The relationship between M-learning and Self-regulated-learning in the context of vocational education

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Abstract

This article focuses on the link between mobile learning (M-learning) and self-management in the context of vocational education. It first discusses the importance of innovative technologies in vocational education that can improve the quality of higher education in the 21st century. The paper presents the results of a systematic mapping exercise carried out in the context of M-learning and the subsequent categorisation of innovative technologies. M-learning offers many benefits, but it is important to pay attention to potential risks such as overuse of technology and distraction. The paper emphasizes self-regulated learning and recommends the promotion of students' self-regulatory skills in M-learning environments. Recent research in the area of self-regulated learning of university students and blended learning versus traditional teaching offers interesting results and suggests that M-learning can be an effective tool both in terms of professional learning and for promoting self-regulation, but it requires communication, a systematic approach and collaboration between teachers and students.

Keywords: M-learning, Self-Regulated-Learning, Vocational Education, Innovative Educational Technologies

1 Introduction

Generation Z students who are growing up in the digital age are showing an increased level of autonomy in managing their own learning process. Almost unlimited access to online tools

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motivates them to take a more active and independent approach. The rapid development of digital technologies places demanding requirements on educators as they have to constantly adapt their teaching methods. Research shows that Generation Z learners make heavy use of digital technologies for academic purposes, favouring interactive and personalised forms of learning, which is what M-learning is. They are used to instant access to information and collaborative digital tools, online platforms and AI. Given these realities, it is essential to try to understand how Generation Z learners use digital technologies to support their development and how these technologies influence their learning strategies. (Firas Khairi, 2024)

The systematic use of innovative educational technologies by teachers to enhance professional learning is a current requirement and trend not only in higher education institutions. The more teaching methods and learning strategies a teacher has, the better he/she motivates students' cognitive activity, the more varied, interesting and effective he/she conducts lessons, promotes the solution of non-standard tasks and situations, encourages the continuous adoption of innovative technologies, practical activities and deep learning. A competitive professional constantly improves his/her didactic skills, develops innovative strategies, chooses new innovative technologies and teaching methods (Vinnyk, 2021).

Nowadays, hybrid forms of teaching, which combine traditional face-to-face teaching with e-learning and the use of modern digital technologies, are increasingly used in higher education. The implementation of technology in vocational education requires students to have an awareness of independent learning, such as exploring learning materials, participating in discussion forums, solving creative online tasks or tests. This blended learning is one of the innovative approaches to integrate digital technologies into vocational education to promote the development of higher cognitive functions, digital creativity and at the same time independent and self-directed learning of students. A prerequisite for success is sufficient preparation on the part of the teacher and sufficient learning materials that are made available to students.

The use of technology to support learning is flexible and stimulating for students as they learn skills such as spatial visualisation, innovative thinking, problem solving, analytical and critical thinking. (Criollo-C, S. et al., 2024)

2   Innovative Educational Technologies

Innovative educational technologies ensure the competitiveness of universities and lifelong learning institutions in the market of educational services and create all the conditions for improving the quality of education. Innovative educational technologies as a means of improving the quality of higher education are understood as modern technologies created on the basis of innovations and current trends.

According to Desiatov (Knysh, 2023), innovative educational technologies, especially distance learning technologies, require greater self-organization, allow to choose the rhythm of learning, provide students with the opportunity to carry out high-quality continuous independent work, provide opportunities for self-expression, and shape the information culture among students. Such technology improves the content of performing and completing practical tasks, systematizes materials, provides the opportunity to acquire knowledge in a professional field at any convenient time, and improves professional skills throughout life. Innovative technology contributes to students' mobilization of forces for interest during education; individual's professional orientation, the formation of education seekers' creativity; increases their motivation to work; orients students to form their own methods of activity.

Knysh (2023) identified the characteristics and needs of innovative educational technologies to improve higher education:

- optimality: the ability to achieve educational goals with the least expenditure of time, effort, and resources;
- modernity: continuous improvement of the content of the professional discipline, striving for innovation, reducing the gap between the latest achievements of production and science;
- scientificity: the implementation of a fully comprehensive analysis of the results of education on the basis of the latest professional achievements in the scientific field of knowledge;
- integrity: synthesis of interdisciplinary knowledge;
- optimality of the material and technical base of education;
- reproduction of the educational process and the results of the monitoring of the education sector;
- programme activities for university candidates and teachers;
- comprehensive use of didactic teaching aids and modern technical conveniences that enable the activation of professional activity in the academic environment;
- qualitative and quantitative monitoring of education and evaluation of learning outcomes.

In order to gain insights into the use of educational technology in education, a systematic mapping exercise was carried out between 2018 and 2022, which can increase knowledge about the state of research in this area. The search identified a number of related works, but only the most relevant ones were included in the mapping. The selection of papers included journal and conference articles, research reports, theses and book chapters. A keyword search string of three scientific databases (Scopus, Web of Science and IEEE Xplore) was used during the five-year systematic mapping (Criollo-C, S. et al., 2024).

Based on the results and within the five categories, a new classification of educational technologies was proposed to cover the largest number of digital technologies used in education. Table 1 shows the categories (A-E) defined for each type of educational technology. These technologies have been used in higher education and lifelong learning. Table 2, on the other hand, lists each educational technology and its categorization. (Criollo-C, S. et al., 2024)

Code	Category
A	Technologies that support adaptive learning
B	Technologies that support collaborative learning
C	Technologies in the service of pervasive learning
D	Technologies that support learning through games
E	Technologies for understanding and creating with devices and hardware

Table 1: Categories of educational technologies in education. (Criollo-C, S. et al., 2024)

Type of new technology	A	B	C	D	E
1 Artificial intelligence	X				
2 Augmented reality	X			X	X
3 Big data	X				
4 Blockchain	X				
5 Cloud computing	X	X	X		
6 Collaboration tools		X			
7 Gamification	X		X	X	
8 Hardware					X
9 Internet of Things					X
10 Learning management systems	X	X	X		
11 Machine learning	X	X			
12 M-LEARNING	**X**	**X**	**X**	**X**	**X**
13 Mooc's			X		
14 Podcasts, Vodcast, Screencast		X	X		
15 Social Networks		X	X		
16 Virtual Reality	X			X	X
17 Wikipedia		X	X		
18 World-Wide Web		X	X		

Table 2: Classification of new technologies in higher education. (Criollo-C, S. et al., 2024)

The results of the systematic mapping showed that M-learning was the most used educational technology, which was found in all five categories (A-E). Learning supported by mobile devices is a trend that is strongly applied in academic settings. Gamification, cloud computing, LMS,

AR and VR share the second place. These technologies are being used to support learning at all levels of education, from primary through higher education to lifelong learning. As technologies are constantly and rapidly changing, the findings and trends identified in this period (2018-2022) may have evolved or changed, and the information gathered may not be entirely relevant to the current state of ET in education (Criollo-C, S. et al., 2024).

The university of the future is a hybrid, flexible learning environment that should harmoniously combine tradition and innovation, effectively and rapidly adapting to trends and innovative changes. Video-learning, e-learning, artificial intelligence, gamification, social networks or virtual and augmented reality are relevant trends in innovative educational technologies for higher education. The introduction of innovative educational technologies, such as M-learning, into the educational process creates the necessary conditions for the attractiveness or flexibility of higher education (Vinnyk, 2021).

3   M-learning in vocational education

In the context of blended learning, the mobile form of M-learning, which is the process of learning through mobile devices such as tablets, laptops, smartphones or tablets, is increasingly being applied in universities. This form of learning takes place in an online environment and offers many advantages, including convenience, flexibility, efficiency, interactivity and portability.

When integrating M-learning into hybrid courses and professional learning, it is important to ensure:

- Coherence with face-to-face teaching. Mobile apps and platforms should support and complement the content of face-to-face classes.

- Interactive elements. Students should be able to actively engage in the learning process, e.g. through quizzes, discussions or simulations.

- Professional content. Mobile apps should provide high quality and up-to-date content that is relevant to the needs of the learners.

- Teacher support. Teachers should be prepared to support students in the use of mobile technologies.

The implementation of mobile technologies in the educational process brings fundamental changes in the way students learn. This form offers students a flexible and interactive way of learning that goes beyond the traditional classroom. M-learning offers a wide range of opportunities for the development of different competencies of students (Koldeova, 2023). The author lists the goals of M-learning in terms of the development of these competencies according to Wiepcke (2006, Koldeová 2023):

Development of professional competences. Mobile devices enable students to engage more actively in the learning process. Thanks to them, learners have a wealth of information at their disposal, which they can adapt to their individual needs and pace of learning. M-learning thus

promotes the development of independence, flexibility and the ability to use available resources effectively.

Development of personal competences. The use of mobile devices in education contributes to the development of students' personal competences. Students become responsible for their own learning, develop initiative and the ability to work independently. M-learning also supports the development of digital competences and critical thinking skills.

Development of methodological competences. Mobile technologies offer new opportunities for personalised and flexible learning. Students can create their own learning plans and pacing, allowing them to better understand the material and achieve better results. M-learning also supports the development of collaborative skills and the ability to work in teams.

Developing media competencies. M-learning contributes to the development of students' media literacy. Students learn to critically evaluate the information they receive from different sources and to use it responsibly. The implementation of mobile technologies also brings new opportunities for personalisation and streamlining of the educational process in language teaching. Mobile apps and platforms allow learners to practice language skills anytime, anywhere, use authentic materials, get instant feedback and interact with other learners.

The integration of M-learning in professional learning represents a promising avenue, especially due to its advantages, as described by Kolde (2015).

Advantage	Description
Flexibility	Students can learn anytime, anywhere, allowing them to tailor their learning to their lifestyle and individual needs.
Personalisation	Learning content and pace can be tailored to each student's individual needs, increasing the effectiveness of learning.
Interactivity	M-learning offers a wide range of interactive tools such as games, quizzes, simulations and more to increase student engagement and motivation.
Authenticity	Students have access to authentic materials such as videos, articles, allowing them to immerse themselves in the target language and culture.
Collaborative	M-learning encourages collaboration between students through online forums, chats and collaborative projects, which develops their communication and social skills.
Immediate feedback	Mobile apps provide instant feedback, allowing students to quickly identify and correct their mistakes.
Accessibility	M-learning makes learning materials and tools accessible to a wide range of learners, regardless of their geographic location or economic means.
Motivation	The interactive nature of m-learning and the ability to track one's own progress increase student motivation.

Table 3: Advantages of M-learning in professional learning.

However, despite all these advantages, we now see that M-Learning can present challenges. Excessive use of mobile devices can lead to an addiction known as Fear of Missing Out (FOMO), which can cause sleep problems, dizziness and distractibility, and difficulty concentrating. Educators should promote a balanced approach that helps students achieve work-life balance, Joy of Missing Out (JOMO), and improves students' overall well-being. Collaboration and communication are key. It helps students using mobile devices access a variety of online resources and the ability to connect with others, fostering a sense of community and knowledge sharing.

The implementation of M-learning in professional learning can make a significant contribution to the development of key 21st century competencies such as digital competence, critical thinking, creativity and collaboration. Equally, its flexibility, personalisation and interactivity make it destined to become an integral part of innovative vocational education.

4   Self-Regulated Learning (SRL)

Since M-learning contributes mainly to increasing motivation and interest in learning, which are essential aspects of self-regulation and meta-learning, it is important to address this topic from the perspective of self-regulated learning. Self-Regulated Learning - SRL is understood as learner-centred learning in which the learner is aware of and manages his/her own learning, controls his/her thought processes and incoming stimuli, also distinguishes incoming information, understands the meaning and purpose of learning and becomes responsible for it. (Zelina, 2021)

The distance between the student and the teacher allows the student autonomy in self-learning and the chance to significantly improve the organization and mastery of independent work, giving him the space for his time management and regulation of priorities, obtaining and evaluating information, controlling his own results, taking responsibility for his own learning, realizing the meaning and reason for learning itself, and above all, the interest in achieving predetermined results.

In terms of building self-management (self-regulation) of learning, Zelina (2018) lists the following six areas of control and skills. Each of these areas focuses on a different aspect of the learning process and allows learners to actively manage their learning:

- Attentional control: the ability to focus on the learning and resist external distractions.

- Decoding control: The ability to evaluate information, filter out what is essential and resist manipulation.

- Emotional Control: The ability to manage one's emotions while learning, maintain a positive attitude, and communicate effectively.

- Motivational Control: The ability to set goals, maintain motivation and cope with obstacles.

- Environmental Control: The ability to create an appropriate learning environment and eliminate distractions.

- Cognitive control: The ability to manage one's thought processes, become aware of one's learning strategies and reflect on them.

In the context of the use of digital technologies and the Internet, we consider attention control to be a particularly important area, which is literally "bombarded" by a barrage of constantly, easily and quickly available information, and requires constant control of our attention, where, when and to what extent we give our attention. Another important area of control in relation to the use of the Internet is decoding control, which we believe relates to the ability to think critically and independently, to judge, to evaluate what is essential and relevant to us. In the context of environmental control, which focuses on distracting elements, the related impairment of concentration, the tendency to procrastinate, etc., we see the use of technology as a means of regulating learning and leisure activities, so-called time-management, i.e. regulating or managing one's own time, planning and scheduling time effectively and positively (apps for planning, calendars, quick and effective communication, reminders for regular and irregular learning tasks, getting and handing in one's results and work quickly, etc.). It is important to what extent and for what purposes the technologies will be used because, if used incorrectly, they can, on the contrary, become a distraction to learning.

We consider the research carried out in university settings in Chile in the areas of Self-Regulated Learning (SRL), Blended Learning (BL) and Traditional Teaching (TL) to be fundamental for the academic development of students, as well as for the development of current educational methods. This research focused on conceptualizing self-regulated learning with a blended learning modality using direct perceptions of students completing an undergraduate degree. Students defined the SRL-BL relationship with respect to the same three phases of SRL: planning, implementation, and evaluation.

Students' emphasis on planning and autonomy, along with a limited focus on implementation and evaluation, indicated that they perceived SRL-BL as primarily a preparatory and organizational process. The authors recommend that educators focus more on improving students' reflective techniques and self-assessment skills to promote a more comprehensive understanding of SRL-BL that includes all phases of the self-regulation cycle (Lobos et al., 2024).

The emphasis on the integration of personal and academic life suggests that students perceive self-regulation as a holistic process. It is not just about achieving academic goals, but about

building a lifestyle that supports their overall development. This perspective, according to the authors, indicates a mature understanding of self-regulation, where learning is part of a broader context of personal growth. This analysis shows that students perceive self-regulation in the context of BL as a multifaceted process that requires skills in emotions, digital technologies, and distraction management. Furthermore, they emphasize the importance of aligning personal and academic lives as an integral part of their learning experience.

The study conceptualized the relationship between self-regulated learning and blended learning (SRL-BL) as a process in which students systematize, monitor, and evaluate their learning through self-reflection and digital technologies, with a particular emphasis on planning. Significant differences were identified between SRL-BL and traditional SRL; in face-to-face learning, teacher supervision is greater, while in SRL-BL, students take on more responsibility and autonomy, thus developing self-management skills. In face-to-face learning, the responsibility for learning lies with the teacher, while in the BL context, the responsibility shifts to the student, making self-regulation skills more critical. Although SRL-BL promotes autonomy and responsibility, students face obstacles such as distractions from social media and leisure technologies that affect their concentration and study planning. (Lobos et al., 2024)

In M-learning, according to the authors, it is important to emphasize a structured and distraction-free learning environment for successful self-regulation. The presence of multiple sources of distraction in a virtual environment challenges students to develop effective strategies to maintain concentration and adhere to study plans. The need for additional effort to manage distractions suggests that students need to be more conscious and purposeful in applying self-regulation strategies in the context of BL. This includes setting clear boundaries for the use of leisure technology and social networks, as well as creating an organized study environment that minimizes distractions. We agree with the authors that distractions pose a significant threat to self-regulated learning, requiring students to make conscious efforts to focus and adhere to their study plans. Promoting self-regulation skills that specifically address these distractions can increase learning effectiveness and help students face the unique challenges of today's digital world. (Lobos et al., 2024)

5 Conclusion

M-learning appears to be a promising tool on the path to modernizing higher education. Its flexibility, personalization, portability, and interactivity predispose it to become an integral part of hybrid courses and blended learning. However, the implementation of M-learning requires thorough and systematic preparation and support from teachers and institutions, as well as a discussion of the challenges it brings.

Higher education teachers should not only offer students opportunities to discover the usefulness of digital technologies and support their integration into the learning process itself, but also support students' self-regulation in learning. One of the tasks of the teacher is to

strive to create a learning environment that supports independent and self-regulated learning, in which students have the opportunity to seek challenges, reflect on their progress, and take responsibility for their learning. In the context of M-learning, the student takes a large part of the control over learning and the learning environment. We consider it all the more important to explore and discuss how to guide students to acquire self-regulation techniques and the above-mentioned skills within the six areas of self-regulation control. Current research on the impact of technology on students' concentration and focus also suggests the need to update and systematize the concept of self-regulated learning (SRL) in the current educational context influenced by technological progress.

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