration” (Monica). One student was more specific: “Like maybe I do two activities and let it, then complete it another time. Because I have notifications” (Ann). At the same time, even when there are no notifications, the mere presence of the social media applications meant that when “I learn using my phone I can have stress. Like, ‘I should finish it, I should check social media, I should check Snapchat’, and others. So, I get stress” (Sam).

The use of smartphones also increased procrastination because:

the phone make me so lazy, every time when I look at it I’m like, ‘Oh’. I only use it while I’m laid down like on the bed. While on the laptop I will use it while I’m sitting, so I feel the phone make me more lazier. (Jo)

Despite this awareness of distraction and the effects on concentration, stress and procrastination, there was also evidence of an inability or unwillingness of

some students to self-regulate their use of social media “because maybe we have important things” (Ruth) and “we need updates, that’s why we don’t turn off notifications” (Faye). In some cases, there was evidence of addiction - “I am not going to ignore the notifications, so I will see it. Snapchat and Instagram, all the apps. All social media” (Ruth).

6.7 Influence of Self-Regulation on Device Use

There was also some evidence in the interviews of students using their capacity for self-regulation to manage and control their use of devices.

6.7.1 Laptops

Some students demonstrated their awareness of the greater functionality of the web-based version of Quizlet over the mobile application, which meant that they chose to use the laptop more often. While the web-version of Quizlet has “more features I can choose” (Clare), the mobile app only has five activities. In particular, “the phone doesn’t have spell or gravity, and I, because I like gravity and spelling, it’s the best” (Jo). In addition, “the phone doesn’t show me my progress or my like finishing points” (Rachel 2) and “in the phone we have to search where the section, where the blocks and everything, and the laptop it was everything clear and in front my eyes, it was easy to use it” (Ruby).

6.7.2 Smartphones

Some students signalled their ability to regulate their use of the smartphone when using Quizlet in three ways. Firstly, they still used their smartphones, but gave more attention to their use so that “I think the phone distract me, but I love to do Quizlet in my phone, so I try my best to concentrate” (Monica). The second strategy was to still use the smartphone, but “put it on silent, so I don’t hear” (Jane) or “just turn off the notifications, because I want to focus on something” (Mary). Thirdly, some students took more drastic steps - “I don’t use my phone because I know that I will go to use other apps and not Quizlet” (Ann), “I should put my phone away” (Sam), and “I switch it off. I don’t want to be distracted by the phone, I just want to finish Quizlet” (Jo). Finally, even when some students only had their smartphone, there was a reluctance to access Quizlet through it: “If I have my phone, but I didn’t have my laptop I will not use Quizlet until I have my laptop” (Kate).

6.7.3 Both Devices

As well as using their devices separately, the students’ responses also showed that they used their laptop and smartphone in sequence and simultaneously, sometimes in quite sophisticated ways. In terms of sequential use, one student stated that she “use my phone, but when I finished I use my laptop to see what I finished and what I didn’t finish” (Monica). Several students described how they multi-tasked across both devices at the same time, using the laptop for the main Quizlet activities and the smartphone to access additional learning resources – “I have in my smartphone an app,

Google Translate app, and in the laptop Quizlet” (Jill). Accessing additional learning resources was easier “on my phone because I have an app for translating” (Ann). Another dual use was having different sections of Quizlet open on both devices so that “when I was doing like the write activity, maybe I forget one word, I just open my device and see the definition of the word, then type it” (Mary).

Space and task were variables that also affected device use with some students also alternating between devices so “sometimes, like when I am outside, I can’t take my laptop with me and I can use my phone” (Ann) and “because it’s in my hand, and because sometimes I use Quizlet when I’m in the car or in the mall, when I have nothing to do, so I open Quizlet and do it, more than the laptop” (Monica). When students were working on Quizlet in groups on the university campus they “were doing it in the laptop because they said that the phone will not show everything, and it is more small, so we cannot read all the sentences, so we use the laptop... It’s big and we can read it clearly” (Nina2). However, “the phone is better to connect with people because I can call my friend whenever I want to ask about Quizlet” (May).

Other students explained how they used their smartphone to access other applications and websites to help counteract boredom while doing Quizlet on their laptops. This seemed to have an effect only when students used Quizlet on their laptops: “I feel that it’s less boring, because I can do with my phone and the computer. Yeah, I only use the laptop, but I can take a rest and watch my phone” (Jane). Accessing social media was the preferred task because

“when I go to the Snapchat I feel more fun over there, so I leave the Quizlet” (Ruby). Similarly, it seemed to help alleviate stress “because I can take a break and see in my phone, and then I do it. Maybe a second, I just yeah, I just see, ‘Oh okay’, then I complete Quizlet” (Jane).

6.8 Summary of Results

- Quizlet did support vocabulary learning, especially learning the meaning of words signalled by the written form.
- Flashcards, Learn and Match were reported by participants to be the most useful Quizlet activities for supporting vocabulary learning.
- Sets, progress charts, the organisation of activities and audio option were reported to be the most useful Quizlet features.
- Commitment control waned as the semester progressed due to increased boredom with activities, pressure from other course commitments and repetition of items within Quizlet.
- Students expressed mixed views on how using Quizlet affected their concentration, procrastination and stress.
- Quizlet was mostly sufficient for the students’ immediate vocabulary needs, so they generally only accessed two additional digital resources.
- Students preferred using the web-based version of Quizlet on their laptops, due to the larger screen, and the physical keyboard, which is separate from the screen. This makes it easier to complete the activities that require textual input.
- Students preferred accessing Flashcards and Match activities on the smartphone because they only required tapping and swiping.

- Smartphones were also used as complementary devices to access Google translate and check definitions on Quizlet when completing main activities on a laptop.
- Many students were aware of how using smartphones reduced concentration, particularly due to social media notifications which were a distraction during digital vocabulary learning.
- Some students were able to self-regulate their use of their smartphones, but others were not.

Chapter 7: Discussion

This chapter will discuss the main findings of the study by synthesising the quantitative and qualitative results, making comparisons with the existing literature and theorising through the possible explanations. It will be organised according to the research questions. At the end of the chapter, I propose an expanded model of self-regulated, mobile vocabulary learning.

7.1 RQ1: Effects on Receptive Vocabulary Knowledge

With an average gain of nearly 40%, receptive vocabulary knowledge clearly increased over the course of the 10-week learning period. This gain is significantly higher than the 11.8% and 11.2% gains claimed by the two previous studies conducted in the UAE with similar cohorts of students (Davidson, Atkinson, & Spring, 2011; Watts, 2011). These results suggest that the out-of-class use of an online digital vocabulary learning tool provides students with some benefits over paper-based materials and other in-class digital materials. The 40% increase in vocabulary knowledge is also significantly higher than the 15% average gains reported by Toy and Buyukkarci (2019) in their experimental study using Quizlet, although their study did not report on how many sets of words or activities were completed. The large number of students who saw an increase in their vocabulary size (89%) was also considerably more than the 37% of the students who saw increases when using another digital vocabulary learning tool, Spelling City, over a similar time period (Bowles, 2017).

In terms of overall vocabulary learning gains, it is possible to extrapolate that the average student in this study went from knowing the meaning of 230 words (46%) of the 500 words on the ALL040 course word list at the beginning of the study, to knowing the meaning of 320 words (64%) after using Quizlet. This means that they gained knowledge of an additional 90 words on average over a 10-week period in terms of their ability to recall the meaning of a word from its written form. If this is compared with two other studies (see Table 53), it is clear that the participants in this study demonstrated vocabulary learning gains that were 20% better in terms of the average number of words learned per week.

Study	No. of words learnt	No. of weeks of learning	Average no. of words learned per week
Bowles (2021)	90	10	9
Davidson et al. (2011)	56	8	7
Watts (2011)	80	16	5

Table 53 Comparison of vocabulary learning gains in different studies.

An explanation for the vocabulary gains in this study is not clear-cut. On the one hand, the main vocabulary learning resources provided to all students on the ALL course were the sets of online digital vocabulary learning activities on Quizlet described in section 4.6. In addition, the results from the Quizlet Survey showed that 87% of the 246 participants stated that Quizlet helped improve their English vocabulary knowledge a lot or quite a lot. This matches the 88% of students who strongly agreed that Quizlet was useful for vocabulary learning in a Japanese study (Duarte, 2019). Furthermore, 88% of students said that they used Quizlet at least three times a week. This suggests that they were following the principle of spaced learning over short,

but frequent periods of time, which research shows is better for remembering new words than mass learning all in one day (Nation, 2013). Finally, the vast majority of participants in the interviews claimed that Quizlet had had a positive effect on vocabulary learning gains. They perceived improvements in the ability to read faster and more fluently, and now had less need to stop and look up the meanings of new words. Participants also said that it boosted their ability to spell and use the words in sentences in writing, and gave them greater confidence when pronouncing the words in speech. The possible reasons for this will be discussed in more detail under research question four.

On the other hand, it was not possible to monitor students' other out-of-class English learning experiences, nor prevent teachers of ALL classes using other paper-based materials to help reinforce learning of the same vocabulary learning in class if they wanted to. As mentioned in Section 4.6, the use of Quizlet Live can only be teacher-initiated and there was anecdotal evidence that many teachers used this at the end of classes to reinforce learning. Thus, it is not possible to claim that completing digital activities through Quizlet on their mobile devices in out-of-class settings was the only or main reason for the increase in the students' vocabulary scores.

It is also worth noting that while the vocabulary gains seem large, if the vast majority of students were assumed to have only had a receptive knowledge of about the first 2,000 most frequent words in English prior to starting the ALL040 course, as they did in a previous study (Bowles, 2017), then the addition of 90 new words means that many students still failed to reach the

ideal target of a receptive knowledge of at least the first 3,000 most-frequent words in English, as preparation for their EMI-degree course. They would still be inhibited in their ability to recall the meaning of a sufficient number of words from their written form when reading academic texts, which would impair their level of comprehension of texts. Indeed, according to Schmitt et al. (2011), knowledge of only 2,500 word families would equate to knowing about 93% of the words in an academic text, which would result in a level of comprehension of just over 50% (p. 38).

7.2 RQ2: Effects on Capacity for Self-Regulated Vocabulary Learning through Technology

7.2.1 Overall

The combined overall scores from the self-regulation surveys showed that Quizlet did not have any effect on students' capacity for self-regulated vocabulary learning using technology, with students' average responses to the statements in each survey remaining equidistant between 'Somewhat true of me' and 'True of Me'. This was supported by the comments from students in the interviews, which showed that many believed the overall effects of Quizlet on their capacity for self-regulated vocabulary learning through technology was mixed.

One reason for the lack of any changes could be that the use of technology and digital learning tools is already normalised and part of the daily academic experience of most students (Selwyn, 2016). Quizlet is merely one more

digital tool that students have been asked to use by their teachers in an educational context in which the use of technology is already firmly established (Lightfoot, 2016). Related to this, could be the explanation that technological learning experiences may not automatically enhance students' capacity for self-regulated learning, and that deliberate interventions may be needed to enhance some aspects of self-regulated learning with technology. In this study Quizlet does not have any specific features that are directly linked to individual dimensions of self-regulation, such as metacognition. At the same time, as there is no explicit mention of learning objectives related to self-regulated vocabulary learning or learning strategies in the ALL course curriculum, it is likely that teachers are not raising awareness or explicitly teaching these.

While there was no change in students' capacity for self-regulated learning, the average item score of 4.6 in the combined pre-survey and in the post-survey was higher than in most of the previous studies – Japan: 3.2 (Mizumoto & Takeuchi, 2012), Turkey: 3.8 (Sentürk, 2016) and Hong Kong: 4.2 (Lai & Gu, 2011). As the studies with the two lowest scores were conducted in non-technology contexts, it could suggest that the widespread use of educational technology might promote higher levels of self-reported self-regulated vocabulary learning. Unfortunately, none of the other studies conducted a pre-survey before and a post-survey after a technological intervention, so it is not possible to make any direct comparisons in terms of changes in self-regulation.

7.2.2 Commitment Control

In terms of commitment to learning goals, the average score in the combined pre-survey for commitment control of 4.71 is very similar to those found in Turkey: 4.56 (Sentürk, 2016), and Hong Kong: 4.68 (Lai & Gu, 2011), but significantly higher than in Japan: 3.03 (Mizumoto & Takeuchi, 2012).

However, after using Quizlet the combined average score for commitment control was the only one to decrease between the pre- and post-surveys, although this was not statistically significant.

The statement related to using technology to help students achieve their vocabulary learning goals more quickly than expected showed the largest decline in the average response score, from 4.91 prior to using Quizlet, to 4.64 afterwards. This decline is supported by the interviews in which many students admitted to a waning commitment to their learning goals as the semester progressed, due to competing demands from other course requirement, increased boredom with Quizlet and the repetition of items within some of the Quizlet activities. This led to a reduction in beliefs about their ability to persist in learning vocabulary, particularly when using their smartphones.

These findings seem to contradict those of other studies. Lai and Gu (2011) found that goal commitment regulation was the strongest dimension in their study and that one of the main factors explaining this was the strong association “with their use of technology to plan and monitor their learning progress” ($r = 0.59$) (Ibid, p. 327), although this was related to general

language learning rather than vocabulary learning. On the other hand, it could suggest that the commitment goal control may be stimulated by technological learning experiences that are chosen by the students themselves because they are seen as personally meaningful and relevant to their lives and learning preferences. Whereas Lai and Gu (2011) looked at students' self-directed language learning beyond the classroom, in this present study the students did not self-select the use of Quizlet themselves.

The waning commitment to learning goals was not found in previous studies. Anjaniputra and Salsabila (2018, p. 10), for example, found that Quizlet led to increases in learner engagement both inside and outside the classroom as students spent more and more time on Quizlet. One explanation for this difference could be that Emirati students on this English foundation course have less persistence and grit to continue with sustained vocabulary learning over the long term (Mutlu & Yıldırım, 2019). It could also suggest that the use of smartphones to access the digital, vocabulary learning tool depletes learners' ability to self-regulate their commitment control, as the lure of social media distracts them from their vocabulary learning goals (Aagaard, 2018). This will be discussed further under research question five.

7.2.3 Metacognitive Control

The average score in the combined post-survey for metacognitive control of 4.64 was the second highest amongst the five different dimensions in this study. It is also higher than in studies in other countries, including Turkey: 4.45

(Sentürk, 2016), Hong Kong: 3.78 (Lai & Gu, 2011) and Japan: 3.23 (Mizumoto & Takeuchi, 2012). In terms of changes between the combined overall pre-survey scores and post-survey scores for metacognitive control, there was a small increase, but it was not statistically significant, so using Quizlet had no effect on this dimension of self-regulation.

The interview responses showed a mixed effect on metacognitive control. Some students provided evidence of planning for their daily learning in terms of time and location when using Quizlet outside of university and adjusting their vocabulary learning goals accordingly. This would seem to suggest that the way that Quizlet was already organised gave the students more cognitive space to concentrate on the learning task in hand. However, in terms of procrastination, some students claimed that they delayed their daily vocabulary learning, which again could be related to the negative effects of using their smartphone to access Quizlet or at least having their smartphone nearby, so that they were habitually distracted by social media (Aagaard, 2018). On the other hand, a sense of making progress and learning new words motivated some students to overcome their procrastination and continue using Quizlet. This could support the view that the perception of small and frequent improvements in vocabulary knowledge is a motivational factor in continued digital vocabulary learning.

7.2.4 Affective Control

According to the combined survey scores, there was no change in affective control. The score in the post-test of 4.57 was higher than the 4.40 found by Lai and Gu (2011) amongst Hong Kong Chinese students, although of course their statements measured general, out-of-class language learning. Other studies used the SRCvoc which had two separate dimensions that covered affective regulation – satiation control and emotion control. However, if those scores are combined, then these are also lower than in the current study - Turkey: 4.18 (Sentürk, 2016) and Japan: 3.04 (Mizumoto & Takeuchi, 2012). This suggests that Emirati students have higher levels of affective regulation than other nationalities, but that Quizlet did not have any effect after 10 weeks of use.

In the interviews, many students expressed some degree of boredom while using Quizlet. Facing 50 sets of words that were structured in exactly the same way and completing the same five to seven activities every day perhaps diminished excitement and led to an increased sense of boredom. In addition, the learning burden, especially for those students who knew fewer of the words at the beginning of the study, and the repetition of words and question types within an activity also contributed to this. However, research shows that it is necessary to encounter the same word perhaps up to 20 times in different contexts in order for a long-lasting trace of the word to be stored and remain in the long term memory (Kihlström, 2011; Nation, 2013). In other words, repetition is essential for long-term vocabulary learning, so the challenge with

digital vocabulary learning materials is to make them more varied and exciting to keep students engaged for longer.

In terms of overcoming boredom, students felt that Quizlet was less able to help because many students in the interviews said how they turned to their smartphones to access social media, as a break from Quizlet in order to help overcome boredom. This aligns with Aagaard's (2015) findings that students are more likely to go off-task and use their mobile devices to access social media when the learning material is considered too difficult or challenging. Overall, this perhaps provides more of a cautious finding than that of Anjaniputra and Salsabila (2018) whose participants said that Quizlet provided an enjoyable learning experience due to the variety of activities, so they “felt like playing and learning at the same time” (p. 9). However, their study was conducted over a much shorter time period, so it strongly suggests initial enthusiasm for digital vocabulary learning tools quickly wears off and students are left to rely on their own internal persistence and resilience (Mutlu & Yıldırım, 2019).

According to the findings in the interviews, the pressure of completing activities for a set of 10 words each day together with the competing demands of other course requirements did cause some stress on students, especially as the semester progressed. However, this seemed to vary according to how many words students felt they already knew. As with boredom, some aspects of stress are inevitable when learning vocabulary simply because of the huge learning burden and the need to persist in focusing on learning both new

words and retrieving words already encountered on a daily basis. At the same time, some students claimed that the mere presence of their smartphones, and the expectation of receiving social media notifications while they were using Quizlet, increased stress levels. This is in line with recent research on stress caused by multi-tasking on digital devices (Judd, 2013 & 2015) and nomophobia (Rodríguez-García, Belmonte, & Moreno-Guerrero, 2020; Gonçalves, Dias, & Correia, 2020).

7.2.5 Resource Control

While this dimension did not show any change over the course of the study, the post-test score of 4.68 was the highest amongst all the dimensions and was very similar to that found by Lai and Gu (2011) of 4.63. The one item in the survey that did show a larger increase was the one related to seeking engaging vocabulary learning materials and experiences via technology, which could mean that Quizlet has sparked students' interest in other digital vocabulary learning resources. On the other hand, the item related to using technology to expand learning resources showed a decline, which is supported by comments in interviews where many students described how they only made use of two other applications - Google Translate and Dictionary Plus Plus - on their smartphones to supplement their main vocabulary learning through Quizlet.

Overall, it would seem, as many students claimed, Quizlet was a sufficient resource for their learning needs because it clearly defined the words, had

useful example sentences and provided sufficient practice. It is also possible that, as with the Hong Kong students, “a stronger belief in seeking language use opportunities beyond the classroom was positively associated with participants’ likelihood of using technology to regulate their learning, especially to expand learning resources” (Lai & Gu, 2011, p. 327). At the same time, the selection of a narrow range of vocabulary learning resources suggests that when faced with the choice of so many different language learning websites and applications, students often only use and rely on the interventions created and suggested by their teachers (Lai, 2017, 2019).

7.2.6 Social Control

Although it remained the dimension with the lowest average score in the combined surveys, social control saw a statistically significant increase between the pre- and post-surveys from 4.30 to 4.42 and was significantly higher than the average score of 3.17 found amongst Hong Kong Chinese students by Lai and Gu (2011). This is slightly surprising considering that Quizlet does not have any built-in social features that allow students to communicate with each other. However, in the interviews, some students mentioned that Quizlet Live encouraged students to communicate with each other in the classroom since it works through cooperation. This is in line with the findings of Muthumaniraja (2020), which showed that Japanese students thought that Quizlet Live enabled much greater cooperation than the traditional methods of vocabulary learning. It could also be a good example of

seamless mobile vocabulary learning that links in-class and out-of-class learning (Wong & Looi, 2011).

Another possible factor, as described in the interviews, is that while most students were completing their own individual activities on Quizlet on their own device, some of them were doing so in groups to encourage and motivate each other. It also enabled them to use their friends and classmates as a resource when they had linguistic questions. In other words, a lot of the social connection was happening face-to-face in physical settings, rather than online through Quizlet or other communication tools. This is in line with the study by Lai and Gu (2011) who found that Hong Kong students “seldom used and were sceptical about using technology to create social learning opportunities and support beyond their immediate social network” (p. 327). In the case of female Emirati students, though, it is also perhaps a reflection of their cultural norms in which Muslim women are encouraged not to have public, online profiles, especially those that use facial images (Hurley, 2020), nor to communicate online with strangers.

Overall, despite the fairly static survey scores, the findings in the interviews suggest that regular use of a digital vocabulary learning tool, such as Quizlet, can have a small training effect on students’ ability to plan their vocabulary learning tasks and relevant materials in out-of-class settings, and adjust their vocabulary learning goals in response to the resources they have.

7.3 RQ3: Relationship between Receptive Vocabulary Knowledge, Capacity for Self-Regulated Vocabulary Learning and Quizlet

As would be expected, there was a fairly strong relationship between the pre- and post-vocabulary test scores. However, there was barely any relationship between levels of receptive vocabulary knowledge and the students' self-reported capacity for self-regulated vocabulary learning through technology both at the beginning of the study and at the end. This supports the findings of Soleimani (2018) who also found no correlation with vocabulary size, but contradicts the findings of Sentürk (2016) in which there was a moderate positive correlation. One explanation for this could be that Sentürk was only measuring general vocabulary size, whereas my study focused on knowledge of specific words. On the other hand, it would seem to support the arguments of Tseng and Schmitt (2008) that the capacity for self-regulated vocabulary learning has an in-direct rather than a direct relationship with vocabulary knowledge and learning gains. Instead, it is mediated through strategic vocabulary learning involvement (SVLI) and mastery of learning tactics (MVLTL) (p. 381).

There was also no relationship between the learners' receptive English vocabulary knowledge and the number of activities completed on Quizlet. This also suggests that there could be more of an indirect relationship between the two and something else, such as the mastery of vocabulary learning tactics, mediates between the two. Other factors could also be more important, such as the time spent on each activity and the quality of the engagement with the digital learning materials, which were beyond the scope of this study.

By contrast, student's self-reported capacity for self-regulated vocabulary learning through technology was slightly associated with the number of Quizlet activities completed, particularly in the post-laptop survey. Affective and metacognitive control were the two dimensions that had the strongest positive relationships, so it could perhaps be argued that these dimension of self-regulation were more important in terms of helping students complete the Quizlet activities. The lack of any correlation between social control and the number of activities completed on Quizlet perhaps underlines the lack of social features within the digital tool and the fact that most deliberate, out-of-class vocabulary learning is essentially an individual, cognitive activity (Nation, 2013).

7.4 RQ4: Mediation of Quizlet Activities and Features

7.4.1 Quizlet Activities

Results from the Quizlet survey and interviews showed that several of the Quizlet activities supported vocabulary learning and positively mediated between the learners and the learning object (e.g., orthographic form of words and their definitions). Flashcards and Learn were ranked the most helpful for improving receptive vocabulary knowledge. The strong preference for flashcards underlines the importance of seeing the word and the meaning first to establish the form-meaning link (Nation, 2013) as part of the noticing process of vocabulary learning (Schmidt, 1990). The use of flashcards or word cards has long been considered an effective method of helping learners retrieve the meaning from the written form of words in order to move a word

into long-term memory storage (Nation, 2013), especially when used on mobile devices (Başoğlu & Akdemir, 2010). There is also a connection between the use of flashcards in Quizlet and metacognition control because students can plan different pathways through the activity and select different options themselves. They can move forward or backwards through different cards, test themselves by either trying to retrieve the phonological or graphological form of the word either from the definition or from the gap-fill sentence, and use the audio option to hear the word. In addition, students can deselect words from the main list that already know and spend more time on the words they do not know. This allowed students to adjust their use of the learning tool, and encourage more personalised and adaptive learning (Kukulska-Hulme, 2012).

The Learn activity seemed to have a mixed impact on students' vocabulary knowledge and self-regulation. On the one hand, the repetition of items for the same words should support vocabulary learning because it aligns with the theory and practice of spaced repetition (Pimsleur, 1967). In addition, the variety of question types and the example sentences to reinforce knowledge of the meaning were also seen as positive attributes. However, using Learn also seemed to contribute to greater procrastination and higher levels of boredom, and made some students feel lazy, primarily because the amount of time required to successfully complete the activity was much longer than the others. This could be because some students were more extrinsically motivated by the shorter activities, such as Spell and Match, which enabled

them to achieve the converted green circle and gain a sense of completion more quickly.

Although productive use of the vocabulary was not a primary focus of this study, spelling is still clearly a secondary priority for students after they have established the meaning. In the interviews, Spell was considered a very beneficial activity and this can be explained by the fact that Emirati learners face consistent challenges with spelling English words, because English and Arabic have completely different writing systems and scripts (Bowen, 2011). In particular, the majority of students lack phonetic spelling strategies, such as knowledge of grapheme-phoneme correspondence and the ability to break words into separate syllables. They also suffer from vowel blindness and fail to notice the short vowels in the spelling of English words, due to an interference from Arabic (Bowen, 2011). Activities that have an explicit focus on spelling are therefore particularly beneficial for Emirati students and Spell does seem to enable students to better encode the orthographic form of words in their long-term memories (Kihlstrom, 2013).

Even though Match was ranked as one of the least helpful activities for improving vocabulary knowledge in the Quizlet survey, participants in the interviews cited it as the one activity that helped students overcome their sense of boredom and also regulate their mood to some extent in order to regain interest and enthusiasm in their vocabulary learning, especially when played on their smartphones. As the students implied in the interviews, it has more gamification elements (Landers, 2014) than the other activities. It

requires rapid matching of the words and definitions, and the recording of the time encourages students to repeat it multiple times in order to beat their previous fastest time and to compete with their classmates. This supports the findings of Anjaniputra and Salsabila (2018) that Quizlet helped generate learner persistence in vocabulary learning through the competitive element of the tool. The constant retrieval of the meaning of the word triggered by the orthographic form through this activity should also aid long-term memory (Nation, 2013, p. 107) and improve word recognition efficiency when reading academic texts (Grabe, 2009, p. 22).

Finally, it is worth mentioning that the teacher-initiated use of Quizlet Live in the classroom by students provided a fun and cooperative way to reinforce their independent, out-of-class vocabulary learning. This perhaps supports Hockley's (2013) view of mobile learning that "encompasses both formal learning within the classroom, and informal and formal learning outside the classroom across myriad devices, in a variety of physical and temporal arenas" (p. 80).

7.4.2 Quizlet Features

The daily sets of 10 words provided students with a clear learning goal of how many words and which words to learn and helped them to plan their vocabulary learning. This perhaps helps explain the increase in survey scores for metacognitive regulation. Having a clear goal or target of what you are going to do is the first step in motivating yourself to study (Oxford, 2017). Another explanation for this might be that by providing an organised set of

vocabulary learning materials that were ready to use, students could focus on actually learning the words, rather than spending time deciding what to learn which can take up valuable time and cognitive space (Nation, 2013, p. 570). It also helped some students realise that by not doing one set a day meant that they then fell behind and struggled to catch up on subsequent days.

The fact that the definitions were clear and easy to understand was due to the skill of instructors on the ALL course who wrote them. However, the way that Quizlet presents them on the main page for each set of 10 words is a useful preview for students before they tackled the main activities. This is in line with the process of vocabulary learning, in which noticing new words needs to happen first (Schmidt, 1990). It also meant that students had less need to go outside Quizlet to find definitions themselves.

The audio option seemed to help a lot of students because hearing the word aided memory and helped connect the phonological form to the orthographic form (Nation, 2013, pp. 70-72). Unlike the sets and definitions, it is a feature that users of Quizlet have significant control over, because in four of the activities (Flashcards, Learn, Spell and Write), users can decide to hear the words, the definitions and example sentences being spoken when they want to. It is perhaps not surprising that many Emirati students like this feature, because there is a cultural preference for learning languages through listening and oral production rather than reading (Martin, 2003). It also seems to support the encoding of both the spoken and written form in students' long-term memory (Kihlstrom, 2013).

The effects of the progress charts was mixed. In the interviews, the progress chart was considered a very useful feature for keeping track of completed activities and helping to prioritise learning tasks. However, it was ranked as the least helpful feature in the Quizlet survey and students' capacity to effectively monitor their progress in vocabulary learning declined in the self-regulation surveys after using Quizlet. This perhaps suggests that this feature is more strongly related to tracking completion of activities rather than learning. The green circle in the top right corner of the activity icon provided a clear visual signal to students that they had completed an activity, so they knew what to complete next. With mobile learning enabling the use of 'dead time' (Wu, 2015, p. 177) between classes or when commuting between home and university, the progress chart seemed to allow students to see exactly what activities they had already completed in Quizlet and what they needed to do next.

Overall, the activities and features within Quizlet seemed to be effective at reinforcing the relationship between the meaning and orthographic form of words, as well as the relationship between the orthographic and phonological forms of words to enable improved spelling. They also supported the vocabulary learning processes of noticing and encoding. However, what is currently missing are features that enable creative processing (Nation, 2013, p. 10) and more active retrieval of words, especially after the initial encounter with a set of 10 words, which research shows is essential for long-term vocabulary learning. At the same time, having to complete the same activities in 50 sets of words and the repetition of the same items and words within

Learn and Test over a 10-week period was seen by some students as unnecessary and introduced a greater sense of boredom and stress. This necessitated greater self-regulation as the semester progressed in order to overcome these negative emotions.

7.5 RQ5: Mediation of Device

The type of mobile device seemed to influence both the way that the students learnt vocabulary and their capacity for self-regulated vocabulary learning through technology. At the same time, there was also evidence that some students used their capacity for self-regulation to control their choice and use of mobile devices in general, which underlines the two-way interaction.

7.5.1 Vocabulary Learning

The results from the Quizlet survey clearly showed that students overwhelmingly preferred using their laptops to access and use Quizlet for vocabulary learning rather than their smartphones (76% versus 18%). The score for smartphones is slightly higher than the findings in the study by Andrew et al. (2018), in which just 6% stated a preference for using a smartphone for general, in-class learning purposes. However, in terms of digital vocabulary learning, the findings in my study are very similar to those of Stockwell and Liu's (2015) who found that 83% of Japanese and Taiwanese university students preferred using a personal computer to access digital vocabulary learning materials, compared to 17% who used their mobile or

smartphone. Thus, there is some consistency between studies in terms of students' self-reported preference for laptops in digital vocabulary learning. It could also be argued that smartphones are seen as being slightly more suitable for digital vocabulary learning materials in out-of-class settings than for general, in-class learning, perhaps due to their greater portability and accessibility.

When examining the uses of each device for different vocabulary learning activities and tasks, the interviews indicated that while laptops were used as the main device for accessing Quizlet activities for the majority of the vocabulary learning, students often used their smartphones to access the Quizlet wordlist, Google Translate and Dictionary Plus Plus. This was mainly to provide extra support with word definitions, often at the same time as using their laptop. This supports the findings of Lai and Zheng (2018, p. 310), in which 73% of Hong Kong university students primarily used their mobile telephones to consult dictionaries or translation tools, as opposed to only 22% who preferred laptops. In addition, smartphones were preferred for accessing the two game-like activities - Flashcards and Match - that could be completed more efficiently by tapping on the screen and did not require textual input from a keyboard. Again, this is in line with Lai and Zheng (2018), who found that more than 50% of students used their smartphones to access digital flashcards for learning vocabulary, rather than laptops. Clearly, the convenience of a touch screen for certain vocabulary learning tasks and activities is one benefit of the smartphone and needs to be factored into the design of digital vocabulary learning materials. Another important point to

make is that smartphones are more quickly accessed than laptops, so they allow students to make better use of “fragmented time” (Hu, 2011, p. 147) in between classes. This is when short activities, such as Flashcards and Match, can be completed quickly and the progress recorded, so that students do not have to remember where they left off the next time they access the digital tool.

In terms of location and mobility, students mainly used their laptops to access Quizlet when at home or on the university campus, but also when using public and private transport between home and the campus. However, when outside in shopping malls or at social gatherings, they used their smartphones. In the Quizlet survey, of the participants who stated a preference for using a smartphone, the most frequent reasons given were that it was easy to carry around and can be used anywhere. These findings generally support the arguments of mobile learning researchers who often highlight the portability and mobility of learning as one of its main benefits (Kukulska-Hulme, 2012 & 2018; Traxler, 2009 & 2010). Finally, the ability to access the same digital vocabulary learning tool through both a web-based platform on their laptops and a mobile application on their smartphones allows students to automatically switch between devices in various locations and at various times, safe in the knowledge that their activity and progress is being recorded continuously, which supports the concept and practice of seamless mobile learning (Wong & Looi, 2011).

7.5.2 Capacity for Self-Regulated Vocabulary Learning

In terms of the overall SRL survey scores, the students' capacity in SRL through laptops was statistically significantly higher than their self-reported capacity in SRL through smartphones in both the pre- and post-surveys. The differential increased after using Quizlet, although this increase was not statistically significant. Similarly, there was a slightly higher correlation between the laptop post-survey scores and the number of Quizlet activities completed than between the smartphone post survey and the number of Quizlet activities. These results perhaps support the findings in the Quizlet survey and interviews that students were mainly using their laptops for accessing Quizlet.

In terms of the five individual dimensions of self-regulation, the differences between the scores in both the pre-surveys and post-surveys for learning vocabulary through a laptop and a smartphone were all statistically significant, although the difference after using Quizlet only widened in terms of three of the five dimensions: commitment control, affective control and resource control.

The largest increase in the differential between the pre-surveys and post-surveys was for commitment control, and this was the only one that was statistically significant. It can largely be explained by the decline in the score for the smartphone survey, rather than an increase in the score for the laptop survey. In particular, there was a decrease in students' self-reported ability to achieve their learning goals more quickly than expected. As suggested by the

interview findings, this could be where the negative aspects of smartphones, such as the physical constraints and social media distractions had the greatest impact. In particular, I would argue that the inability of many students to focus on their vocabulary learning on their smartphone shows that the device itself has a negative effect on students' willpower and volitional control strategies (Corno & Kanfer, 1993).

The difference in the scores for affective regulation between the pre- and post-surveys also widened, but this increase was not statistically significant. The difference could be partly explained by the increase in stress when learning vocabulary through Quizlet on their smartphones which some students mentioned in the interviews. Pop-up notifications, the desire to check social media, and also the mere presence of their smartphones perhaps contributed to this. At the same time, smartphones did seem to help some students overcome boredom at times, but mainly by using the device to check their social media feeds in order to take a break from learning vocabulary on the laptop. This could be seen as some evidence of affective self-regulation and aligns with the findings of Cojocnean (2016) and Jurkovič (2019) that many students perceive their smartphones as "sources of entertainment" (Cojocnean, 2016, p. 36) and opportunities for socialising, rather than learning devices, so that as soon as they access the device, "their mind is not focused on learning anything" (Cojocnean, 2016, p. 36). Thus, on the one hand, using smartphones for digital vocabulary learning causes more stress, but on the other, they can be used to overcome boredom by accessing non-academic applications. The ability to manage this contradiction seems to come down to

how well students can regulate and control the use of their device for different purposes (Mahapatra, 2019).

There was a similar pattern of scores for resource control, with scores for the smartphones declining slightly, so the difference in the post-survey scores was statistically significant. Perhaps the main reason for this was that most students were using their laptops to access Quizlet, and seemed to be content just to use Quizlet. In addition, many did not go beyond the basic translation and dictionary tools and search for other vocabulary learning resources.

These were often accessed on their smartphones because it is often quicker and easier to access them as mobile applications and to see the results at the same time as using Quizlet on a laptop. The limited range of resources used could partly be a reflection of a lack of time or interest, or a reliance on the teacher to suggest in trying to find other resources, as found by Lai (2017) in her study of Hong Kong university students.

7.5.3 Device Control

There was also evidence that some students used their capacity for self-regulation to control their choice and use of mobile devices for vocabulary learning purposes. Many students preferred using their laptops for accessing and using Quizlet in most situations because they were aware that physical characteristics of the device, such as the larger screen size and a physical keyboard, better supported their self-regulated, mobile vocabulary learning. This mirrors the findings of Stockwell and Liu (2015, p. 315). The students

also seemed to associated laptops with more focused out-of-class study which allows for better academic multi-tasking (Lai & Zheng, 2018, p. 309-311) and is part of an “instruction-orientated experience” (Lai et al., 2018, p. 119) to enhance and expand their knowledge of vocabulary. Many students in this current study were also aware the web-based version of Quizlet had more features and activities than the mobile application, and that the laptop had the potential for encouraging less digital distraction, which has not been previously mentioned in the literature on self-regulated vocabulary learning through technology.

Conversely, many students view the smartphone as more compatible for social communication, casual learning through games and for academic tasks that were quick and light (Lai & Zheng, 2018, p. 309-311). It is also predominantly part of the “entertainment and information-orientated” experience” (Lai et al., 2018, p. 120) of out-of-class, mobile vocabulary learning. Many of the interviewees in this current study were also aware that using their smartphones generally depleted their capacity for self-regulated vocabulary learning, and admitted to their attraction, and even addiction in some cases, to social media applications, such as WhatsApp, Instagram and Snapchat, especially through pop-up notifications. As Pedro, Barbosa, & Santos (2018) state, “this addictive dimension is brought about by the ubiquitous presence of digital devices and social media in students’ lives” (p. 1). The magnetism of social media (Aagaard, 2015, 2018) and the allure of notifications causes students to be distracted from doing other more productive tasks, such as learning vocabulary, which is of serious concern,

especially at this present time when many students are learning online at home, with no face-to-face classes.

Despite this awareness of the addictive nature of social media on their smartphones, many students were unable and unwilling to turn off their smartphones or put them out of sight during learning periods on their laptops due to Fear of Missing Out (FOMO). As with Omani students (Qutishat et al., 2020), it would seem that the resulting nomophobia is widespread amongst Emirati university students. This is clearly interfering with their capacity and ability to regulate their use of smartphones for learning purposes and is certainly an issue that demands further investigation. In particular, it is vital to identify the effects of smartphone use on their academic performance. I would not be surprised to see similar results to those identified by Junco (2012), Lepp, Barkley and Karpinski (2015) and Siebert (2019) who all found that smartphones were detrimental to learning and academic performance in both formal and informal settings, but especially in out-of-class, mobile learning contexts. At present this is a neglected issue in the literature related to mobile and digital second language vocabulary learning.

7.6 Model of Self-regulated, Mobile Vocabulary Learning

From the preceding discussion, particularly in Section 7.5, I propose that the model of self-regulated, mobile vocabulary learning through technology that was introduced in Chapter 3 would benefit from the inclusion of a sixth dimension – device control (see Figure 30).

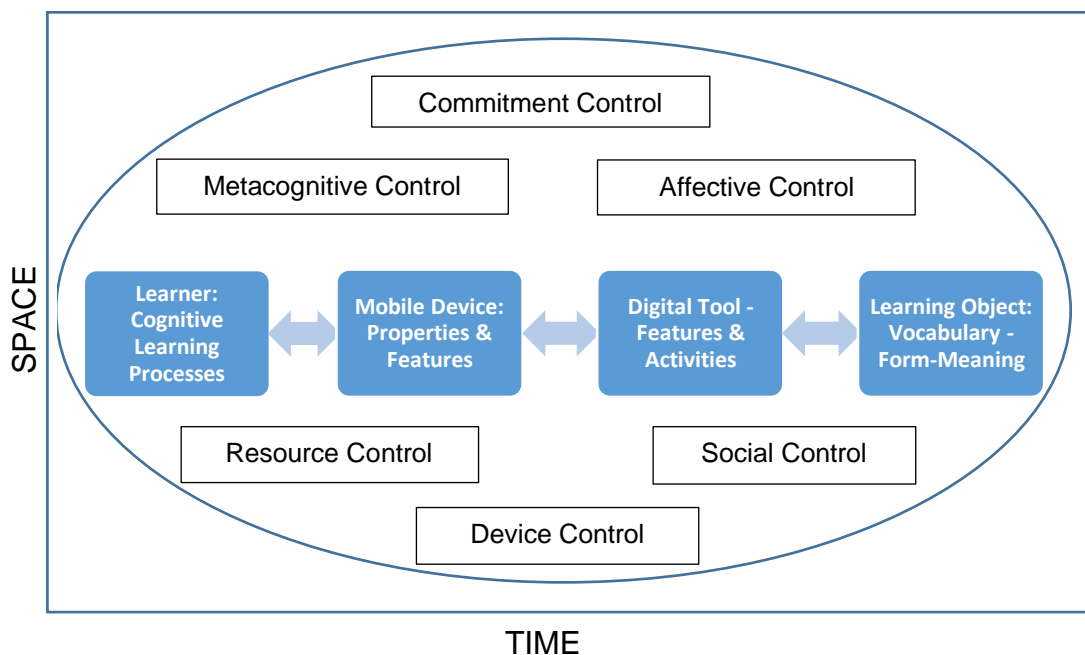


Figure 30 Model of Self-Regulated, Mobile Vocabulary Learning (SERMOVOL).

This additional dimension should include four different statements of belief (see Table 54). The first is an awareness of which device is best suited to the different types of vocabulary learning tasks and activities. For example, which device is better for accessing and learning from digital flashcards.

Device Control	<ol style="list-style-type: none"> 1. I know which device is better to use for different vocabulary learning tasks and activities. 2. I believe that I am able to switch between using different mobile devices depending on the time and place. 3. I know how to use different devices simultaneously to maximise my vocabulary learning. 4. I can identify digital distractions and find ways to overcome them in order to refocus on learning tasks.
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Table 54 Mobile device control dimension.

The second is the ability to know which device to use at different times and in different locations, which overlaps considerably with the first aspect. The third statement is possessing knowledge about using different devices

simultaneously to make vocabulary learning more efficient. For example, being able to access an online dictionary on one device, while completing online activities on another. Finally, and perhaps most importantly of all, students need to be able to identify different digital distractions and how to overcome them, especially when using mobile devices for academic learning purposes. This is particularly urgent and important as smartphones are now so ubiquitous and deeply embedded in both daily life and higher education settings. It is also necessary because of the addictive nature of many social media applications that have been deliberately designed to compete for the attention of users (Parkin, 2018; Zuboff, 2019) and, as a consequence, distract them from their academic tasks and learning. This is likely to become an ever-increasing problem in all aspects of higher education, but particularly when using smartphones for mobile, digital vocabulary learning.

Chapter 8: Conclusion

The need for students on EMI degree courses in HEIs to possess a receptive vocabulary knowledge of at least the 3,000 most frequent words in English has clearly been established by a large body of research in the field of second language learning. This goal is of particular importance for those Emirati students in the UAE who did not have the privilege of attending an English-medium secondary school, who often demonstrate insufficient levels of English vocabulary knowledge, and thereby struggle to achieve academic success in higher education. At the same time, technological solutionism is often viewed in the UAE as the most efficient way to address such educational problems. Thus, the aim of this study was to explore the mediating effects of using a commercial, off-the-shelf, digital vocabulary learning tool, itself mediated through different mobile, digital devices, in out-of-class settings, on the receptive vocabulary knowledge of such students on an academic English course in one particular higher education institute. It also examined how the same tool has mediated the students' capacity for self-regulated vocabulary learning, and how this might be related to vocabulary learning gains. Finally, it explored the students' preferences for the devices that they used to access this digital tool and how this may also have affected their capacity for self-regulation. It aimed to identify the 'state-of-the-actual' rather than the 'state-of-the-art' (Selwyn, 2011) in the field of mobile learning. In this conclusion, I will highlight the contributions to knowledge, discuss the implications for practice and policy, identify some limitations of the study and present some potential areas for further research.

8.1 Contributions to Knowledge

The first main point is that students using an off-the-shelf, digital vocabulary learning tool (Quizlet) over a 10-week period in out-of-class settings as part of an English foundation course at a HEI in the UAE demonstrated reasonable learning gains in terms of their receptive vocabulary knowledge. Although the role of the teacher and the possible use of Quizlet and other vocabulary learning materials in class are unknown factors in contributing to this outcome, the large sample size and number of participants involved in this study suggest that more reliable generalisations can be made than other previous studies that showed smaller gains and were often conducted with far smaller numbers of participants. The results suggest that such a digital vocabulary learning tool can support effective noticing, encoding and retrieval, which are three of the key cognitive processes of vocabulary learning.

Another important finding was that Emirati students' capacity for self-regulated vocabulary learning was higher than in most of the previous studies in other countries, particularly those in non-technology contexts. In addition, while there was no change in the Emirati students' overall capacity for self-regulated vocabulary learning through technology after using the digital vocabulary learning tool, there was a statistically significant difference between this capacity in relation to using a laptop and in relation to using a smartphone both prior to and after the intervention. It showed that while scores for all five dimensions of self-regulation when using laptops remained constant or strengthened slightly, those for three of the five dimensions when using smartphones declined. In particular, commitment control declined significantly

by the end of the study, which suggests that smartphones deplete this dimension of self-regulation. These results were obtained by using a newly developed, valid and reliable survey tool in a mobile learning context to measure five different dimensions of students' self-regulated vocabulary learning. As far as I am aware, no previous studies have used this survey tool in other Middle Eastern contexts or indeed in other context.

Thirdly, based on the responses from the interviews, a majority of students seemed to prefer using their laptop to access and interact with the digital vocabulary learning tool, but mainly when at university or at home. For these students, the laptop was seen as a serious learning device, while the smartphone was predominantly a communication and entertainment device, despite the fact that smartphones are now very sophisticated and offer very similar functionality and processing power to laptop computers. However, students did use their smartphones for vocabulary learning on-the-go, when outside the home and university, in the classroom when playing a cooperative vocabulary game, and simultaneously with their laptops. This supports the findings of other previous studies and provides some empirical evidence to support the envisioned ideal of seamless mobile learning which “encompasses both formal learning within the classroom, and informal *and* formal learning outside the classroom across myriad devices, in a variety of physical and temporal arenas” (Hockley, 2013, p. 80).

A fourth finding relates to the usefulness and effectiveness of different features and activities of the digital vocabulary learning tool itself, and how

these supported or hindered different dimensions of self-regulation. Features such as the daily sets of 10 words were linked to metacognitive control because they helped students plan their vocabulary learning and not waste time searching for learning materials. The progress charts also enabled more efficient use of 'fragmented time' (Wu, 2015, p. 177). In terms of activities, students had a strong preference for short, gamified activities within Quizlet, such as Flashcards, Spell and Match, which could be completed quickly using the touch screen of their smartphones. While students valued longer and more involved activities, such as Learn, in terms of their pedagogical aims, over a semester-long learning period these impacted negatively on affective control, and boredom in particular. There have been few previous studies that have investigated different types of digital, vocabulary learning activities and features in relation to the theory of self-regulation.

There was also some recognition by the students that the magnetism of social media and distractions from notifications on the students' screens could distract them and inhibit their ability to concentrate and persist in their vocabulary learning tasks when using their smartphones. This depletes their capacity for self-regulated vocabulary learning and has resulted in conditions such as nomophobia and even smartphone addiction. Recognition of these negative aspects of smartphone use has rarely appeared in the mobile vocabulary learning literature.

Overall, the key contribution to scholarship that this thesis makes is that through the synthesis of L2 vocabulary learning, out-of-class mobile learning,

device preference and the theory of self-regulation, the student's ability to self-regulate their use of personalised and connected mobile devices is a key factor in their vocabulary learning. This important finding has resulted in an original contribution to the field in the form of an expanded model of self-regulated, mobile vocabulary learning (SERMOVOL), that adds a sixth dimension of mobile device control (see section 7.6). This dimension includes four statements of belief, that could be used as part of an extended scale to measure learners' capacity for self-regulated vocabulary learning through different uses of technology.

8.2 Implications for Practice and Policy

This study identifies five implications for the use of digital mobile vocabulary learning on other English foundation courses, the design of digital vocabulary learning tools and higher-level policy decisions.

Firstly, the results for the vocabulary learning gains suggest that the implementation of a structured and intentional, out-of-class, digital, mobile vocabulary learning program can be effective in helping students on an English foundation course improve their receptive knowledge of general academic English vocabulary. Such a program is particularly important in Middle-Eastern contexts like the UAE, where general vocabulary levels are low and incidental vocabulary learning is inefficient, especially due to the lack of a strong reading culture. In addition, the delivery of vocabulary learning materials through an off-the-shelf, commercial digital tool which has a free-

version for students, such as Quizlet, can be just as effective as an expensive, custom-designed mobile application.

Secondly, since the students' capacity for self-regulated vocabulary learning showed no change over the course of the study, another implication is that an explicit awareness-raising programme needs to be designed and delivered alongside and integrated with the use of the digital vocabulary learning tool. In particular, a programme that focuses on metacognitive self-regulation, such as the one devised by Bilican and Yesilbursa (2015) might lead to enhanced self-regulation. At the same time, such a programme needs to integrate knowledge about the main vocabulary learning processes (Kihlstrom, 2013; Nation, 2013) and the key vocabulary learning strategies (Oxford, 2017) to help students make informed and better use of the features and activities of digital vocabulary tools. For example, in order to meet the requirements of spaced repetition, students could be shown charts that explain how learning vocabulary is better done through spaced repetition as opposed to mass repetition (Pimsleur, 1967). As Tseng and Schmitt (2008) state, mastery of such specific vocabulary learning strategies are more directly linked to vocabulary learning, so students need training in different strategies and opportunities to practice these regularly (Nation, 2013).

Another implication is that students would perhaps experience less boredom and procrastination, and remain more committed to their learning goals, if the design of digital vocabulary learning tools provided them with a greater variety of activities and features that they had more direct control over. For example,

the use of audio or video representation of words and sentences, that are easily customisable would enable students to adjust them to suit their own personal learning approach (Kukulska-Hulme, 2012). Another feature could be one that encourages students to create their own adaptable vocabulary materials that are more suited to their own individual learning goals. For example, in Quizlet, users can create their own personalised sets of vocabulary, which can also be shared with other people. In this way learners can be empowered to become active “producers and creators of value utilizing digital technology” (Passey et al., 2018, p. 434), rather than merely passive “consumers of convenience” (Passey et al., 2018, p. 434).

This greater sense of control and empowerment could also form part of an overall approach to vocabulary learning that supported the development of greater learner independence, and encouraged more self-directed and autonomous, out-of-class learning (Lai, 2013 & 2017). It would also acknowledge that the role of the teacher in facilitating the right conditions for, and supporting and guiding the development of these skills and strategies, is vital (Lai, 2013, 2017; Lai et al., 2016) and that the development of an online training platform can have a positive effect on enhancing a learner’s self-directed use of technology for language learning purposes (Lai et al., 2016).

A fourth related implication from this study is that teachers need to have open and honest discussions with students about the negative aspects of smartphones. In particular, they need to know how to better self-regulate the use of the device so that they are less distracted by social media applications

and pop-up notifications, and are better able to concentrate and persist in their digital vocabulary learning both inside and outside the classroom. This could involve the co-construction of an agreed contract or mobile device policy for each class or group of students (Aaron & Lipton, 2018).

At the policy-level, one implication could be to ensure that learning goals related to the development of self-regulation and learner autonomy are included in curricula and that teacher development programmes include modules on how to help students develop greater learner autonomy and self-direction in vocabulary learning. Finally, with the increase in smartphone addiction and nomophobia, which can seriously deplete self-regulation, it would also seem necessary for policy-makers and curriculum designers to initiate the development of culturally-relevant and localised courses in developing both digital agency (Passey et al., 2018) and digital wellbeing (Themelis & Sime, 2020). These could be a mandatory curriculum requirement in schools and in the first year of higher education in order to ensure that students have the knowledge and skills to better manage and control the use of their mobile devices to support their academic success, rather than impede it.

8.3 Limitations of the Study

With a mean score of 46% in the vocabulary pre-test, most students in this study probably already knew nearly half of the 500 words they encountered through Quizlet. This means that the measurement of the learning gains was

only really based on half of the total number of words. If most of these known words were replaced with words that students did not know at the beginning of the study, the mean scores in the pre-test would have been lower and more time would have been spent on learning the new words. As a result, the learning gains from using the digital vocabulary learning tool would perhaps have been greater. This strongly suggests the need for some kind of diagnostic testing to identify known words as part of the word list construction process (Burkett, 2017).

Another limitation is that this study only investigated one component of vocabulary knowledge, which was the form-meaning link and the ability to recall the meaning of words from the orthographic form in isolated sentences. As Nation (2013) has pointed out, there are actually nine components of word knowledge, and the testing of productive knowledge in terms of writing or spelling could have added another dimension to the research findings. Similarly, the vocabulary post-test in this study was conducted almost immediately after the intervention had finished, which means that I was only measuring the short-term learning gains.

The use of a naturalistic study could be seen as a slight limitation in terms of making claims about the benefits of using Quizlet in out-of-class settings. For example, it was not possible to monitor students' possible other, out-of-class English language and vocabulary learning experiences, nor the extent to which teachers may or may not have introduced other teaching materials in the classroom that presented, practiced or reviewed the same vocabulary

items that were presented on Quizlet. Thus, it was difficult to isolate the use of Quizlet as the sole reason to explain the vocabulary learning gains.

In terms of the theoretical framework, I limited myself to one particular theory of self-regulation – volitional control. As Mizumoto and Takeuchi, (2012) argue, “self-regulating capacity, with its focus on volition, is only part of a complex picture of self-regulated learning” (p. 90), so it might have been possible to utilise one or two other theories and see which one is more suitable for the field of second language vocabulary learning. In addition, as Gao (2007) suggests, the underlying self-regulating capacity that I used overlaps considerably with the concept of metacognitive learning strategies. Another related limitation is that self-regulation was only measured through students’ own perceptions in responses to a survey tool and in oral interviews, which inevitably adds a more subjective nature to the results.

A fifth limitation is to do with the fact that I only measured the total number of Quizlet activities completed by each participant. This is a slightly crude measure and did not allow for a more nuanced picture to emerge about which Quizlet activities were actually used more or less often. This would have allowed triangulation with the results from the Quizlet survey, particularly in relation to participants’ perceptions about the most useful activity type for improving their vocabulary knowledge.

For the interviews, there was a small limitation related to the language used. Interviews were conducted in English, but for most of the participants their

level of English was at an intermediate or B1 level according to the Common European Framework of Reference for languages (CEFR). This means that they were perhaps not able to fully express their perceptions, views and opinions about their digital vocabulary learning and capacity for self-regulation.

Finally, the characteristics of the participants in this study limit the generalisability of the results to some extent. Ninety-four per cent of the participants were female, so it's very possible that a study conducted with a population of mainly male students might produce different results. For example, Emirati females may be more attached to their smartphones than Emirati males, which might affect the SRL survey scores. Indeed, Emiratis in general may have a stronger affinity to using their smartphones, which means the results are not easily generalisable to other nationalities and non-Arab cultures.

8.4 Future Research

Based on the limitations highlighted above, an obvious follow-up would be to conduct a similar study by employing a more refined and relevant word list, after diagnostic testing has been conducted, as the basis of the vocabulary learning content. This would ensure more accurate measurement of learning gains from using the digital tool. In addition, to test the durability and the long-term retention of the vocabulary learning gains, a longitudinal study could be

conducted by re-administering the same meaning-recall vocabulary test after 3, 6 and 12 months (Schmitt, 2019).

Secondly, a battery of additional vocabulary tests could be used to enable the measurement of the effects of the digital vocabulary learning tool on other dimensions of students' vocabulary knowledge. In particular, a vocabulary depth test, such as the one used by Tseng and Schmitt (2008), to measure knowledge of spelling, which the students themselves indicated was important, and collocation, could be used. Measuring the distinction between receptive and productive knowledge could also prove to be fruitful and identify how a digital vocabulary learning tool, such as Quizlet, might help "to push learners knowledge from receptive mastery to the point where they can independently use lexical items fluently and appropriately in their own output" (Schmitt, 2019, p. 264). Finally, the Vocabulary Levels test could also be administered to students before and after the intervention to enable testing of the relationship between specific breadth and depth learning gains and general vocabulary size.

In terms of self-regulated vocabulary learning, it would be interesting to replicate Senturk's (2016) study with Emirati students by recruiting participants of differing language proficiency levels and measure their levels of self-regulation, to see if this variable had any effect on self-regulation and vocabulary learning gains. Another area rich for investigation is identifying the relationship between self-regulation and other important aspects of technology-enhanced vocabulary learning, such as motivation, self-efficacy,

and learner beliefs (Lai, 2019). In addition, observing and measuring the students' actual use of specific vocabulary learning strategies with different mobile devices would also add to the literature. In particular, replication of Tseng and Schmitt's study (2008) both before and after the use of a digital vocabulary learning tool would help not only to identify any effects on strategic vocabulary learning involvement (SVLI) and mastery vocabulary learning tactics (MVLТ), but also allow comparisons of the relationships between the different components of their model of motivated vocabulary learning in technology-based contexts.

Fourthly, it be well worth observing and measuring the number of times each participant accessed and completed each of the seven different Quizlet activities. Not only would this provide a more nuanced picture of Quizlet use, but it would also enable measurement of the possible correlation between different aspects of vocabulary knowledge and the six dimensions of self-regulated, mobile vocabulary learning through technology.

Considering the fact that the students themselves identified digital distractions as a negative factor in their out-of-class digital vocabulary learning, it would also be useful to conduct a follow-up study that focused explicitly on levels of nomophobia and smartphone addiction amongst students in this context and how these may be related to vocabulary learning gains. In terms of the former, the use of the NMP-Q tool (Yildirim & Correia, 2015) would provide results which could be compared with those from other studies in the Middle East region (Qutishat et al., 2020). In terms of smartphone addiction, students'

actual usage of social media applications could be collected as log data along the lines of the research conducted by Jeong, Jung, & Lee (2020) in order to identify when these coincided and interfered with vocabulary learning sessions.

Finally, future research could test the model of self-regulated, mobile vocabulary learning through technology (SERMOVOL) described at the end of chapter seven through an extended SRLvoclCT survey that included the sixth dimension of device control and the four new survey items outlined. This would allow testing of the validity and reliability of the new tool, and also enable the measurement of the mediating effects of other digital, vocabulary learning tools and students' abilities to manage and control their use of different mobile devices.

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Appendices

Appendix A: Meaning-Recall Vocabulary Test

Student Code		Part A		Total	
		Part B		%	

- This is a test to see if you know the meaning of 50 English words.
- You need to think about the meaning of the word in **bold** and show you know the meaning.
- You can do this by writing in the 'Response' column on the right either (1) An Arabic translation OR (2) a short definition in Arabic OR (3) a word in English that has a similar meaning (a synonym) OR (4) a short definition in English.
- If you don't know the word, draw a circle (O).

Example

0	resident	n	She is a resident .	مقيم / person who lives in a place
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PART A

No.	Word	POS	Example sentence	Response
1	decrease	verb	It might decrease .	
2	responsible	adjective	They are responsible people.	
3	neither	conjunction	I saw neither of them.	
4	construction	noun	I can see a lot of construction .	
5	honor	noun	We did it in his honor .	
6	ton	noun	That's nearly one ton .	
7	nevertheless	adverb	It's hot. Nevertheless , we'll go out.	
8	campaign	noun	Let's start a campaign .	
9	predict	verb	We can predict what will happen.	
10	engaged	adjective	They have just got engaged .	
11	possess	verb	We possess too many things.	
12	statistics	noun	There are a lot of statistics .	
13	destroy	verb	They want to destroy it.	
14	port	noun	We arrived at the port .	
15	cheerful	adjective	You look cheerful .	
16	range	noun	We have a wide range .	
17	nervous	adjective	I was nervous .	
18	device	noun	Stop the device .	
19	nowhere	adverb	He has nowhere to go.	
20	occasion	noun	It's a big occasion .	
21	signal	noun	Wait for my signal .	
22	exchange	verb	I want to exchange this.	
23	revise	verb	We need to revise it.	

24	tool	noun	Put the tool over there.	
25	principle	noun	This is the main principle .	

PART B

No.	Word	POS	Example sentence	Response
1	graph	noun	Show me the graph .	
2	anxiety	noun	My sister has a lot of anxiety .	
3	sensitive	adjective	It's very sensitive .	
4	decorate	verb	We need to decorate .	
5	shift	noun	There has been a shift .	
6	wealth	noun	The country has a lot of wealth .	
7	withdraw	verb	Let's withdraw some.	
8	climate	noun	The climate is changing.	
9	achieve	verb	We have to achieve something.	
10	persuade	verb	He tried to persuade his brother.	
11	element	noun	It's a very important element .	
12	tough	adjective	She has a tough job.	
13	sequence	noun	There is a clear sequence .	
14	auditorium	noun	They are in the auditorium .	
15	citizen	noun	The woman is a citizen .	
16	innocent	adjective	The man was innocent .	
17	loan	noun	I need a loan , please.	
18	disappointed	adjective	My brother was disappointed .	
19	structure	noun	I can see the structure .	
20	champion	noun	He became the champion .	
21	selection	noun	They have a big selection .	
22	enemy	noun	They are the enemy .	
23	mention	verb	Don't mention it.	
24	promote	verb	They decided to promote him.	
25	dust	noun	There is a lot of dust .	

Appendix B: Smartphone Survey Statements

A. Commitment Control

1. When learning vocabulary, I believe smartphones and smartphone applications can help me achieve my goals more quickly than expected.
2. When learning vocabulary, I believe smartphones and smartphone applications can help me persist until I reach the goals that I make for myself.
3. Smartphones and smartphone applications are important sources and tools to maintain my interest in achieving my vocabulary learning goals.
4. I believe smartphones and smartphone applications are effective in boosting willpower for learning vocabulary.

B. Metacognitive Control

5. I know how to use smartphones and smartphone applications to effectively monitor myself to achieve my vocabulary learning goals.
6. I plan tasks and relevant materials to learn vocabulary outside of school that involve the use of smartphones and smartphone applications.
7. I adjust my vocabulary learning goals in response to the information resources and communication venues I have access to via smartphones and smartphone applications.
8. I believe smartphones and smartphone applications help me monitor my progress in learning vocabulary.
9. I know how to adjust my smartphone and smartphone applications according to my learning styles.

C. Affective Control

10. During the process of learning vocabulary, I believe that smartphones and smartphone applications can help me overcome any sense of boredom.
11. When feeling bored with learning vocabulary, I use my smartphone and smartphone applications to regulate my mood in order to regain the interest and enthusiasm in learning.
12. When I feel stressed about vocabulary learning, I feel that my smartphone and smartphone applications help to reduce this stress.
13. I feel satisfied with the way I use my smartphone and smartphone applications to reduce the stress of vocabulary learning.
14. I feel smartphones and smartphone applications can make the task of vocabulary learning more attractive to me.
15. I feel smartphones and smartphone applications effectively maintain my interest and enthusiasm in learning vocabulary.

D. Resource Control

16. When I feel I need more learning resources in vocabulary learning, I use my smartphone and smartphone applications to expand my learning resources.
17. I use my smartphone and smartphone applications to create and increase opportunities to learn and use vocabulary.
18. I use my smartphone and smartphone applications to seek learning resources and opportunities to help achieve my vocabulary learning goals.
19. I seek engaging vocabulary learning materials and experience delivered via my smartphone.
20. I believe smartphones and smartphone applications are effective in expanding my resources for vocabulary learning.

E. Social Control

21. When learning vocabulary, I use my smartphone and smartphone applications to seek encouragement and support from other learners.
22. When learning vocabulary, I use my smartphone and smartphone applications to connect with native speakers of the language.
23. When learning vocabulary, I use my smartphone and smartphone application to connect with peer learners all over the world.

Appendix C: Pair-Depth Interview Questions

A. Vocabulary Learning

Opening Interview Questions	Possible Follow up Questions
Vocabulary Knowledge <ol style="list-style-type: none"> 1. Has your knowledge of English vocabulary changed over the semester? 2. How has it changed? 	<ul style="list-style-type: none"> • What aspects of vocabulary knowledge have changed the most? • How has it affected your ability to: Read / Listen / Write / Speak?
Quizlet Organisational & Learning Features <ol style="list-style-type: none"> 3. How did the features of Quizlet affect your vocabulary knowledge? 	<ul style="list-style-type: none"> • Which features of Quizlet helped? How? / Why? • Which features of Quizlet were not helpful? How? / Why?
Quizlet Activities <ol style="list-style-type: none"> 4. How did the Quizlet activities affect your vocabulary knowledge? 	<ul style="list-style-type: none"> • Which Quizlet activities helped? How? / Why? • Which Quizlet activities were not helpful? How? / Why?

B. Self-Regulation Capacity in Vocabulary Learning

1. Overall

Opening Interview Questions	Possible Follow up Questions
Overall <ol style="list-style-type: none"> 1. Has the use of Quizlet affected your ability to manage and control your learning of English vocabulary? 	<ul style="list-style-type: none"> • What have been the effects? • Why has it had this effect?
Quizlet Organisational & Learning Features <ol style="list-style-type: none"> 2. Which features of Quizlet have helped you to manage and control your learning of English vocabulary? 	<ul style="list-style-type: none"> • How? • Why?
Quizlet Activities <ol style="list-style-type: none"> 3. Which Quizlet activities have helped you to manage and control your learning of English vocabulary? 	<ul style="list-style-type: none"> • How? • Why?

2. Commitment Control: Learning Goals

Opening Interview Questions	Possible Follow up Questions
Overall 1. What were your vocabulary learning goals this semester? 2. Has the use of Quizlet affected your <i>Commitment to your Learning Goals</i> ?	<ul style="list-style-type: none"> • How has it affected your commitment? • Why has it had this effect?
Quizlet Organisational & Learning Features 1. How did the features of Quizlet affect your <i>Commitment to your Learning Goals</i> ?	<ul style="list-style-type: none"> • Which features of Quizlet helped? How? / Why? • Which features of Quizlet were not helpful? How? / Why?
Quizlet Activities 2. How did the Quizlet activities affect your <i>Commitment to your Learning Goals</i> ?	<ul style="list-style-type: none"> • Which Quizlet activities helped? How? / Why? • Which Quizlet Activities were not helpful? How? / Why?
Device 3. How did the choice of device (smartphone or laptop computer) you used Quizlet on affect your <i>Commitment to your Learning Goals</i> ?	<ul style="list-style-type: none"> • Which device helped you the most? How? Why? • Which device stopped you the most? How? Why?

3. Metacognitive Control: Concentration

Opening Interview Questions	Possible Follow up Questions
Overall 1. Has the use of Quizlet affected your <i>Concentration</i> when learning vocabulary?	<ul style="list-style-type: none"> • How has Quizlet affected your <i>Concentration</i>? • Why has it had this effect?
Quizlet Organisational & Learning Features 2. How did the features of Quizlet affect your <i>Concentration</i> ?	<ul style="list-style-type: none"> • Which features of Quizlet helped you to <i>Concentrate</i>? How? Why? • Which features of Quizlet made you lose your <i>Concentration</i>? How? Why?
Quizlet Activities 3. How did the activities in Quizlet affect your <i>Concentration</i> ?	<ul style="list-style-type: none"> • Which Quizlet activities helped you to <i>Concentrate</i>? How? Why? • Which Quizlet activities made you lose your <i>Concentration</i>? How? Why?
Device 4. How did the choice of device (smartphone or laptop computer) affect your <i>Concentration</i> ?	<ul style="list-style-type: none"> • Which device helped you to <i>concentrate</i> the most? How? Why? • Which device made you <i>lose your concentration</i> the most? How? Why?

4. Metacognitive Control: Procrastination

Opening Interview Questions	Possible Follow up Questions
Overall 1. Has the use of Quizlet affected your <i>procrastination</i> when learning vocabulary?	<ul style="list-style-type: none"> • How has Quizlet affected your <i>procrastination</i>? • Why has it had this effect?
Organisational & Learning Features 2. How did the features of Quizlet affect your <i>procrastination</i> ?	<ul style="list-style-type: none"> • Which features of Quizlet helped you to avoid <i>procrastination</i>? How? Why? • Which features of Quizlet made you procrastinate? How? Why?
Quizlet Activities 3. How did the activities in Quizlet affect your <i>procrastination</i> ?	<ul style="list-style-type: none"> • Which Quizlet activities helped you to avoid <i>procrastination</i>? How? Why? • Which Quizlet activities made you <i>procrastinate</i>? How? Why?
Device 4. How did the choice of device (smartphone or laptop computer) affect your <i>procrastination</i> ?	<ul style="list-style-type: none"> • Which device helped you to avoid <i>procrastination</i> the most? How? Why? • Which device made you <i>procrastinate</i> the most? How? Why?

5. Affective Control: Boredom

Opening Interview Questions	Possible Follow up Questions
Overall 1. Has the use of Quizlet affected your levels of <i>boredom</i> when learning vocabulary?	<ul style="list-style-type: none"> • How has Quizlet affected your levels of <i>boredom</i>? • Why has it had this effect?
Quizlet Organisational & Learning Features 2. How did the features of Quizlet affect your levels of <i>boredom</i> ?	<ul style="list-style-type: none"> • Which features of Quizlet helped you to avoid <i>boredom</i>? How? Why? • Which features of Quizlet made you feel <i>bored</i>? How? Why?
Quizlet Activities 3. How did the activities in Quizlet affect your levels of <i>boredom</i> ?	<ul style="list-style-type: none"> • Which Quizlet activities helped you to avoid <i>boredom</i>? How? Why? • Which Quizlet activities made you <i>feel bored</i>? How? Why?
Device 4. How did the choice of device (smartphone or laptop computer) affect your levels of <i>boredom</i> ?	<ul style="list-style-type: none"> • Which device helped you to avoid <i>boredom</i> the most? How? Why? • Which device made you <i>feel bored</i> the most? How? Why?

6. Affective Control: Stress

Opening Interview Questions	Possible Follow up Questions
Overall 1. Has the use of Quizlet affected your levels of <i>stress</i> when learning vocabulary?	<ul style="list-style-type: none"> • How has Quizlet affected your levels of <i>stress</i>? • Why has it had this effect?
Quizlet Organisational & Learning Features 2. How did the features of Quizlet affect your levels of <i>stress</i> ?	<ul style="list-style-type: none"> • Which features of Quizlet helped you to avoid <i>stress</i>? How? Why? • Which features of Quizlet made you <i>feel stressed</i>? How? Why?
Quizlet Activities 3. How did the activities in Quizlet affect your levels of <i>stress</i> ?	<ul style="list-style-type: none"> • Which Quizlet activities helped you to avoid <i>stress</i>? How? Why? • Which Quizlet activities made you <i>feel stressed</i>? How? Why?
Device 4. How did the choice of device (smartphone or laptop computer) affect your levels of <i>stress</i> ?	<ul style="list-style-type: none"> • Which device helped you to avoid <i>Stress</i> the most? How? Why? • Which device made you <i>feel stressed</i> the most? How? Why?

7. Resource Control: Learning Resources

Opening Interview Questions	Possible Follow up Questions
Overall 1. Has the use of Quizlet affected your ability to find new and extra <i>learning resources</i> for learning vocabulary?	<ul style="list-style-type: none"> • How has Quizlet affected this ability? • Why has it had this effect?
Quizlet Organisational & Learning Features 2. How did the features of Quizlet affect your ability to find new and extra <i>learning resources</i> ?	<ul style="list-style-type: none"> • Which features of Quizlet helped you to do this? How? Why? • Which features of Quizlet stopped you from doing this? How? Why?
Quizlet Activities 3. How did the Quizlet activities affect your ability to find new and extra <i>learning resources</i> ?	<ul style="list-style-type: none"> • Which Quizlet activities helped you to find new and extra <i>learning resources</i>? • Which Quizlet activities stopped you from finding new and extra <i>learning resources</i>?
Device 4. How did the choice of device (smartphone or laptop computer) affect your ability to find new and extra <i>learning resources</i> ?	<ul style="list-style-type: none"> • Which device helped you to find new and extra <i>learning resources</i> the most? How? Why? • Which device helped you the least? How? Why?

8. Social Control

Opening Interview Questions	Possible Follow up Questions
Overall 1. Has the use of Quizlet affected your ability to <i>connect with other people</i> to learn vocabulary?	<ul style="list-style-type: none"> • How has Quizlet affected your ability to connect with other people to learn vocabulary? • Why has it had this effect?
Quizlet Organisational & Learning Features 2. How did the features of Quizlet affect your ability to <i>connect with other people</i> to learn vocabulary?	<ul style="list-style-type: none"> • Which features of Quizlet helped you to do this? How? Why? • Which features of Quizlet stopped you? How? Why?
Quizlet Activities 3. How did the Quizlet activities affect your ability to <i>connect with other people</i> to learn vocabulary?	<ul style="list-style-type: none"> • Which Quizlet activities helped you to do this? How? Why? • Which Quizlet activities stopped you? How? Why?
Device 4. How did the choice of device (smartphone or laptop computer) affect your ability to <i>connect with other people</i> to learn vocabulary?	<ul style="list-style-type: none"> • Which device helped you to connect with other people to learn vocabulary the most? How? Why? • Which device did not help? How? Why?

C. Overall

Opening Interview Questions	Possible Follow up Questions
1. Has Quizlet helped you to improve your vocabulary knowledge or not?	<ul style="list-style-type: none"> • What's the main reason?
2. Has Quizlet helped you to manage and control your vocabulary knowledge or not?	<ul style="list-style-type: none"> • What's the main reason?
3. Which device is more beneficial for learning vocabulary – Smartphone or laptop computer?	<ul style="list-style-type: none"> • What's the main reason?