



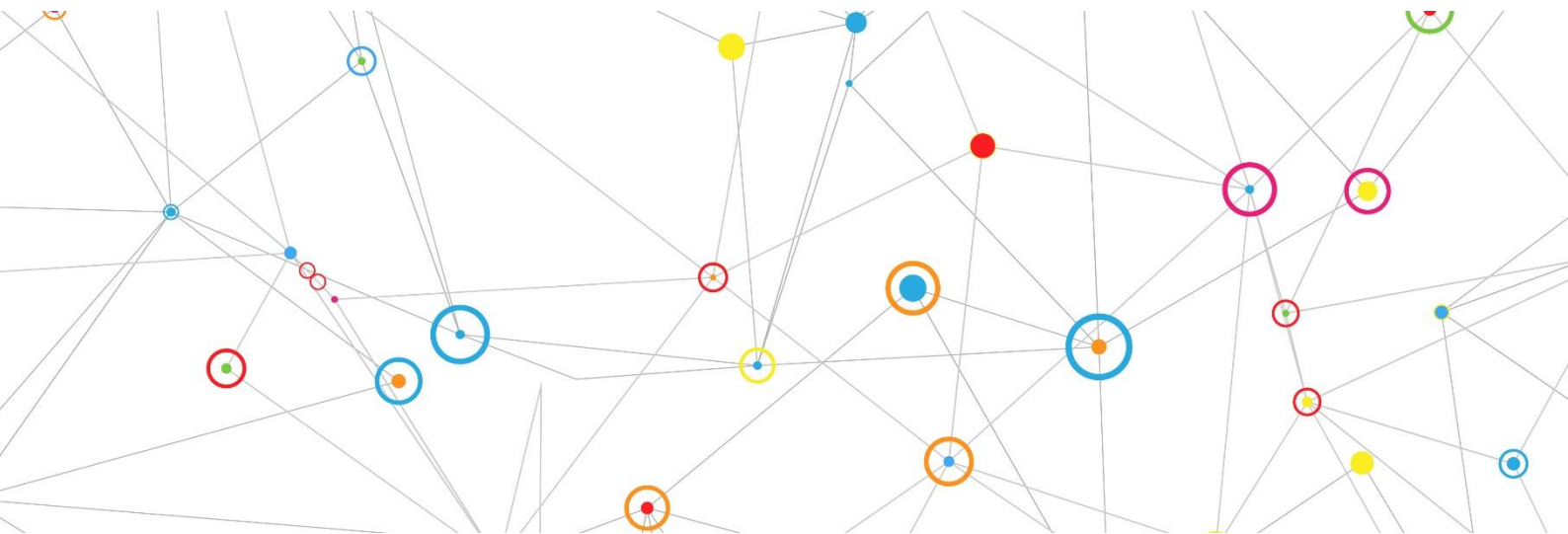
*INNOVATION, TECHNOLOGIES, EDUCATION ET COMMUNICATION*

N° 8



# **USAGE DES PLATEFORMES D'APPRENTISSAGE DES LANGUES EN CONTEXTE UNIVERSITAIRE**

**Coordonneurs :  
Toufik AZZIMANI  
Mohamed BOUKARE  
Nour-eddine ER-RADI**



**ISSN Numérique : 2737-8195**

**Mars 2025**

# Overcoming Barriers and Ensuring Accessibility and Inclusion with Technology in Moroccan Higher Education

Abdellatif Belkadi<sup>1</sup>, Amal Zerouali<sup>2</sup>, Khaoula Atmani<sup>3</sup>

1. *Associate Professor: Laboratory of Legal, Political, and Human Sciences, Criminology and Digital Transformation  
Faculty of Legal and Political Sciences Settat.*
2. *Ph.D Student: Creativity Education Digital Usage and Communication Laboratory  
CEDUC Faculty of Letters and Human Sciences Oujda*
3. *Ph.D Student: Creativity Education Digital Usage and Communication Laboratory  
CEDUC Faculty of Letters and Human Sciences Oujda*

## Abstract:

This study examines the factors influencing Moroccan university students' acceptance and use of Moodle and Rosetta Stone for language learning, drawing on the Technology Acceptance Model (TAM) and Ertmer's framework. A survey was conducted to assess students' experiences with these platforms.

The findings indicate that while students acknowledge the benefits of these tools, engagement is hindered by inadequate ICT infrastructure, limited technology access, and insufficient technical support. Additionally, resistance to change and a lack of confidence in using digital platforms further impede adoption.

To enhance ICT integration in education, universities should prioritize technical support and training, improve infrastructure, foster positive attitudes toward technology, and ensure learning platforms align with students' needs. Addressing these barriers will lead to better engagement, improved language acquisition, and greater proficiency in utilizing digital tools for learning.

**Keywords:** Technology Acceptance Model (TAM), ICT Integration, Language Learning, Student Engagement. Rosetta Stone.

## Introduction

Integrating Information and Communication Technology (ICT) tools into education is increasingly important, as learning platforms enhance learner-centered approaches, active learning, and communicative competence (Bingimlas, 2009; Davis, 1989; Ertner, 1999; Ertner et al., 2012; Rodríguez et al., 2012; Scherer et al., 2019). However, despite their potential, effectively implementing these tools remains challenging. Gaining insights into these obstacles from students' perspectives is essential to optimize learning outcomes and ensure successful ICT adoption in education.

This study investigates the factors influencing Moroccan university students' acceptance and use of Rosetta Stone and Moodle as language-learning tools. It focuses on both extrinsic and intrinsic barriers that hinder their effective utilization. Extrinsic barriers, such as limited access to technology, inadequate ICT infrastructure, and insufficient technical support, are examined alongside intrinsic barriers, including students' attitudes, self-efficacy, and motivation. Additionally, the study explores how students' perceptions of the usefulness and ease of use of these platforms shape their acceptance and engagement.

To achieve these objectives, the study employs a dual-framework approach, integrating the Technology Acceptance Model (TAM) and Ertmer's (1999) conceptual framework on first-

order and second-order barriers. TAM provides a foundation for understanding how perceived usefulness and ease of use influence students' acceptance of technology, while Ertmer's framework offers insights into the external and internal barriers that impede ICT integration. By combining these frameworks, the study aims to provide a comprehensive understanding of the challenges and facilitators of ICT adoption in Moroccan higher education.

The study addresses the following research questions:

- (i) What factors influence Moroccan university students' acceptance and use of Rosetta Stone and Moodle as language-learning tools?
- (ii) What first-order (external) barriers do students encounter when using Rosetta Stone and Moodle?
- (iii) What second-order (internal) barriers do students experience with these platforms?
- (iv) How do perceived ease of use and usefulness impact students' engagement with Rosetta Stone and Moodle?

Based on these questions, the study tests the following hypotheses:

H1: Students' perceived usefulness of Rosetta Stone and Moodle correlates with their acceptance and use of these platforms.

H2: First-order barriers (e.g., lack of technical access and support) significantly affect students' usage of Rosetta Stone and Moodle.

H3: Second-order barriers (e.g., attitudes or self-efficacy) significantly reduce students' engagement with Rosetta Stone and Moodle.

H4: Perceived ease of use positively impacts students' engagement with Rosetta Stone and Moodle.

By addressing these questions and hypotheses, the study aims to provide actionable recommendations for improving the integration of ICT platforms in Moroccan higher education. These recommendations will focus on enhancing infrastructure, providing adequate training and technical support, fostering positive attitudes toward technology, and aligning platforms with user needs. Ultimately, the study seeks to contribute to more effective language acquisition and the broader adoption of technology in educational contexts, ensuring that students can fully benefit from the opportunities offered by ICT tools like Moodle and Rosetta Stone.

## **1. Literature review**

### **1.2 ICT in education**

Researchers have provided multiple definitions and descriptions of ICT in education. Ghavifekr et al. (2013) describe ICT tools as *“common technology-based tools that are used in schools such as computers, laptops, LCDs, digital photocopy machines, digital audio and video devices, digital cameras, scanners, DVD players and multimedia projectors”* (p. 39). This concept emphasizes the physical components and equipment of Information and Communication Technology (ICT).

Expanding on this, Khan et al. (2012) provide a more comprehensive definition, stating that ICT in education includes *“computers, the Internet, broadcasting technologies (radio and television), and telephony that can facilitate not only delivery of instruction but also learning processes itself”* (p. 67). This definition encompasses both hardware and communication technologies. Davis (1989) further highlights that ease of use plays a fundamental role in the

adoption of ICT in educational settings, with user-friendly platforms being more likely to be integrated into teaching and learning processes.

It is crucial to consider the significance and possibilities of ICT in education. Ghavifekr et al. assert that “*ICT in education has the potential to transform teaching*” (p. 38). Similarly, Khan et al. observe that “*technologies allow students to work more productively than in the past*” (p. 61). Further supporting this perspective, Venkatesh et al. (2003) emphasize that perceived usefulness is a critical determinant of technology adoption, meaning that when students and teachers see clear benefits, they are more likely to integrate ICT into their learning environments.

Khan et al. (2012) further highlight that ICT can support education in multiple ways, including “*supporting education in schools, providing non-formal education for out-of-school children and adults, supporting pre-service distance education of teachers and their in-service professional development, and enhancing the management of schools*” (p. 62). Moreover, Al-Emran et al. (2020) argue that if users do not see tangible benefits or if the platforms fail to meet their expectations, adoption rates may remain low.

Building on these definitions and descriptions, we can synthesize a more comprehensive definition of ICT in education: ICT encompasses a wide range of technological tools and resources that are utilized for the transmission, storage, creation, sharing, and exchange of information. This inclusive definition incorporates physical devices (such as PCs, tablets, and smartphones) and programs (including online resources and communication services). In this sense, language-teaching platforms like Rosetta Stone are prominent examples of ICT. As emphasized by Teo (2019), educational technology must be designed to enhance learning experiences while also being accessible and adaptable for different user needs.

---

## **1.2 Barriers to technology integration**

Despite the potential advantages, the effective integration of language platforms in educational environments encounters various obstacles. According to Khan et al., (2012), this understanding is crucial for enhancing the integration of computers and other technological tools in education. It is important to comprehend the obstacles to teaching methods, psychology, and cognitive processes that hinder the effective use of information technology. Selwyn (2016) emphasizes that ICT adoption is frequently hindered by infrastructure challenges, such as poor internet connectivity and lack of access to devices. Ertmer et al. (2012) also identify training gaps for both teachers and students as critical barriers, while Scherer et al. (2019) highlight resistance to change as a significant factor limiting the use of new educational technologies.

These hurdles are diverse and intricate, encompassing a wide range of challenges, including constraints in infrastructure, individual attitudes, and institutional problems. To successfully tackle these difficulties, it is imperative to recognize and classify them into first-order (external) and second-order (internal) barriers (Bingimlas, 2009; Tawfik et al., 2021; Burns, 2021).

### **1.2.1 First-Order barriers to ICT integration**

First-order barriers refer to external factors that impede the successful integration of ICT in educational settings (Bell & Barr, 2023; Burns, 2021; Durff & Carter, 2019; Ertmer,

1999; Makki et al., 2018; Tawfik et al., 2021). These barriers include limited access to technology, insufficient planning time, inadequate technical support, and financial constraints (Burns, 2021, p.48).

One of the most significant first-order barriers is the lack of adequate ICT infrastructure. Khan et al. (2012) emphasize that *“the development of ICT infrastructure in a country depends on the availability of a reliable electricity supply”* (p. 68). Similarly, Selwyn (2016) stresses that poor internet connectivity and inadequate access to devices severely limit ICT implementation in many educational contexts.

Financial constraints also pose a major challenge. Afshari, Bakar, Su-Luan, et al. (2009) argue that efficient and effective use of technology depends on the availability of hardware, software, and equitable access to resources by teachers, students, and administrators (Khan et al., 2012, p. 68). Pelgrume (2001) found that in 26 countries, four of the top ten barriers to ICT adoption were related to the accessibility of resources.

Technical support plays a critical role in overcoming first-order barriers. Snoeyink and Ertmer (2001) identified that without proper maintenance, troubleshooting, and training, teachers may struggle to integrate ICT into their classrooms (Khan et al., 2012, p. 67). Al-Rahmi et al. (2021) highlight that providing adequate technical support and training can reduce user frustration and improve satisfaction, thereby increasing ICT adoption rates.

### **1.2.2 Second-Order barriers to ICT integration**

Second-order barriers are internal factors that affect teachers' attitudes, beliefs, and pedagogical knowledge (Ertmer, 1999, p. 51). They refer to internal factors that relate to teachers' attitudes towards teaching and learning in the first place, and they may prevent the effective integration of ICT in educational settings. (Bell & Barr, 2023; Burns, 2021; Durff & Carter, 2019; Makki et al., 2018; Tawfik et al., 2021). According to Teo et al. (2017), teachers' willingness to use technology is significantly influenced by perceived usefulness and ease of use (Druff & Carter, 2019, p. 248). However, Durff (2019) notes that even when teachers believe technology is beneficial, their attitudes can still act as barriers to integration (p. 248).

Teachers' knowledge and skills form another critical aspect of second-order barriers. Khan et al. (2012) cite multiple studies like Mamun & Tapan, 2009 Pelgrum, 2001 Ihmeideh, 2009 Williams, 1995, highlighting that a lack of knowledge about ICT use is a major hindrance to technology integration in both developed and developing countries (p. 72). In the same vein, Abedi and Ackah-Jnr (2023) suggest that *“lack of technology professional development and training, which results in teachers having insufficient technical and pedagogical knowledge, is a common barrier affecting teachers' ability and confidence to integrate technology in Ghana's classrooms effectively”* (p. 148). Furthermore, Khan et al. (2012) note that insufficient skills in ICT tools and software have limited the use of technology in teaching and learning situations in countries like Bangladesh (p. 72). Abedi and Ackah-Jnr (2023) add that *“if students are unfamiliar with the technological tools used in instruction, teaching with them becomes difficult because students struggle to comprehend what is taught using such tools”* (p.157)

Pedagogical factors, particularly understanding how to integrate technology into instruction, are implied throughout Khan et al. (2012) as a prominent barrier. According to Goodyear 2014, *“pedagogical barriers were tied to folk beliefs about teaching”* (cited in Durff

and Carter, 2019, p. 249). These “*beliefs about teaching and learning [which] are formed through experiences as students, siblings, and parents [...] shape how teachers teach*” (Duff & Carter, 2019, p. 249). This suggests that merely having technical knowledge is insufficient; teachers must also understand how to incorporate technology into their teaching practices effectively.

Additionally, school-level and systemic barriers contribute significantly to the challenges of ICT integration. Systemic barriers refer to “*the school culture [which] includes the students, teachers, staff, administrators, and the school board*” (Duff & Carter, 2019, p. 248). As mentioned by Keengwe, Onchwari et al., 2008 (cited in Khan et al. 2012, p. 68), organizational culture can either facilitate or hinder technology adoption. The lack of vision and planning at an institutional level is another crucial barrier. Khan et al. (2012) stress the need for proper plans, policies, execution, and monitoring for effective ICT implementation (p. 69). They also highlight the importance of school-level ICT plans (p. 69).

Accordingly, successfully integrating ICT into education is a complex process that requires addressing many barriers. These obstacles span from tangible, resource-related issues, such as a lack of infrastructure and funding, to intangible factors, like teacher attitudes, skills, and organizational culture. The interplay between first-order and second-order barriers highlights the need for a holistic approach to ICT integration beyond merely providing technology resources. More concretely, overcoming these barriers requires concerted efforts at multiple levels, from policymakers and school administrators to individual teachers. It involves investment in infrastructure and resources, comprehensive professional development programs, supportive school cultures, and policies that facilitate ICT integration.

By understanding and systematically addressing both first-order and second-order barriers, educators and policymakers can foster more effective ICT integration. Future research should explore targeted strategies such as improving ICT infrastructure, providing comprehensive teacher training, and fostering a culture of technological adaptability (Teo, 2019; Al-Rahmi et al., 2021).

## **2. Conceptual framework**

### **2.1. Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM), developed by Davis (1989), serves as a foundational framework for understanding students' perceptions of the utility and usability of educational technologies such as Moodle and Rosetta Stone. TAM posits that two key factors—perceived usefulness and perceived ease of use—significantly influence users' acceptance and adoption of technology. Perceived usefulness refers to the extent to which students believe that using these platforms will enhance their learning efficiency and outcomes. Perceived ease of use, on the other hand, refers to the degree to which students find these technologies simple and user-friendly, which directly impacts their willingness to engage with them. Together, these constructs play a pivotal role in determining the likelihood of students adopting and effectively utilizing ICT platforms in their learning processes.

TAM has been widely applied in educational research to explore technology adoption. For instance, Teo (2019) utilized TAM to investigate the factors influencing pre-service teachers' acceptance of technology, emphasizing the importance of perceived usefulness and ease of use in shaping their intentions to use digital tools. Similarly, Al-Rahmi et al. (2021) applied TAM to examine students' acceptance of learning management systems (LMS), finding that both constructs significantly predicted students' behavioral intentions to use LMS platforms. These

studies underscore the relevance of TAM in understanding technology adoption in educational contexts.

However, TAM has also faced criticism for its simplicity and limited scope. Venkatesh & Bala (2008) argue that TAM does not account for external variables, such as social influence or facilitating conditions, which can significantly impact technology adoption. To address these limitations, Venkatesh et al. (2003) proposed the Unified Theory of Acceptance and Use of Technology (UTAUT), which integrates additional constructs such as social influence, facilitating conditions, and effort expectancy. Despite these criticisms, TAM remains a valuable framework for examining the core factors influencing technology acceptance, particularly in educational settings.

## **2.2. Ertmer's framework for ICT integration**

Ertmer's (1999) framework complements TAM by providing a structured approach to understanding the barriers to ICT integration in education. Ertmer categorizes these barriers into two types: first-order barriers (external) and second-order barriers (internal). First-order barriers include tangible, external obstacles such as limited access to technology, insufficient time for planning and implementation, and inadequate technical and administrative support. These barriers are often immediate and visible, directly hindering the effective use of platforms like Moodle and Rosetta Stone.

Second-order barriers, on the other hand, are internal and deeply ingrained in users' attitudes, beliefs, and perceptions about technology's role in education. These barriers include resistance to change, lack of confidence in using technology, and insufficient pedagogical knowledge to integrate ICT effectively. Ertmer (1999) emphasizes that addressing first-order barriers alone is insufficient; second-order barriers must also be tackled to achieve meaningful ICT integration. For example, even if schools provide adequate resources and training, teachers may still resist using technology if they perceive it as irrelevant to their teaching practices or if they lack confidence in their ability to use it effectively.

The interplay between first-order and second-order barriers is complex. Resolving first-order barriers, such as providing access to technology and technical support, may reveal or exacerbate second-order barriers, such as teachers' resistance to change or lack of pedagogical knowledge. This dynamic highlights the need for a holistic approach to ICT integration that addresses both external and internal barriers.

## **2.3. Integrating TAM and Ertmer's framework**

This study integrates TAM and Ertmer's framework to provide a comprehensive understanding of the factors influencing the adoption and effective use of Moodle and Rosetta Stone in Moroccan higher education. By combining TAM's focus on perceived usefulness and ease of use with Ertmer's emphasis on first-order and second-order barriers, the study aims to identify both the facilitators and obstacles to technology integration.

For instance, while TAM helps explain students' willingness to adopt these platforms based on their perceived benefits and usability, Ertmer's framework sheds light on the external and internal barriers that may hinder their effective use. This dual-framework approach enables a nuanced analysis of the challenges faced by students, offering insights into how these platforms can be optimized to enhance foreign language learning in Morocco.

## **2.4. Critiques and extensions of TAM in educational research**

While TAM provides a robust foundation for understanding technology acceptance, its application in educational research has revealed several limitations. For example, Scherer et al. (2019) argue that TAM does not adequately account for the role of social and cultural factors in shaping technology adoption. In collectivist cultures, such as Morocco, social influence and peer pressure may play a significant role in determining students' acceptance of educational

technologies. Similarly, Sánchez-Prieto et al. (2020) highlight the importance of considering students' prior experiences with technology, as these experiences can shape their perceptions of usefulness and ease of use.

To address these limitations, researchers have proposed extensions to TAM. For instance, Teo (2019) introduced the concept of perceived enjoyment, which captures the extent to which students find using technology enjoyable and engaging. This construct has been shown to significantly influence students' intentions to use educational technologies, particularly in contexts where technology is used to support active and collaborative learning. Similarly, Al-Rahmi et al. (2021) emphasize the role of facilitating conditions, such as institutional support and access to resources, in shaping students' acceptance of technology.

By incorporating these extensions, this study aims to provide a more comprehensive understanding of the factors influencing the adoption and use of Moodle and Rosetta Stone in Moroccan higher education. This approach not only enhances the explanatory power of TAM but also aligns with Ertmer's framework by addressing both external and internal barriers to ICT integration.

The integration of TAM and Ertmer's framework provides a robust conceptual foundation for this study. By examining both the perceived usefulness and ease of use of Moodle and Rosetta Stone, as well as the external and internal barriers to their adoption, the study aims to identify strategies for enhancing the effective use of these platforms in Moroccan higher education. This dual-framework approach enables a thorough analysis of the challenges faced by students, offering valuable insights into how these platforms can be optimized to support foreign language learning. Furthermore, by incorporating critiques and extensions of TAM, the study addresses the limitations of the original model and provides a more nuanced understanding of technology acceptance in educational contexts.

### **3. Methodology:**

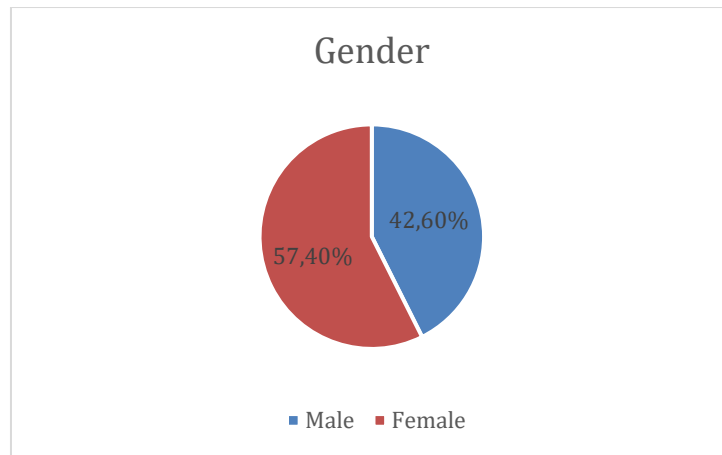
This research aimed to understand and identify the challenges facing the implementation of ICTs in public education in Moroccan universities. A survey-based approach was employed, targeting higher education students from various universities in Morocco. The focus was specifically on students expected to spend a significant portion of their study time using platforms such as Rosetta Stone or Moodle. Teachers and education managers were excluded from the study, as the research focused on barriers related to students.

#### **3.1. Sampling:**

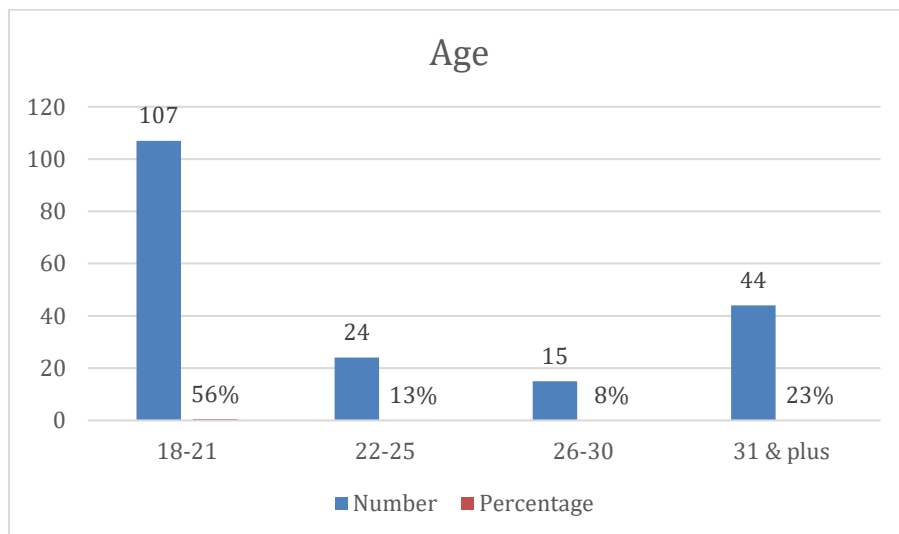
A random sampling technique was used to cover 190 students from 8 different universities in Morocco. Table 1 describes the demographic characteristics of the participants. The predominant age range is 18 to 21 (56%), with a prevalence of students aged 19. This means that most of the students are in the first semester. It is worth mentioning that the survey covers all ages since there are students of all ages, from 18 to 60.

The table also illustrates the distribution of participants in terms of study level and gender. 57,4% are female, whereas 42,6% are male. Concerning studies level, most respondents (73%) pertain to "Licence Fundamental," meaning they are bachelor students.





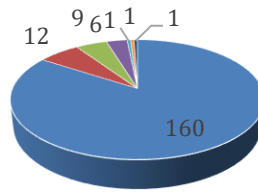
*Chart 1: Respondents' distribution in terms of gender*



*Chart 2: Respondents' distribution in terms of age, gender*

The survey targeted various universities to provide a diverse perspective on the challenges faced in implementing teaching platforms in their educational experiences. However, as illustrated in Table 2, most participants (84,2%) belong to Hassan—1<sup>er</sup> in Settati.

### Respondants According to their Universities



- Hassan 1st Settlat
- Cadi Ayad Marrakech
- Mohammed 1er Oujda
- Hassan II Casablanca
- Mohammed V Rabat
- Moulay Ismail Meknes
- Moulay Slimane Beni-Mellal

Chart 3: Distribution of respondents in terms of universities of study

University	Number	%
Hassan- 1 <sup>er</sup> , Settlat	160	84,2%
Kadi Ayad, Marrakech	12	6,3%
Mohammed Ier, Oujda	9	4,7%
Hassan II, Casablanca	6	3,2%
Mohammed-V, Rabat	1	0,5%
Moulay-Ismaïl, Meknes	1	0,5%
Sultan Moulay Slimane, Beni Mellal	1	0,5%

Table 1: Distribution of respondents in terms of universities of study

In an attempt to verify the accessibility of digital tools and internet connection in addition to previous training in how to deal with teaching platforms: Moodle and Rosetta Stone. Table 2 shows that 90,5% own a digital communication device, meaning that 9,5% of students cannot access the device. Additionally, not all students have access to the internet. 77,4% do. Furthermore, 74,9% report that the card they have received from the university does not ensure connection. Finally, 52,1% have received Moodle and Rosetta Stone training.

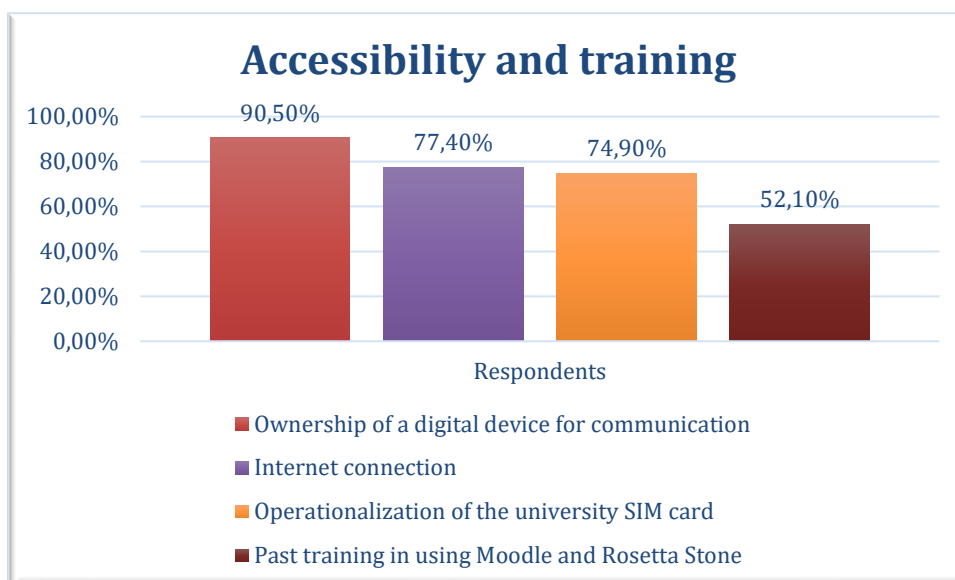


Table 2: Responses regarding accessibility of tools, internet connection, and previous training about Moodle and Rosetta S

This survey-based methodology allowed the researchers to gather empirical data directly from the target population, the students, to gain a deeper understanding of the barriers and challenges they face in adopting and implementing ICT-based learning environments in Moroccan public universities.

### 3.2.Results

#### 3.2.1. Validity

The validity statistics presented in Table 4 highlight the strong psychometric properties of the measurement scales employed in this study. The Cronbach's alpha values for the constructs of utility, ease of use, and barriers to ICT all surpass the recommended threshold of 0.70, demonstrating excellent internal consistency reliability. Specifically, the utility-scale achieved a Cronbach's alpha of 0.938 across six items, the ease-of-use scale yielded an alpha of 0.943 for six items, and the barriers to ICT scale recorded an alpha of 0.909 for five items. These high alpha values underscore the reliability and validity of the measured constructs, indicating that the survey instrument effectively captures the key dimensions associated with the adoption and use of educational technology platforms. The robust psychometric properties of the scales enhance the credibility of the findings and affirm the suitability of this instrument for use in similar research contexts.

	Cronbach's	N. elements
<b>Utility</b>	,938	6
<b>Ease of use</b>	,943	6
<b>Barriers to ICT</b>	,909	5

Table 3: Validity statistics related to utility, ease of use, and barriers to ICT

#### 3.2.2. Utility

Table 4 presents descriptive statistics for a series of items assessing perceptions regarding the utility of Moodle and Rosetta Stone as learning platforms. With a sample size of

190 respondents, the data includes each item's minimum, maximum, mean, and standard deviation. Overall, the mean scores for the items range from 2.95 to 3.19, reflecting a general tendency toward neutral to slightly positive perceptions among respondents. For instance, the statement “Using Moodle or Rosetta Stone for learning would allow me to complete tasks more quickly” yielded a mean score of 2.95, indicating that, on average, respondents expressed neither strong agreement nor disagreement with this assertion. Conversely, the item with the highest mean score of 3.19, “I would find Moodle or Rosetta Stone useful for learning,” suggests a marginally more favorable view regarding the overall utility of these platforms. The standard deviations, which range from 1.331 to 1.454, indicate a moderate level of variability in responses, suggesting a diverse range of opinions among respondents concerning different aspects of utility.

The descriptive statistics reveal that students perceive Moodle and Rosetta Stone as moderately useful for enhancing learning performance, productivity, and efficiency. For example, the statement “Using Moodle or Rosetta Stone would improve my learning performance” has a mean score of 3.16, while “I would find Moodle or Rosetta Stone useful for learning” has a mean score of 3.19. These scores suggest that while students recognize the potential benefits of these platforms, their perceptions are not overwhelmingly positive. The moderate mean scores indicate that there is room for improvement in how these platforms are designed, implemented, or communicated to users to increase their perceived usefulness. Recent studies emphasize that perceived usefulness is a critical determinant of technology adoption in education (Venkatesh et al., 2003). Platforms that demonstrate their ability to improve learning outcomes are more likely to be adopted by users. However, if users do not see tangible benefits or if the platforms fail to meet their expectations, adoption rates may remain low (Al-Emran et al., 2020). The moderate perceived usefulness observed in this study aligns with findings from other research, which highlight the importance of addressing user needs and ensuring that educational technologies deliver measurable improvements in learning experiences.

	N	Min	Max	Mean	ST
Using Moodle or Rosetta Stone for learning would allow me to complete tasks more quickly	190	1	5	2,95	1,356
Using Moodle or Rosetta Stone would improve my learning performance.	190	1	5	3,16	1,331
Using Moodle or Rosetta Stone for learning would increase my productivity.	190	1	5	3,02	1,454
Using Moodle or Rosetta Stone would improve my learning efficiency.	190	1	5	3,18	1,370
Using Moodle or Rosetta Stone would make learning easier.	190	1	5	3,14	1,392
I would find Moodle or Rosetta Stone useful for learning.	190	1	5	3,19	1,382

*Table 4: Students' responses related to the utility of Moodle and Rosetta Stone*

The descriptive statistics from Table 4 provide valuable insights into the central tendencies and variations in perceptions of Moodle and Rosetta Stone as educational tools. While students generally view these platforms as somewhat useful, the moderate mean scores and variability in responses suggest that there is significant potential for enhancing their design and implementation to better meet user expectations. These findings contribute to the broader

discourse on the adoption and use of educational technology and underscore the importance of aligning technological tools with the needs and preferences of learners. Future research could explore specific strategies for improving the perceived usefulness of these platforms, such as incorporating user feedback, enhancing usability, and demonstrating clear benefits to learning outcomes.

### 3.2.3. Ease of use

Ease of use is a significant predictor of technology adoption, as emphasized by Davis (1989), with platforms that are intuitive and require minimal training being more likely to be adopted. Recent research further underscores the importance of user-centered design in educational technologies to reduce cognitive load and improve usability (Sánchez-Prieto et al., 2020). In this context, Table 5 presents descriptive statistics for a set of items measuring students' perceptions regarding the ease of use of the Rosetta Stone.

	N	Min	Max	Mean	ST
Learning to use Rosetta Stone would be easy for me.	190	1	5	3,09	1,439
I would find it easy to make Rosetta Stone do what I want.	190	1	5	2,90	1,344
My interaction with Rosetta Stone would be clear and understandable.	190	1	5	3,08	1,436
I would find Rosetta Stone flexible to use.	190	1	5	2,90	1,340
It would be easy for me to become skilled at using Rosetta Stone.	190	1	5	3,05	1,376
I would find Rosetta Stone easy to use.	190	1	5	3,08	1,423

*Table 5: Students' responses related to Moodle and Rosetta Stone ease of use*

The mean scores for these items range from 2.90 to 3.09, indicating generally neutral to slightly positive perceptions among respondents. For example, items such as "Learning to use Rosetta Stone would be easy for me" (mean of 3.09) and "I would find Rosetta Stone easy to use" (mean of 3.08) reflect a moderately positive perception of the platform's overall ease of use. However, the lower mean score for "I would find it easy to make Rosetta Stone do what I want" (2.90) suggests potential usability issues, indicating that some aspects of the platform could be more user-friendly. The standard deviations, ranging from 1.340 to 1.439, indicate moderate variability in responses, reflecting some diversity in how respondents rated different aspects of ease of use. These descriptive statistics provide valuable insights into the central tendencies and dispersions of perceptions about Rosetta Stone's ease of use, offering a foundation for further analysis and contextualizing the findings within broader research on educational technology adoption and user experience.

### 3.2.4. First-order and second-order barriers to the use of Moodle and Rosetta Stone

Table 6 provides descriptive statistics for items measuring perceptions related to the likelihood of various barriers hindering the effective use and implementation of Moodle and Rosetta Stone. The mean scores for these items range from 3.21 to 3.28, indicating a generally neutral to slightly higher perception of the likelihood of these barriers among respondents. For example, the item "What is the likelihood that a lack of adequate technical support for maintenance and troubleshooting will prevent the successful implementation of these platforms?" has the highest mean of 3.28, suggesting that respondents, on average, perceive this as a relatively likely barrier. Similarly, the items "What is the likelihood that limited access

to necessary devices or internet connectivity among students will hinder the widespread adoption of these platforms?” and “What is the likelihood that reluctance among teachers or students to adopt new educational technologies will hinder the integration of Moodle and Rosetta Stone?” have means of 3.23 and 3.22, respectively, indicating that respondents also viewed these as relatively likely barriers. Additionally, "Inadequate ICT infrastructure" has a mean of 3.21, further highlighting concerns about technological limitations.

The standard deviations, ranging from 1.346 to 1.433, suggest moderate variability in responses, reflecting some diversity in how respondents perceived the likelihood of these different barriers. These findings indicate that students identify several significant barriers, including inadequate infrastructure, lack of technical support, insufficient training, limited access to devices or internet connectivity, and reluctance to adopt new technologies. These barriers can hinder the effective adoption and use of Moodle and Rosetta Stone in educational settings.

	N	Min	Max	Mean	ST
How likely will inadequate ICT infrastructure (e.g., insufficient computers and unreliable internet connectivity) hinder the effective use of Moodle and Rosetta Stone?	190	1	5	3,21	1,387
What is the likelihood that a lack of adequate technical support for maintenance and troubleshooting will prevent the successful implementation of these platforms?	190	1	5	3,28	1,412
What is the likelihood that inadequate training for teachers and students on the effective use of Moodle and Rosetta Stone will be a significant obstacle?	190	1	5	3,21	1,433
What is the likelihood that limited access to necessary devices or internet connectivity among students will hinder the widespread adoption of these platforms?	190	1	5	3,23	1,346
What is the likelihood that reluctance among teachers or students to adopt new educational technologies will hinder the integration of Moodle and Rosetta Stone?	190	1	5	3,22	1,398

*Table 6: Students' responses to the barriers hindering the use of Moodle and Rosetta Stone in learning.*

These results align with existing studies on barriers to ICT adoption in education. Common issues include infrastructure challenges, such as poor internet connectivity and lack of access to devices (Selwyn, 2016), training gaps for both teachers and students (Ertmer et al., 2012), and resistance to change due to reluctance to adopt new technologies (Scherer et al., 2019). The descriptive statistics from Table 6 provide valuable insights into the central tendencies and variability of respondents' perceptions regarding these barriers, offering a foundation for further analysis and contextualizing the findings within broader research on educational technology adoption and implementation challenges. Addressing these barriers—such as improving technical support, enhancing ICT infrastructure, providing adequate training, and fostering a culture of openness to technological change—could facilitate more effective use of platforms like Moodle and Rosetta Stone. These insights can inform targeted interventions or strategies to address key areas of concern and improve the integration of these technologies in educational environments.

### 3.2.5. Correlations

The analysis of correlations in Table 7 reveals a consistent relationship between perceived ease of learning to use Rosetta Stone (and Moodle) and concerns regarding technical support, inadequate training, and access to technology. Specifically, moderate positive correlations (Rho values of 0.455, 0.448, and 0.469) indicate that individuals who find these platforms easy to learn are less likely to express significant concerns about technical issues, training quality, and limited access to necessary resources—and vice versa. Furthermore, a strong positive correlation (Rho of 0.608) between perceived ease of use and the ability to effectively manipulate Rosetta Stone suggests that users who view the platforms as user-friendly feel more empowered in their interactions. For example, the correlation of 0.608 for "Perceived ease of using Moodle or Rosetta Stone and ease of getting Rosetta Stone to perform specific tasks" highlights the importance of usability in fostering confidence and competence among users.

These findings suggest that barriers such as inadequate training, insufficient technical support, and limited access to digital tools significantly impact students' perceptions of ease of use. Addressing these barriers could improve the overall usability of the platforms, thereby promoting greater adoption and effective utilization of educational technology. Enhancing user perceptions of ease of learning and use is paramount to alleviating apprehensions related to technical and logistical challenges. Accordingly, it is recommended that institutions prioritize providing robust technical support, adequate training, and improved accessibility to digital tools to foster a more positive user experience.

These insights align with existing literature, which emphasizes that addressing barriers such as infrastructure limitations and training gaps can enhance perceived ease of use and, consequently, technology adoption (Teo, 2019). For instance, providing adequate technical support and training can reduce user frustration and improve satisfaction (Al-Rahmi et al., 2021). By focusing on these areas, educators and administrators can create an environment that supports the seamless integration of platforms like Moodle and Rosetta Stone, ultimately enhancing their effectiveness in educational settings.

Variables	Spearman's Rho	Number of valid observations	Sig. asymptotic (two-tailed)
Perceived ease of learning learning to use Rosetta Stone and technical support concerns.	,455	190	,000
Perceived ease of learning Rosetta and concerns about inadequate training	,448		,000
Perceived ease of using Rosetta and concerns about access to technology	,469		,000
Perceived ease of using Moodle or Rosetta Stone for learning and ease of getting Rosetta Stone to perform specific tasks	,608		,000
. The correlation is significant at the 0.01 level (two-tailed).			

Table 7: Correlations between perceived ease of using Rosetta Stone, Moodle and concerns about technical support, training, and access to technology.

## 4. Discussion

The findings of this study provide valuable insights into the factors influencing the adoption and use of language-learning platforms like Moodle and Rosetta Stone among Moroccan university students. Drawing on the Technology Acceptance Model (TAM) and Ertmer's framework for ICT integration, the results highlight the interplay between perceived usefulness, ease of use, and the barriers that hinder effective platform utilization.

### 4.1 Perceived usefulness and acceptance

The study reveals that perceived usefulness significantly influences students' acceptance of Moodle and Rosetta Stone. With a mean score of 3.19 for the statement, "I would find Moodle or Rosetta Stone useful for learning," students hold moderately favorable views of the platforms' utility. This aligns with TAM, which posits that perceived usefulness is a key driver of technology adoption (Davis, 1989). However, the slightly neutral scores suggest that students may view these platforms as supplementary rather than essential to their learning. This could stem from insufficient perceived utility or a lack of clear demonstration of how these platforms enhance learning outcomes. As Basuki et al. (2022) found, perceived usefulness influences both enjoyment and intention to use technology, which underscores the importance of ensuring that students recognize the tangible benefits of these platforms. In addition, a study conducted by Al-Hawamleh (2024) using survey data from 372 students at Arab Open University in Saudi Arabia confirms that information quality enhances perceived usefulness, system quality, and ease of use, boosting user satisfaction and continued engagement with e-learning platforms. These findings highlight the importance of high-quality content and system design in improving user experience and retention. Consequently, Hypothesis H1 is confirmed, as students' acceptance and use of Rosetta Stone rely on their perceived usefulness of the platform.

### 4.2 Ease of use and engagement

The findings on ease of use provide moderate support for Hypothesis H2. The mean scores for ease-of-use items (ranging from 2.90 to 3.09) indicate that students find the platforms moderately easy to use. However, the lower mean score for "I would find it easy to make Rosetta Stone do what I want" (2.90) suggests that some aspects of the platform may be less intuitive or user-friendly. The correlation analysis further explains this finding, revealing that students' concerns about training, technical support, and access to technology significantly impact their perceptions of ease of use. For instance, the strong positive correlation ( $Rho = 0.608$ ) between perceived ease of use and the ability to perform specific tasks on Rosetta Stone highlights the importance of usability in fostering engagement and task completion. This result aligns with a study by Venkatesh and Davis (2000) that extended the original TAM to include social influence and cognitive instrumental processes, further elucidating the determinants of perceived usefulness and usage intentions. Their research underscores the significance of external factors, such as training and support, in shaping users' perceptions of ease of use and usefulness. Additionally, Scherer et al. (2019) found that perceived ease of use and usefulness significantly impact educators' attitudes toward technology adoption. The research highlights the importance of addressing external factors, such as providing adequate training and ensuring access to necessary resources, to enhance educators' perceptions of technology's ease of use and usefulness. These studies corroborate your findings, emphasizing that while perceived ease of use is crucial, external factors like training, technical support, and accessibility play a significant role in shaping users' acceptance and effective utilization of educational technologies. Therefore, Hypothesis H2 is partially confirmed, as other factors—such as



training, technical support, and accessibility—interfere with students' perceptions of ease of use.

#### **4.3 First-Order Barriers: Infrastructure and support**

The study identifies several first-order barriers that hinder the effective use of Moodle and Rosetta Stone. Students expressed moderate concerns about inadequate ICT infrastructure (mean = 3.21) and limited access to necessary devices or internet connectivity (mean = 3.23). These findings align with Ghavifekr et al. (2016), who identified the lack of computers and reliable internet as critical barriers to ICT adoption in education. Additionally, the lack of adequate technical support (mean = 3.28) emerged as a significant obstacle, corroborating previous research by Snoeyink and Ertmer (2001), who highlighted the importance of technical support in overcoming resource-related challenges. The correlation between perceived ease of learning Rosetta Stone and concerns about technical support ( $Rho = 0.455$ ) further underscores the need for reliable support systems to enhance platform usability. These findings confirm Hypothesis H3, as technical support limitations are a significant obstacle for students.

#### **4.4 Second-Order barriers: Attitudes and beliefs**

The study also highlights the role of second-order barriers, such as students' attitudes and beliefs, in shaping their engagement with Moodle and Rosetta Stone. The mean score of 3.22 for the item “What is the likelihood that reluctance among teachers or students to adopt new educational technologies will hinder the integration of Moodle and Rosetta Stone?” suggests that resistance to change is a notable barrier. This finding aligns with Ertmer's (1999) framework, which emphasizes that internal factors, such as attitudes and self-efficacy, significantly impact technology integration. While some studies suggest that students are generally more receptive to technology than teachers (Alkawaldeh, undated), the current study reveals that students' reluctance can also hinder engagement. This partially supports Hypothesis H4, as second-order barriers like attitudes and beliefs play a significant role in reducing students' engagement with ICT tools.

#### **Limitation:**

Our study is limited because this is the first year our universities have implemented Rosetta and Moodle for learning foreign languages, particularly French and English. As a result, both students and instructors are still in the early stages of adapting to these platforms, which may have influenced engagement and outcomes. Additionally, our sample size is restricted due to the low number of student participants, despite extensive efforts to solicit thousands of students across multiple universities in Morocco. This limited participation affects the generalizability of our findings and suggests that future studies should aim for broader and more sustained engagement to obtain more representative results.

### **5. Conclusion and recommendations**

This study underscores the importance of addressing both perceived usefulness and ease of use in promoting the adoption of language-learning platforms like Moodle and Rosetta Stone. While students recognize the potential benefits of these platforms, their engagement is hindered by first-order barriers such as inadequate infrastructure, limited access to technology, and insufficient technical support, as well as second-order barriers like resistance to change and lack of confidence in using technology. These findings highlight the need for a holistic approach to ICT integration that addresses both external and internal barriers.

**Enhance Technical Support and Training:** Universities should prioritize providing robust technical support and comprehensive training programs to help students and teachers become

proficient users of Moodle and Rosetta Stone. This includes offering workshops, tutorials, and ongoing assistance to address technical issues and build confidence in using these platforms.

**Improve ICT Infrastructure:** Ensuring consistent access to reliable internet connectivity and necessary devices is critical for overcoming first-order barriers. Investments in ICT infrastructure, such as upgrading computer labs and expanding Wi-Fi coverage, can significantly enhance the usability of these platforms.

**Foster Positive Attitudes Toward Technology:** Orientation sessions and awareness campaigns can help cultivate positive attitudes toward digital learning tools among students and teachers. Highlighting the benefits of these platforms and sharing success stories can mitigate resistance to change and encourage greater adoption.

**Align Platforms with User Needs:** To increase perceived usefulness, universities should work with platform developers to ensure that Moodle and Rosetta Stone are aligned with students' learning needs and preferences. Incorporating user feedback into platform design and demonstrating clear benefits to learning outcomes can enhance students' perceptions of utility.

**Promote a Culture of Digital Openness:** Creating a supportive institutional culture that values innovation and technology integration is essential for overcoming second-order barriers. Encouraging collaboration between teachers, students, and administrators can foster a shared commitment to leveraging technology for educational improvement.

By addressing these barriers and implementing targeted interventions, universities can enhance the effectiveness of Moodle and Rosetta Stone as tools for language acquisition. This, in turn, will contribute to more engaging and productive learning experiences for students, ultimately supporting their academic success in a technologically advanced world.

## **Bibliography**

- Abedi, E. A., & Ackah-Jnr, F. R. (2023). First-order barriers still matter in teachers' use of technology: An exploratory study of multi-stakeholder perspectives of technology integration barriers. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 19(2), 148-165.
- Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2020). Technology Acceptance Model in M-learning context: A systematic review. *Computers & Education*, 125, 389-412. <https://doi.org/10.1016/j.compedu.2018.09.009>
- Al-Hawamleh, A. (2024). Exploring the satisfaction and continuance intention to use e-learning systems: Integrating the information systems success and technology acceptance models. *International Journal of Electrical and Computer Engineering Systems*, 15(2), 201-214.
- Alkawaldeh, N. (n.d.). Barriers to utilizing ICT for educational purposes in Jordan (Master's thesis, Swedish Business School, E-Government Program). ResearchGate.
- Al-Rahmi, W. M., Yahaya, N., Aldraiweesh, A. A., Alamri, M. M., Aljarboa, N. A., Alturki, U., & Aljeraiwi, A. A. (2021). Integrating technology acceptance model with innovation diffusion theory: An empirical investigation on students' intention to use E-learning systems. *IEEE Access*, 9, 26728-26743. <https://doi.org/10.1109/ACCESS.2021.3053382>
- Basuki, R., Tarigan, Z. J. H., Siagian, H., Limanta, L. S., Setiawan, D., & Mochtar, J. (2022). The effects of perceived ease of use, usefulness, enjoyment, and intention to use online platforms on behavioral intention in online movie watching during the pandemic era. *International Journal of Data and Network Science*, 6(1), 13-24. <https://doi.org/10.5267/j.ijdns.2021.9.003>

- Bell, E., & Barr, D. (2023). Barriers to technology integration in the A-level history classroom in Northern Ireland. *Irish Educational Studies*. Advance online publication. doi.org/10.1080/03323315.2023.2209853
- Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science and Technology Education*, 5(3), 235-245.
- Burns, M. (2021). Technology in education. UNESCO.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. https://doi.org/10.2307/249008
- Durff, L., & Carter, M. (2019). Overcoming second-order barriers to technology integration in K-5 schools. *Journal of Educational Research and Practice*, 9(1), 246-260. doi.org/10.5590/JERAP.2019.09.1.18
- Ertmer, Peggy. (1999). Addressing first- and secondorder barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47-61. 10.1007/BF02299597.
- Ertmer, Peggy & Ottenbreit-Leftwich, Anne & Sadik, Olgun & Sendurur, Emine & Sendurur, Polat. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*. 59. 423–435.
- Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and learning with ICT tools: Issues and challenges from teachers' perceptions. *Malaysian Online Journal of Educational Technology*, 4(2), 38-57. https://files.eric.ed.gov/fulltext/EJ1096028.pdf
- Khan, S.,H., Hasan, M., & Clement, C. K. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *International Journal of Instruction*, 5(2), 61-80.
- Makki, T. W., O'Neal, L. J., Cotton, S. R., & Rikard, R. V. (2018). When first-order barriers are high: A comparison of second- and third-order barriers to classroom computing integration. *Computers & Education*, 120, 90-97. doi.org/10.1016/j.compedu.2018.01.005
- Pelgrum, W.J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. *Computers & Education*. 37. 163-178. 10.1016/S0360-1315(01)00045-8.
- Rodríguez, P., Nussbaum, M., & Dombrovskaja, L. (2012). ICT for education: A conceptual framework for the sustainable adoption of technology-enhanced learning environments in schools. *Technology, Pedagogy and Education*, 21(3), 441-464. doi.org/10.1080/1475939X.2012.720415
- Sánchez-Prieto, J. C., Hernández-García, Á., García-Peñalvo, F. J., & Chaparro-Peláez, J. (2020). Exploring the influence of gender and academic degree on the acceptance of mobile learning. *Computers in Human Behavior*, 111, 106311. doi.org/10.1016/j.chb.2020.106311
- Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, 128, 13-35. doi.org/10.1016/j.compedu.2019.103595
- Selwyn, N. (2016). Is technology good for education? Polity Press. doi.org/10.1002/9781119179108
- Tawfik, A. A., Shepherd, C. E., & Gish-Lieberman, J. J. (2021). First and second order barriers to teaching in K-12 online learning. *TechTrends*, 65(6), 925-938. doi.org/10.1007/s11528-021-00648-y
- Teo, T. (2019). Technology acceptance research in education. In J. Voogt, G. Knezek, R. Christensen, & K.-W. Lai (Eds.), *Second handbook of information technology in primary and secondary education* (pp. 1-15). Springer. doi.org/10.1007/978-981-13-8161-4\_1

- Venkatesh, Viswanath & Bala, Hillol. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences*, 39. 273-315. doi.org/10.1111/j.1540-5915.2008.00192.x.
- Venkatesh, V., & Davis, F. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*. 46. 186-204. 10.1287/mnsc.46.2.186.11926.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478. doi.org/10.2307/30036540