Enabling digital transformation and sustainability via the use of Artificial Intelligence-powered learning tools and mobile assisted learning: Towards inclusive education in business and management schools

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Track: Learning & Knowledge

Summary: (150 words)

Artificial intelligence technology is poised to transform management education, dramatically increasing efficiency and accessibility for students. The current study explored how Quizlet, a digital learning platform, can be used to help students (especially international students) understand and memorise various terms and theories before a final exam using their mobile phones. The current study used classroom action research methodology and explored students' attitudes towards Quizlet through student focus group discussions and reflective journals. These were also triangulated with their lecturers' observations using thematic analysis. Findings indicated that Quizlet increased learner engagement and persistence in learning theory and concepts, as it used cutting-edge technology and promoted learner autonomy to develop their metacognitive skills. Based on the findings of the current study, the researcher offers recommendations for the successful implementation of Quizlet in business schools, as it appears to transform students' learning experience by promoting social justice, knowledge sharing and sustainable learning.

Keywords: Artificial intelligence, machine learning, digital transformation, sustainable learning, management education, well-being, innovation, inclusion, student learning attitudes, mobile-assisted learning.

Word Count: 2770 words (excluding tables and references)
Introduction (530 words)

Artificial intelligence (AI) is a general-purpose technology that can perform a variety of activities previously only performed by humans. Some people consider AI to be a simulation of human mental functions performed by machines. It is a field of research with many subfields. AI has recently had a rapid and transformative impact on various industries, such as healthcare, transportation, business, retail, construction, food, manufacturing and education (Dwivedi et al., 2021). Due to the rapid evolution of technology, learners can now access the internet connection from multiple devices, i.e. their mobile devices, anytime, anywhere and can access anything they want. Students can easily download and use any learning application they want to improve their academic performance. Although lecturers often complain that students can easily become addicted to their mobile phones and use them constantly, lecturers can also use techniques and tools that students can easily access through their mobile devices to enhance their learning by engaging students more easily and providing opportunities for personalised learning (Whalley et al., 2020).

In this project, Quizlet was used as a revision tool to help students enhance their learning of content in the area of leadership in business management (BM). Quizlet is a popular online learning tool that can be accessed on both computers and mobile devices. It can be used to study any subject, but can primarily support content learning and semester retention, especially for low ability, dyslexic, neurodiverse and international students (Waluyo and Bucol, 2021). In Quizlet, students can effectively focus on either self-study, pair work or group study to learn content, terms and develop their language skills. Teachers can also invite students to create and share their own study sets and track their progress. Most importantly, it can be freely accessed by any student, anywhere.

Vocabulary and the acquisition of new terms are undoubtedly linked to language production and comprehension. Insufficient vocabulary and understanding of new concepts can hinder students' understanding and production of speech and text. For example, Groot (2000) claims that vocabulary is closely linked to the development of reading, listening, speaking and writing skills. Despite its primacy, many students lack the necessary vocabulary (i.e., terms specific to their discipline) for their academic studies (Barr, 2016), which may prevent them from producing and understanding a wide range of speech or text. This is even more evident for international students who speak and write English as a second language (ESL) (Gass and Selinker, 2008). Many students show indifference to learning new terms as they find it boring, extremely time consuming and ineffective. Therefore, there is a need to learn terminology and new concepts in an alternative way that meets students' specific needs.

An innovative way of learning new vocabulary, terms and definitions is to incorporate technology into the learning process, known as Computer Assisted Learning (CAL). It requires minimal guidance as students are already familiar with learning applications and use their mobile phones to download and use them. Embedding CAL in content and vocabulary (term) learning is crucial as it provides learners with metacognitive tasks that allow them to make inferences about contexts using imagery and semantic techniques (Kose, Cimen, and Mede, 2016). Research suggests that the use of technology in learning is highly beneficial as it engages learners, promotes autonomy and enjoyment, and develops students' digital literacy (Wieking, 2016). This study investigated the perceived impact of using Quizlet as a revision tool that undergraduate students can use either alone or in pairs/groups to master content, terms and definitions. This also allows students to clarify different aspects of the theories while working

in groups. Considering the need to develop BM students' content learning and prepare them effectively for exams in a relatively stress-free environment, it is more important than ever to develop innovative ways to enhance students' content learning while engaging them in highly attractive learning strategies that facilitate the revision and deep understanding of different leadership theories while engaging learners and helping them to revise important theories, terms and scholars. Based on the findings of this study, recommendations will be made on how all relevant stakeholders in management education (ME) can promote the use of AI-based strategies, such as the use of Quizlet combined with mobile-assisted learning, to effectively support BM students, further develop their digital skills and promote social justice for international students and students with special learning needs. This will hopefully enable the HEI to improve student retention and progression rates.

Research focus, rationale, questions and methods (265 words)

A mixed methods approach, classroom action research (Wallace, 2010) and semi-experimental design was used to investigate the perceived impact of Quizlet on 160 HRM undergraduate students (volunteers - randomly selected). Qualitative data from student focus groups (twice during the semester) and student final reports were analysed by the researcher in QSR NVivo 9. Classroom action research was used in this study as it helps researchers to make decisions about their future practice as it allows them to collect and analyse data from their everyday practice (Wallace, 2010). During the 12 weeks of the academic semester, students were asked to participate in two group assignments in weeks 5 and 11 in which they were asked to revise the theories, terms, and key theorists they had learned using Quizlet in order to remember them for the final exam. The researcher also triangulated the data provided by the students with the observations of the lecturer and her assistant. This allowed for more in-depth exploration and qualitative triangulation (Flick, 2018) with the findings from the students' feedback. The researcher analysed all data using thematic analysis (Nowell et al., 2017) to identify patterns in the data and used these themes to address the research questions.

The main aim of the current study was to answer the following research questions:

- What are undergraduate students' perceptions of Quizlet as a revision tool that enhances students' academic performance in final exams and promotes sustainable learning development?

- What are undergraduate students' perceptions of Quizlet as a revision tool that improves student attitudes, increases student autonomy, and develops their metacognitive skills while promoting social justice?

Preliminary analysis and initial findings from phase one (703 words)

The current study has produced rich preliminary data. The themes that emerged from the analysis of the qualitative data (focus group discussions and student final reports) revealed several benefits that students believed they gained from using Quizlet.

Students' perceptions of Quizlet as a learning tool that enhances students' academic performance on exams while promoting Sustainable Learning Development (SLD)

Students found using Quizlet very beneficial because it was extremely easy to use and allowed them to use different tasks, i.e. a mix of multiple choice or multiple matching, true/false, flashcards and recall. They believed that these had a positive impact on their academic performance as they were able to recall the terms as they associated them with enjoyable activities they participated in with their friends (Dizon, 2016). They were also able to clarify points with their peers and the lecturer, as they were given ample time to interact and reflect on their work so far.

Students also noted that Quizlet allowed them to use their mobile phones instead of their desktop computers, avoiding boring and messy notebooks (Walters, 2012). This further motivated them to spend considerable time after implementation reviewing key terms and definitions related to their module. Students could even easily use them in their groups to form their study sets. This encouraged them to engage and put in more time and effort.

However, some students said that they were challenged when they lost their internet connection. In addition, some students' mobile phones were rather small or old-fashioned and not as easy to use (Tran, 2016). They suggested that the university should have provided devices for some students as they needed support. Social justice is still an issue when it comes to the use of technology in the 21st century, and both universities and our societies should provide all students with equal access to basic things, such as free mobile devices and the internet. Overall, students were able to identify numerous benefits for Quizlet users, but also offered suggestions for improving the overall implementation of Quizlet as a learning tool in higher education.

Students' perceptions of Quizlet as a study tool that improves student attitudes, increases student autonomy, and develops their metacognitive skills while promoting social justice. Students reported that they enjoyed working with Quizlet (Anjaniputra and Salsabila, 2018) as they were able to work in groups using words from their own language to seek clarification on the different theories. They were also able to develop their independence as learners and their metacognitive skills, as they engaged in deep reflection in good company. This was also beneficial for their wellbeing in the post-Covid -19 era, when they felt isolated and some of them faced mental health issues. Students were able to bond during this 3-hour session and make decisions about their study load up to the exam. They were tired of using notebooks and using their easily accessible mobile phones and games to enhance their learning was a relief to the students.

Nevertheless, some mature students expressed concern about being able to use this exciting app (Quizlet) efficiently as they were not very familiar with using apps on their mobile phones (Dizon, 2016). They were a bit scared and disappointed at first, but soon they asked for help from their peers and were able to develop their digital skills and use Quizlet. In the end, they were grateful to be able to develop their IT skills and proud to be able to use Quizlet as effectively as their younger peers.

In conclusion, the results of the current study showed that students enjoyed their involvement in group work using Quizlet to revise their work and understand terms and definitions. They created their own study sets and were able to share them with their peers. They found the whole experience enjoyable and valuable for their future academic and personal development. They were able to develop various professional skills and prepare for the exams by relying on themselves and their peers. Although they encountered some problems, they realised that they needed to develop valuable skills, i.e. IT skills and perseverance, if they were to graduate and succeed in their future jobs.

Theoretical contribution of the study (266 words)

Considering the findings of this study, it can also be concluded that Quizlet fulfils most of the principles associated with the theory of Technology Acceptance Model (TAM), which was introduced by Davis (1989) and is now widely used by researchers to predict the use and acceptance of information technology by its users (Surendran, 2012). In TAM, there are two factors that influence users to accept or reject any information technology; perceived usefulness and perceived ease of use (Davis, 1989). Davis believed that these two factors are important in determining acceptance or rejection of any information technology. Perceived usefulness (PU) can be defined as the user's individual perception of the prospect that using a particular information technology will improve the user's job or life performance (Davis and Venkatesh, 2000). Perceived Ease of Use (PEOU), on the other hand, is "the degree to which a person believes that using a particular system will be effortless" (Davis, 1989, p. 214). In other words, the students in this study were willing to use Quizlet because they believed it would improve their performance and it was convenient for them to use. This has been confirmed in other studies (Baptist, 2018; Christanti, 2018; Dizon, 2016). However, for the first time in the literature to date, the current study found that Quizlet did not have some principles, namely the principle of 'real-world relevance', because the content of the sets sometimes consisted of isolated words. Since vocabulary is one of the most important aspects of a language, it is crucial to include more vocabulary practice in teaching-learning activities (Herrington et al., 2009).

Practical significance and implications

- Research implications (83 words)

The current study used a relatively small sample that was not representative of BM students in the UK, or even in London. Further research is needed to explore the impact of Quizlet on students' academic and professional development, particularly in the post-Covid-19 era. The current study was conducted in the UK, so the results cannot be generalised to other countries. Furthermore, a nation's culture and values shape diversity, so cross-cultural and comparative studies can also be undertaken by aspiring researchers in this field.

- Implications for practice (631 words)

Studies focusing on the use of Quizlet have been mainly exploratory. Its implementation in classroom practice has been described by several researchers (Ismailova et al., 2017; Wolff, 2016). However, there is a need for more papers discussing the effectiveness of Quizlet and its impact on students' attitudes, metacognitive skills and autonomy. The current project

implemented Quizlet as a learning tool in undergraduate education and found that learners were eager to use it, confirming previous research (Anjaniputra and Salsabila, 2018; Tran, 2018), especially when contrasted with analogue materials such as notebooks, pen-and-paper flashcards, or traditional textbooks (Dizon and Tang, 2017; Kalecky, 2016). However, it remains controversial whether this positive attitude easily translates into more frequent vocabulary revision (Tran, 2018).

The current study identified several additional challenges faced by students, such as a lack of suitable mobile devices on which to use Quizlet, reliable internet connectivity, and IT skills. In general, Quizlet is an easy-to-use vocabulary learning tool that can be accessed either on the web or via a mobile app. Its seven self-learning activities, which consist of a mix of multiple-choice or multiple-matching items, true/false exercises, flashcards, and recall tasks that require typing the correct answer, are examples of paired-associate vocabulary learning, which is considered valuable for the acquisition of meaning-form relationships (Elgort, 2011). Despite didactic reservations about such decontextualised lexical relations, paired-associate vocabulary learning has been shown to be an effective measure for increasing vocabulary size (Fitzpatrick et al., 2008). In this context, Fryer and Bovee (2016, 22) assert that '[such] drill-and-practice e-learning can be instrumental in ensuring that all students acquire and operationalise foundational knowledge'. Indeed, Quizlet's mix of seven different activities may prove to be a boon in this regard, as previous research has highlighted that mixed-modality instruction and "a wider range of learning options" can lead to better retention (Fryer et al., 2014, p. 32). This was also confirmed in the current study, which highlights that students were enthusiastic about the variety of activities offered, which were suitable for both group and individual work, and that they gradually developed their metacognitive skills, enabling them to develop their learning autonomy.

Students identified several benefits associated with using Quizlet. The first benefit is that students view Quizlet as a one-stop vocabulary learning application. Quizlet has different features and modes that really helped the students not only to learn the terms, but also to test themselves and practice their pronunciation (especially useful for international ESL students). The Flashcard feature introduced them to the terms and they could easily see the terms and definitions by just tapping their screen. The Learn, Write and Match features helped them to deepen their understanding of the terms and theories. Finally, the Test feature helped them to find out how much they understood what they had learned. From these two cycles of classroom action research, the researcher concluded that learning content through Quizlet was helpful for these undergraduate students. In addition, the use of technology made learning easier and more practical.

The current study highlighted some of the benefits and challenges of engaging learners in using Quizlet as a study tool to help them revise effectively for an exam. Overall, students felt that Quizlet was motivating, allowed for group collaboration, and created a strong game-like experience that allowed them to successfully revise for their exam, taking into account all the challenges that different students faced in terms of the theories and terms they needed to study. Quizlet was successfully used twice by all students, regardless of their background, allowing them to find answers to questions they had and to connect with their peers. This was an extremely positive experience, as 95% of the students involved asked to use it again, not only in relation to this module, but also in other modules and courses.

Discussion and further development (192 words)

AI is impacting education in a number of ways and this is expected to continue. AI has created educational tools that have attracted attention for their potential to improve the quality of education, enhance teaching and learning methods, and promote social justice and sustainable learning development. In the coming decades, AI will transform education. As today's students will work in an environment where AI is a reality, it makes sense for our academic institutions to expose learners to AI technology. Certainly, more research is needed before we can draw firm conclusions about the impact of this AI-based tool on students' academic performance and the development of their learning autonomy and meta-cognitive skills. However, we can say that Quizlet is a promising learning strategy that can be initiated by educators in higher education and further used by students who want to prepare for exams, especially when they have to revise large amounts of theories and terms. Finally, we need to highlight the fact that Quizlet promotes social justice by allowing students to work at their own pace, and sustainable learning development as students can use it during and after their sessions to improve their academic performance.

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