

**MOBILE LEARNING FOR CORPORATE TRAINING IN
PORTUGAL: CURRENT CHALLENGES AND FUTURE
DIRECTIONS**

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Acknowledgments

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Abstract

Currently, the workforce is becoming more and more global and diversified, raising new challenges to the corporate training area. Technological progress has created new opportunities to tackle these challenges, one of them, the diffusion of mobile-learning. However, academic research has been focused on studying this type of learning only for educational purposes. This dissertation approaches how Portuguese managers perceive mobile-learning for corporate training and identifies best practices to maximize the effectiveness of these initiatives.

This study applies the qualitative method, with a content analysis to seven interviews to managers of diversified activity sectors. Conclusions are presented under four main categories: General perceptions on mobile-learning; Current practices; Advantages; Limitations; Opportunities.

Results show that mobile-learning is perceived as an extension of e-learning, with clear divergencies from managers on the underlined learning theories and the role of the trainee in this learning context. Nevertheless, some companies are investing in selecting adjusted technological platforms, integration new functionalities, adapting content, and processes for this specific learning context. Managers recognize the existence of several benefits and limitations associated with mobile-learning. Lastly, managers perceive possible improvements with a focus on reinforcing relationships between trainees and the creation of customized content. Additionally, they foresee the integration of new technological advancements, like augmented reality.

The conclusions of the performed analysis set guidelines that describe pedagogical improvements and reinforce the need to suppress social necessities of trainees to maximize the effectiveness of existing and future mobile-learning initiatives.

Keywords: Training and Development; Technology-based training; Mobile-learning; E-learning

M100 Business Administration: General

M530 Personnel Economics: Training

Resumo

Atualmente, a força de trabalho é cada vez mais global e diversificada, criando desafios para área de formação empresarial. O progresso tecnológico fomentou novas oportunidades para ultrapassar estes desafios, entre elas, a disseminação de mobile-learning. Contudo, a literatura científica foca esta forma de aprendizagem para fins educacionais. Esta dissertação aborda a forma como gestores portugueses percebem mobile-learning na formação empresarial e identifica boas práticas para maximizar a eficácia destas iniciativas.

Este estudo aplica o método qualitativo, com uma análise de conteúdo a sete entrevistas a gestores de sectores de atividade diversificados. Nesse sentido, as conclusões são apresentadas sob quatro categorias principais: Percepções gerais sobre mobile-learning; Práticas atuais; Vantagens; Limitações; e Oportunidades.

Os resultados indicam que mobile-learning é percebido como uma extensão do e-learning, com divergências sobre as correntes de aprendizagem associadas ao conceito e o papel do formando nesse contexto. Todavia, algumas empresas estão a investir na seleção de plataformas tecnológicas ajustadas, integração de novas funcionalidades, adaptação dos conteúdos, e processos para este contexto de aprendizagem. Os gestores reconhecem a existência de benefícios associados a mobile-learning, assim como realçam as suas limitações. Por fim, os gestores enunciaram possíveis melhorias com foco em fomentar relação entre os formandos e na criação de conteúdo. Adicionalmente, antevêm a integração de novos avanços tecnológicos, como a realidade aumentada.

As conclusões da análise realizada estabelecem linhas orientadoras ao descrever melhorias pedagógicas e reforçar a necessidade de suprimir as necessidades sociais dos formandos para maximizar eficácia de iniciativas de mobile-learning existentes e futuras nas organizações.

Palavras-chave: Formação e Desenvolvimento; Formação à distância; Mobile-learning; E-learning

M100 Business Administration: General

M530 Personnel Economics: Training

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I. Introduction

We live in a world where technology is deeply embedded in multiple aspects of our everyday life. A generation of digital natives, which grew up with technology, joins a generation of digital immigrants, people that have adapted to the technological advancements over the last ten years. These people constitute today's workforce. These are users comfortable with technology-based training, creating an opportunity for managers in the area of Learning and Development (Colbert, Yee and George, 2016). Managers have grasped this and deployed learning technologies through organizations. Currently, over 25% of corporate training hours are online and nearly 40% are technology supported (Stone, Deadrick, Lukaszewski and Johnson, 2015). In a survey conducted by CIPD (2015) to professionals from the training and development area, it was found that three in four organizations use learning technologies.

The growing number of smartphones linked with the wider access to the internet is creating new opportunities to learn. According to Cisco's Visual Networking Index (CISCO, 2017) report, in 2021 there will be 12 billion connected mobile devices worldwide and 5.5 billion mobile users worldwide. Smartphones are expected to reach around 88% of global mobile device sales in 2018 (Moreira, Pereira, Durão and Ferreira, 2017). This technological revolution has followed a trajectory that is manifested, as the numbers presented indicate, a transition from desktop computing to the widespread use of mobile technology.

Initial studies on mobile learning focused primarily on Education. Currently, with the rise of mobile device affordances, there has been a steady rise in research interest on the topic. Crompton, Burke, and Gregory (2017) published a review that included 113 papers on mobile learning used in K-12 education, a total of 62% of studies reported positive outcomes. Hence, mobile learning contributes to increased student learning. However, in the analyzed cases, more than 40% of learning activities were aligned with at behaviorist theory. This translates as full capabilities of mobile learning not being supported has collaborative learning is reduced to interactions among tutor and learner, excluding other learners in the group from the learning process. Learners aren't given a chance to produce, collaborate, research and create new knowledge.

Mobile learning technologies are expected to have the greatest impact on the L&D profession in the next five years when compared to other forms of learning technologies like virtual classrooms or social media (CIPD, 2015). Bell, Tannenbaum, Ford, Noe, and Kraiger (2017) state that one of the main challenges in training design and delivery for the upcoming years is evaluating how the unique features of mobile technologies affect learning and transfer.

Portugal belongs to the group of countries with the most advanced score in the digital economy and society index¹. In the last year, the country has improved in all dimensions except Digital Public Services and it has had an overall growth superior to average in the European Union (European Commission, 2017). Thus, what does the uprising of mobile learning mean for Portuguese managers? How can Portuguese managers in the HR area leverage this opportunity in the new digital era? This dissertation looks to provide insights to answer these questions.

As a result, the systemized knowledge achieved will give managers a picture of the existing possibilities to deploy mobile learning technologies in their organization and can help to increase the effectiveness of these initiatives. Moreover, the information will provide clues on the next developments in mobile learning, which will offer the opportunity for organizations that already have these initiatives to prepare themselves to best leverage these advancements.

¹ Index that tracks Europe's digital performance and tracks the evolution of EU member states in digital competitiveness. It comprises five dimensions: Connectivity, Human Capital/Digital Skills, Use of Internet by citizens, Integration of Digital Technology by businesses and Digital Public Services.

II. Literature review

2.1. Training and workforce development

Training has been recognized as a key element to guarantee competitive advantage through a company's workforce. Training consists of the planned and systematic activities designed to endorse the acquisition of knowledge, attitudes, and skills (Salas, Tannenbaum, Kraiger and Smith-Jentsch, 2012). The changes in today's workforce pose new challenges for training. The workforce is becoming increasingly diverse in terms of age, race and national origin. In addition, employees are demanding more opportunities to develop their skills and expect feedback on the go (Noe, Clarke, and Klein, 2014). For companies, this means that they need to take action to respond to their expectations and ensure that employees are motivated to learn to maintain their competitive advantage (Salas, Tannenbaum, Kraiger and Smith-Jentsch, 2012)

The goal of training is to create changes in cognition and behavior to provide individuals the competencies they need to perform a certain job. Learning and training are related but subsist separately from each other. Learning is a desired outcome of training, but it surpasses this concept. One person can learn in an environment that is not training related. Another concept that is mistaken with training is education. Education stands as a broader concept. Comparatively, education has a less defined aim than training and a target with distinct characteristics (student vs working adult). As previously address an adult learner is usually over twenty-one and working full time or part-time. These learners attribute higher importance to career development, job security, upward mobility, and re-careering. They prefer their training to include discussions about course materials that relate with their lives, are problem-centered and wish to perceive immediacy of application (Hashim, Tan, and Rashid, 2015). This means that what guarantees effectiveness in learning initiatives does not necessarily apply to training in organizations and vice-versa (Salas, Tannenbaum, Kraiger and Smith-Jentsch, 2012).

2.2. E-learning

Paiva, Morais, Costa and Pinheiro (2016) describe "E-learning" as any electronic technology such as computer-based learning, computer-assisted instruction, Internet-based learning, web-based learning, online education, virtual education or digital collaboration. Most recently, Cidral, Oliveira, Di Felice, and Aparicio (2017) defined e-learning as a web-based learning ecosystem that incorporates several stakeholders with technology and processes.

As mentioned previously e-learning has largely been deployed throughout organizations. Although it has high development costs, organizations considered it in comparison with

spendings with face-to-face instruction. E-learning creates savings through reduced travel and lodging costs, drop of recurring instructional costs, and wages paid to learners when they are not performing to business-related activities (Noe *et al.*, 2014).

The first-ever study published in the Journal of Applied Psychology on technology-based distance learning came out in 1957 (Benschoter and Charles, cited in Bell *et al.*, 2017). Since then, research on the subject has had an evolutionary pattern in the framework of more traditional training methods.

Results of research so far have indicated that technology reduces training time, but trainee attitudes and achievement are comparable to more conventional methods (e.g., classroom) (Bell *et al.*, 2017). Researchers now agree that efforts to evaluate the comparative effectiveness of different technologies have reduced value. It's proved that well design media instruction works irrespective of the delivery mode (Salas *et al.*, 2012). The main focus should be on the pedagogical features that influence the effectiveness of technology-based training and conditions in which it is held that enhance its effectiveness (Bell *et al.*, 2017). Thus, research conducted in the last years has been directed towards the effects of learner control in technology-based training, strategies designed to help learners make better use of this control and monitor their behavior in this setting.

Computer-based training has a higher focus on the learner/ trainee in comparison with classroom training. The responsibility is passed to the trainee for his learning experience. However, trainees may not have the necessary skills or motivation to have the necessary control over their learning experience. Goal abandonment has been studied as a cause of attrition from voluntary online training. Learners use regulatory mechanisms that include planning, monitoring, metacognition, attention, persistence and time management. Previous studies have shown that in this context, trainee goals must be aligned with learning goals, the trainee must have a perception that goals are attainable and there must exist maintenance of the trainee motivation. Ultimately, the trainee may benefit from enhanced encoding and retention of information because he plays a more active role in the learning process (Noe *et al.*, 2014).

An empirical study conducted by Kimiloglu, Ozturan, and Kutlu (2017) to a sample of top 500 companies in Turkey regarding their e-learning practices revealed that companies were willing to embrace e-learning for corporate training to accompany and enrich their classroom training. The author's findings also reveal that organizations consider that e-learning harnesses several advantages. For the companies participating in the study, e-learning is perceived to be highly cost-effective, customizable, a way to capture employee readiness and commitment and for the company to attain a learning organization profile. When considering adoption, it was

mostly human factors that prevented companies to advance with an e-learning initiative. The top personal concern was the existence of sociability and interactivity in the e-learning environment. Additionally, companies recognized that for implementation to be effective, a competent team must be able to implement the e-learning system and management support should exist. However, once companies had some level of experience with e-learning they perceive advantages much more strongly compared to those who had never used it at all.

For years now, the evaluation of technology learning systems has been sustained in the IS Success Model (Table I).

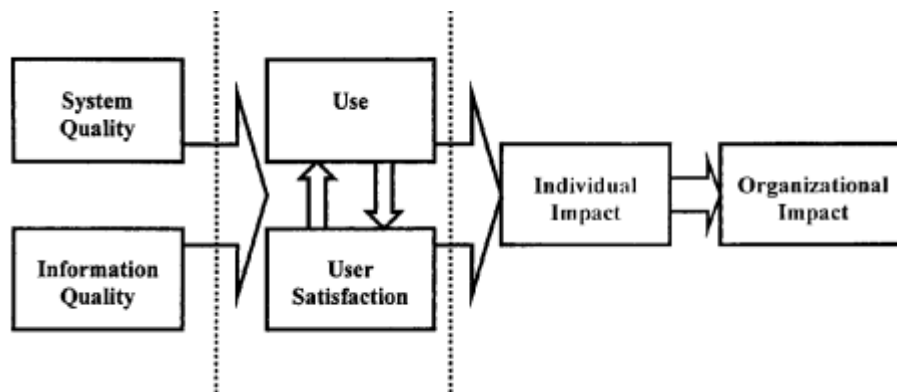


Table I - IS Success Model DeLone and McLean (2003) cited by Cidral et al (2017)

Cidral *et al* (2017) and Al-Emran, Mezhyuev, and Kamaludin (2018) set out to find the determinants for user perceived satisfaction, use and individual impact of technology based training based on this model (Table II).

DRIVERS FOR EACH VARIABLE		
<p>User satisfaction (E-learning supports the area of study, efficiency of the e-learning system, effectiveness of the learning system, satisfaction with the system as a whole)</p>	<p>E-learning Use (User retrieves information, publishes information, communicates with colleagues and instructors, stores and shares documents and executes coursework in the system)</p>	<p>Individual impact (User believes the system allows him to accomplish tasks more quickly, increases productivity, makes it easier to accomplish tasks, is useful for the user's job)</p>
Information quality	Collaboration quality	System quality

(Applicability, comprehensiveness, and reliability of information)	(Web environment features, digital culture and universal use of the web on different existing platforms)	
System quality (ease of use - navigability, accessibility, structure, visual logic, and stability of e-learning systems to ensure a good user experience and learning)	Information Quality (Information retrieved from the system is useful, understandable, interesting, reliable)	E-learning Use
Instructor attitude toward e-learning (User considers that the instructor thinks web-based learning technology to be useful)	User perceived Satisfaction	User perceived Satisfaction
Diversity in assessment (System has diversity in learning assessment)		
Learner perceived interaction with others (User perceives he learns more from others in a specific system, Instructor elicits student interaction, Class discussions are easy to follow)		

Table II - Description of constructs (Cidral et al , 2017)

After the implementation of an e-learning system, its long-term effectiveness is dependent on its congruence with the business and employee's needs. Authors mention that the intention

to continue using e-learning comes from motivating students to use communication tools during courses.

Virgin, a company with businesses in numerous sectors, recognized for companies like Virgin Records and Virgin Airlines, recently faced this reality. When a consultancy firm came and analyzed their e-learning system, they found that from the 3,500 learning items available, only 200 were being used on a semi-regular basis. It was a moment where they had to recognize failure and go on to rethink their Learning and Development philosophy. They divided their portal into four new learning areas: sales, services, management, and professional and personal skills.

When collecting training needs they found out that people wanted to train just in time, just enough and with content personalized for them. The content available in the e-learning system was now to be small bite size to help employees on the go. Four months into the launch of the platform they had on average 2,000 users each week. Some employees from the retail teams were even recording learning clips for their colleagues to use. The learning and development team launched at the same time an interactive gaming app called Albert. This set Virgin as a company that had gone to surpass e-learning to enter in the mobile-learning domain (CIPD,2017).

2.3. Mobile - Learning

Mobile learning can be defined by the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies (Terras and Ramsay, 2012). This goes to the encounter of the third generation learning model, that focuses on the learner as an active agent and gives emphasis to his need for social interaction. According to this perspective, knowledge is socially constructed with shared meaning based on instructor – learner and learner-learner interactions. Hence, the learner becomes socially embedded and participates actively in the learning process (Noe *et al.*, 2014; Ellingson and Noe, 2017)

In a more recent overview, mobile learning was defined as the use of mobile technologies to facilitate learning (Chiang *et al.*, 2016). In that sense, it encompasses various mobile technologies, that include all portable and lightweight devices, such as smartphones, tablets, laptops and Personal Digital Assistants (E.g. Alexa from Amazon) (Mohammadi, 2015). From the range of devices available, smartphones are the most widely used devices for mobile-learning (Chee, Yahaya, Ibrahim, and Hasan, 2017).

A review conducted by Fu and Hwang (2018) revealed that over the last ten years there has

been an increase in personal devices used for mobile-learning education initiatives.

Currently, the prevalence of handheld devices combined with the necessity for learning on the go has made a case for mobile learning or m-learning to distinguish itself from the e-learning concept (Mohammadi, 2015). The majority of e-learning systems support mobile devices, however, they are not able to fully utilize m-learning affordances such as portability, locality, advanced augmentation, and geocaching (Pappas, Giannakos, and Sampson, 2017).

Mobile learning has been integrated into recent perspectives of learning. One of those perspectives is ubiquitous learning, that stands for learning anywhere and at any time. Furthermore, it has been classified as pervasive learning. Pervasive learning can be defined as “learning at speed of need through formal, informal and social learning modalities” (Shuib, Shamshirband, and Ismail, 2015:241).

M-learning has been more commonly associated with informal learning than with formal learning initiatives. The majority of m-learning studies over the last years was done in the context of informal learning (Chee *et al.*, 2017). Nevertheless, this way of learning now accounts for 75 % of learning within organizations (Ellingson and Noe, 2017). Informal learning includes learning from oneself through self-reflection, learning from others at work like peers, supervisors, and mentors and learning from non - interpersonal sources, for example, online material (Noe *et al.*, 2014). Moreover, m-learning has been considered as part of autonomous learning, given the relevance that the trainee has in the learning process and his control over it. In this perspective, mobile learning would not be administratively or operationally supported by the organization, but trainees would use it to build knowledge and skill relevant to their job or career (Fu and Hwang, 2018).

Mobile devices, that mediate mobile learning, have a number of unique characteristics such as portability, connectivity, convenience, expediency, immediacy, accessibility, individuality, and interactivity (Terras and Ramsay, 2012). From a technology standpoint, it connects mobile computing technology, network technology and multimedia technology (Chiang *et al.*, 2016).

Information design strategy principles for mobile learning suggest that for content to be effective it should be displayed in small, short units segments; visual information such as graphic elements should be used moderately; words should be presented in a conversational style, there should be employment of storytelling techniques; audio should be short-term and maintain a coherent format; and text should be condensed, grouped and design in a visually coherent manner. Another principle is Microlearning, which has been associated with more effective learning outcomes. In this learning model, information overload is avoided by the usage of short text segments, flashcards, podcasts or video clips ranging from a few seconds to

more than 15 min (Park, 2019).

In a review of patents filled on mobile learning between 1976 and 2013 most popular target audience were students (Chiang *et al.*, 2016). The United States of America was the country with the higher number of patents (46%), followed by South Korea (20%) and China (19%). The most recent patents filled in mobile learning are more inclined to provide personalized, contextualized, easily-retrievable, auto-updated and intelligent pushed learning content.

In research, most samples came from higher education institution (Chee *et al.*, 2017). Taiwan is the country with the highest number of journal publications regarding mobile-learning (Chee *et al.*, 2017). While most of the studies conducted focus on the effectiveness of mobile learning.

Pappas *et al.*, (2017) identified several advantages in the use of mobile learning, that included mobility and convenience, promotion of interactivity between trainees and instructors, easy collaboration, reduction of printing materials, accessibility to equipment's necessary and flexibility for all agents involved in the learning process.

In contrast, limitations include small screen size, camera resolution, touch screen technology, storage space, battery limitation, security and dependency on internet connection (Mohammadi, 2015; Shuib *et al.*, 2015). Addressing the hardware limitations described above, Shuib *et al.*, (2015) describe three common approaches to address this issue, adapting to diverse hardware configurations, providing different software packages to each device or develop applications that support the least common denominator among devices.

Additionally, focusing on the challenges faced by agents in the mobile learning process, the rapid pace of technological development is outstripping the existing technological and informational literacy skills. Mobile devices serve as cognitive artifacts, they augment human cognition with their calculator functions, note-taking, facilities, reminder settings and so on (Terras and Ramsay, 2012). However, several challenges come up in the use of mobile learning. For instance, changes in context lead to several risks in terms of user engagement and concentration. Interruptions have negative consequences for ongoing tasks. Hence, there are five central challenges in mobile learning that fall under cognitive functioning (context-dependency, resource limitations, and distributed cognition) and individual differences (attitudes and preferences concerning technology use). Transfer of skills acquired in formal settings to use mobile learning seems slow, which calls attention for a need to promote it. Other issues include access to resources needed, physical and psychological preparation and adaptation of the tutor or instructor to one on one setting in opposition to a group setting (Terras and Ramsay, 2012).

Recently, other trends in research of information technology have been linked with mobile learning. These include gamification techniques, augmented reality, social media and MOOCs (Massive online open courses) (Moreira *et al.*, 2017). From these four trends, social media and MOOCs are mentioned as a higher number of times in association with mobile learning.

Learning through social media platforms like Twitter, Facebook and LinkedIn has had increased interest in mobile learning (Noe *et al.*, 2014). When addressing younger generations entering the workforce, the use of social media is a standard. Some organizations have chosen to leverage this opportunity to leverage knowledge brought by connections inside and outside of the firm (Noe *et al.*, 2014).

Another form of mobile learning is MOOCs. These have been discussed in society because of platforms like udacity and edX, which makes some of them available for free, and have helped make a case for the adoption of mobile learning (UNESCO, 2013). MOOCs can include activities such as readings, quizzes, videos, and forums. MOOCs have attractive features like its flexible structure and collaborative environment (Noe *et al.*, 2014). Presently, some companies are working with MOOC developers to develop courses that guarantee their employees have the needed skills to perform their jobs (Ellingson and Noe, 2017).

In a study conducted to users of mobile learning in their twenties by Pappas *et al.*, (2017) it was showcased that the main cause of adoption of mobile-learning was perceived usefulness, i.e. the degree to which users believed that m-learning could enhance their learning performance. Furthermore, in the absence of this factor, the main reason for adoption was the subjective norm (user's perception that most people who are important to them think they should or should not use m-learning). If the users demonstrated low levels of self-efficacy, social norm and perceived ease of use, high m-learning adoption would be possible as long as the users had a high m-learning attitude which refers to the presence of enduring positive feelings about m-learning. Lastly, if users showcased high levels of perceived usefulness and perceived ease of use, it would not be necessary to exist any social influence to trigger m-learning adoption.

Hashim *et al.*, (2015) used the UGT (Uses and Gratification theory) to access what led adult learners to adopt m-learning. The UGT theory considers three types of needs, cognitive (necessity of finding information on a certain subject), social (necessity to interact with others) and affective (necessity to enjoy personal fulfillment), to determine individual motivation and behavior when using media in the communications domain. The researchers contended that adult learners' intention to adopt m-learning is influenced positively by their attitude. Moreover, what drove their attitude was their cognitive, affective and social needs. While it's

been proven that attitude plays a role in the adoption of m-learning, what drives this last is still relatively unknown.

The findings revealed that social, affective and cognitive needs influence attitude to adopt m-learning. From the three needs, social has more influence over the attitude of the learner towards m-learning. If m-learning fulfills interaction needs with others, learners are more likely to adopt the technology. This includes activities of getting in touch with fellow attendees of the course or receiving feedback. These conclusions stress the importance of having embedded into the m-learning platform a variety of collaborative communication applications such as a Wiki or Social Media applications, providing the ability to personalize the platform to different learning styles and preferences and assuring the availability of learning resources that are supported by the m-learning platform.

An example of a professional class which already adopted m-learning is nursing staff. Chang, Lai, and Hwang (2018) published a review on mobile learning in nursing education from 1971 to 2016 which showcases great progress in the past decades. This can be related to the nurse's necessity to practice learning repeatedly anytime and anywhere with limited time to gain nursing knowledge effectively. They found that in most of the studies the most common device used was the smartphone. More recurrent themes were basic nursing concepts and skills, Obstetrics & Gynecology and Long-Term care. Studies focused on learning activities revealed which activities are more commonly used: guided learning (which includes giving supplementary learning materials, websites and software), synchronous sharing (interaction with fellow colleagues through technology that is provided via mobile learning in order to foster discussion, sharing and joint problem solving), community service training (learn by serving patients on sites) and contextual mobile learning (Students are guided to apply, observe, discuss the textbook knowledge, collect data, and solve problems in the real-world learning environment.), respectively.

To sum up, a table of the relevant research results reviewed can be found in Table III.

Author	Context	Conclusions/ Results/ Contributions
(Hashim <i>et al.</i> , 2015)	What motivates adult learners to learn	Adult learners showcase clear characteristics regarding their learning preferences: <ul style="list-style-type: none"> - Prefer discussions about course materials that relate with their lives; - Are problem-centered; - Wish to perceive immediacy of application.
(Cidral <i>et al.</i> , 2017)	E-learning Definition	Web-based learning ecosystem that incorporates several stakeholders with technology and processes.
(Noe <i>et al.</i> , 2014).	Computer-based training Benefits and Limitations Best practices for adoption of Computer- based training	Limits: <ul style="list-style-type: none"> - High development and implementation costs; - Lower control of the learning process; - Trainees may not have the necessary skills or motivation to have the necessary control over their learning experience. Benefits: <ul style="list-style-type: none"> - Reduced travel and lodging costs; - Drop of recurring instructional costs; - Savings with wages paid to learners when they are not performing to business-related activities; - Reductions in training time; - Learner plays an active role in the learning process which leads to enhanced encoding and retention. Best Practices in Computer Based Training: <ul style="list-style-type: none"> - Trainee goals must be aligned with learning goals; - Trainee must have a perception that goals are attainable; - Invest in the maintenance of trainee motivation.
(Bell <i>et al.</i> , 2017)	E-learning Benefits and Limitations	Benefits: <ul style="list-style-type: none"> - Reductions in training time. Limitations:

	Best practices for the adoption E-learning	<ul style="list-style-type: none"> - Trainee attitudes and achievement are comparable to more conventional methods (e.g., classroom). <p>Best Practices in E-learning Based Training:</p> <ul style="list-style-type: none"> - The focus should be on pedagogical features, more specifically in stimulating learner control.
(Kimiloglu <i>et al.</i> , 2017)	E-learning Benefits and Limitations	<p>Benefits:</p> <ul style="list-style-type: none"> - Highly cost-effective; - Customizable; - Way to evaluate employee readiness and commitment; - Key for the company to obtain a learning organization profile; <p>Limitations:</p> <ul style="list-style-type: none"> - Lack of possibility to socialize and interact for trainees in training; - Lack of internal knowledge to accompany the implementation and maintenance of the platform. <p>Best Practices in E-learning Based Training:</p> <ul style="list-style-type: none"> - Necessity for management support.
(Cidral <i>et al.</i> , 2017)	Best practices for the adoption Technology Learning Systems	<p>E-learning use is driven by:</p> <ul style="list-style-type: none"> - Collaboration Quality; - Information Quality; - User Perceived Quality which in turn is determined by information quality, system quality, instructor attitude toward e-learning, diversity in assessment and learner perceived interaction with others.
(Terras and Ramsay., 2012) (Mohammadi., 2015) (Chiang <i>et al.</i> , 2016) (Chee <i>et al.</i> , 2017)	Mobile - Learning Definition	<p>Processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies.</p> <p>Mobile learning as the use of mobile technologies to facilitate learning which includes all portable and lightweight devices, such as smartphones, tablets, laptops and Personal Digital Assistants (E.g. Alexa</p>

		from Amazon). Currently, smartphones are the most widely used devices for m-learning.
(Park, 2019)	Best practices for the adoption Mobile-learning	<p>Information design strategy principles for mobile learning:</p> <ul style="list-style-type: none"> - Small, short units' segments; - Visual information such as graphic elements should be used moderately; - Words should be presented in a conversational style; - Employment of storytelling techniques; - Audio should be short-term and maintain a coherent format; - Text should be condensed, grouped and design in a visually coherent manner. <p>Example of materials: Flashcards, podcasts or video clips ranging from a few seconds to more than 15 min.</p>
(Mohammadi, 2015; Shuib <i>et al.</i> , 2015)	Mobile – Learning Limitations	<p>Limitations:</p> <ul style="list-style-type: none"> - Small screen size; - Camera resolution; - Touch screen technology; - Storage space; - Battery limitation; - Security and dependency on the internet connection.
(Terras and Ramsay, 2012)	Mobile – Learning Benefits Limitations	<p>Benefits:</p> <ul style="list-style-type: none"> - Support for on-going classroom initiatives; <p>Limitations:</p> <ul style="list-style-type: none"> - Costs with material adaptation; - Physical and psychological preparation of the tutor or instructor; - Low technology and informational literacy skills by trainees; - Low engagement and concentration by trainees.

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(Noe <i>et al.</i> ,2014)	Mobile – Learning Benefits	Benefits: <ul style="list-style-type: none"> - It matches the expectations of younger generations; - Inclusion of the latest interactive technologies/channels MOOCS, social media.
(Chee <i>et al.</i> , 2017)	Mobile - Learning Benefits and Limitations	Benefits: <ul style="list-style-type: none"> - Promotion of informal learning, which now accounts for 75 % of learning in organizations; Limitations: <ul style="list-style-type: none"> - Lack of financial resources to purchase mobile devices.
(Moreira <i>et al.</i> , 2017)	Mobile - Learning Benefits	Benefits: <ul style="list-style-type: none"> - Inclusion of the latest interactive technologies/channels: MOOCS, augmented reality, social media.
(Pappas <i>et al.</i> , 2017)	Mobile - Learning Benefits Best practices for the adoption Mobile-learning	Benefits: <ul style="list-style-type: none"> - Access to knowledge anytime and anywhere; - Promotion of interactivity between trainees and instructors; - Easy collaboration between trainees; - Reduction printing materials; - Accessibility to the equipment's necessary; - Flexibility for all agents involved in the learning process. M-learning use is influenced in different manners by: <ul style="list-style-type: none"> - Perceived usefulness for learning performance; - Subjective norm; - Perceived ease of use; - M-learning Attitude, i.e. enduring feelings positive about m-learning; - Self-efficacy.
(Hashim <i>et al.</i> , 2015)	Best practices for the adoption Mobile-learning	M-learning use is determined by the fulfillment of 3 needs: <ul style="list-style-type: none"> - Cognitive (necessity of finding information on a certain subject);

		<ul style="list-style-type: none"> - Social (necessity to interact with others); - Affective (necessity to enjoy personal fulfillment). <p>From the 3 above, social has the highest positive influence over user adoption.</p>
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Table III - Summary of articles reviewed

III. Research Objectives and Method

3.1. Research Objectives

According to Chee, Yahaya, Ibrahim, and Hasan (2017), there is an existing gap in research on the subject of mobile learning in the working adult context (individuals above 21 years old currently working (Fu and Hwang, 2018; Hashim, Tan, and Rashid, 2015). Furthermore, there is a lack of studies approaching the organizational perspective of m-learning adoption. Most of the existing studies focus on individual perspective by application of technology adoption models (Kimiloglu, Ozturan, and Kutlu, 2017). This dissertation aims to bridge these gaps.

To do so, it explores the areas of management, human resource management, organizational psychology, and information management to gather quality and current research on mobile learning in training. Articles published in B-ON between 2012 and 2018 from top journals (with impact factor superior to two) were considered for the literature review.

Thus, this study sets to provide an outlook on mobile learning applied to training in Portugal. In further detail, it poses the question of current practices of mobile learning in Portuguese companies. To begin it identifies differences in perception of mobile learning by learning and development professionals, comparing it to classroom training and e-learning; details perceptions on mobile learning benefits and limitations of learning and development professionals and identifies opportunities for the adoption of mobile learning that can benefit learning practices and trainees experience.

3.2. Method

A qualitative method was used to produce primary data to answer the research question posed initially. So far, the majority of existing studies on mobile learning favors a quantitative approach, rather than a qualitative or mixed approach creating a gap in terms of qualitative data (Chee *et al.*, 2017).

3.3. Sample

To access the current state of mobile learning in training, this dissertation aims to reach HR professionals in Portugal or managers with the responsibility for learning and development in their organizations. The sample was non-probabilistic. Individuals in the universe had different probabilities of being selected. More specifically, it was a purposive sample. The participation in the study was dependent on existing e-learning practices in the organization and previous knowledge of the existence of mobile learning.

Forty-nine companies were contacted via LinkedIn to participate in the study. The outlook on the Portuguese landscape for corporate usage of mobile learning was provided by face to face interviews with seven companies representatives willing to share their experience (Appendix I – Interview Guide). Interviews were recorded, with a duration of forty-five minutes on average. Later, information was transcribed. In order to assure privacy and confidentiality, identities of interviewees and respective companies are anonymized. Companies will here forward be addressed through letters. Sectors covered include technology, telecommunications, retail, consumer goods, health, consultancy, and government and public.

Companies diverge in the number of workers ranging from 120 workers to 8500 workers in the retail sector. The average age of workers varies between 35 to 49 years. As to the interviewee's tenure in the company it falls into an interval of 3 to 16 years. The scope of their function spans from general Human Resources to focusing only on Training and Development. Interviewee's age is mostly in the [40,50[interval (Appendix II – Participant Companies General Profile).

3.4. Data collection

This study aims to be mostly an exploratory study. The interviews conducted were semi-structured. Before the interview, it was crucial to align expectations about the time that will be spent and subjects covered. Previously, it was asked to the interviewee for the interview to be recorded. A formal document was constructed to assure confidentiality of the data disclosed, signed by the researcher and delivered to the interviewee at the beginning of the interview. Interviews were conducted face to face but if the interviewee or researcher had conflicting schedules, the interview was conducted via mobile phone. Later, follow-up contacts were to demonstrate appreciation for the availability and to disclose the results of the study.

Until now the literature review has allowed to identify some key topics to be addressed in the interview to both learning and development professionals. The interview started with questions that aim to characterize the organizations of the interviewee. The script will continue with questions regarding the role and evolution of the learning department in the organization.

The script includes view's on mobile learning definition, reasons for adoption, current use in the organization, trainee's reaction to mobile learning, adaptations made to the learning process, type of content included, type of devices used, benefits and limitations perceived in mobile learning for the organization and learners, effectiveness of the training process so far and future initiatives planned. To close the interview, data was collected on the interviewee age and tenure on the organization.

The information collected from interviews was analyzed through content analysis. Data from the interviews was transcribed and then organized into different categories. Data was analyzed using Excel, to facilitate the study performed (Appendix III – Coding Frame in Excel). Later on, data was compared to information previously collected in the literature review and the conclusions reflect on the juxtaposition of what was said by the practitioners and the current state of the topic of mobile learning in the literature.

To sum up, this dissertation gives an outlook on mobile learning in Portugal by collecting insights from a purposive sample of learning and development professionals. A qualitative approach was undertaken, by the form of an interview, with produced data being the target of content analysis using available software for the purpose, and later on, compared with literature review initially held on the subject.

IV. Results

To answer the research questions risen, the next chapter details perceptions shared by human resources and learning, and development managers segmented by codes matching the questions posed: **General perceptions of mobile learning, Current practices of mobile learning, Advantages perceived of mobile learning, Blockers of mobile learning and Opportunities for mobile learning** (Appendix IV- Analytical Framework)

4.1. General perceptions of mobile learning

Participants insights on the mobile learning concept, the way mobile learning is viewed by trainees and the learning models associated with its usage for the organization. This includes e-learning and mobile learning definition, comparison between classroom training and technology-based training, learning perspectives (ubiquitous learning, pervasive learning, informal learning), trainee expected role and trainee's views on technology-based training.

4.1.1. E-learning and Mobile Learning definition

Overall participants see mobile learning as a proxy for e-learning. In their perception e-learning can be used in smartphones and tablets which coincides to them with their inherent concept of Mobile Learning². However, one interviewee from company B stressed that mobile

² For this purpose, going forward mobile learning will be addressed as proxy for e-learning has results are detailed.

learning distinguished itself from the e-learning concept by recurring to the internet to procure knowledge for on the moment learning needs triggered by a specific task.

Company	Quotes
B	<i>“One thing is for e-learning to be accessible from different devices. It is something built by us considering what we want to deliver, customized. Mobile learning is what we can take from the availability of multiple tools, apps and google to learn (...). (...) everything that is the knowledge that exists through our smartphones and the internet to be able to do training.”</i>
D	<i>“Interviewer: What do you define as Mobile Learning? Interviewee: To us, it is the use of e-learning in mobile phones and tablets.”</i>
F	<i>“The platform can be used on the mobile phone (...) We can access the platform through the phone. The platform even has an app”</i>

4.1.2. Learning perspectives (ubiquitous learning, pervasive learning, informal learning)

When addressing mobile learning, less than half of the managers mentioned the use of it as part of a wider learning perspective. In cases where it was mentioned, Mobile Learning is associated by managers with mobility, flexibility, self – development.

Company	Quotes
A	<i>“(...) Because I think that people like to have flexibility, every one of them, they like to learn at their pace, of being able to learn from wherever at wherever time”</i>
B	<i>“Nowadays, in the world of the internet and the digital, knowledge is a click away with mobile learning. We can be constantly learning. (...) We cultivate this with the culture of people doing it by themselves, developing by themselves and give continuity to the e-learning principles”</i> <i>“The person is always responsible for his/hers own development; the person is responsible for managing his/hers career.... We have a lot of training available online...a lot... The question is if the person wants to and has curiosity”</i>

4.1.3. Comparison between classroom training and technology-based training

Half of the companies mentioned that the ideal method for learning would be blended, which includes the usage of both mobile learning and classroom training in the learning journey of the trainee in a certain learning program. Yet, the reasons that justify opting for blended learning diverge for each participant. For one participant, classroom training is seen as crucial to assure a connection between participants. Mobile Learning is not capable of covering social needs. Another participant suggests that mobile learning by itself only responds to more basic initial learning needs. In particular, for one interviewee from company C, mobile learning by itself is not effective for learning purposes.

Company	Quotes
A	<i>“(...) people can't have only e-learning training, it has to be moments where they can be in a room, can be with each other so they get to know one another, to grow their knowledge, their network, its ...”</i>
C	<i>“Only about 10 people finish the courses, in an universe of 1600. People say they have problems accessing certain browsers, that they don't have a lot of time, that the platform is nor user friendly... On the other hand, we have the course of CAP in blended learning e it has worked out well”</i>
F	<i>“E-learning helped for what? For the initial basic needs, ok? This is my vision. And we tried to fulfill it as well. But what was happened, is that it works perfectly, Level one being e-learning, level two being classroom training and level three being coaching and mentoring”</i>

4.1.4. Trainee's expected role

The managers which refer to this topic stress it has being the trainee responsibility because of a wider access to contents that serve his learning needs. In the case of the interviewee from company G, topic was addressed as a shared responsibility between the company and the trainee has it is stressed that the company must provide the necessary time for trainees to learn what they need.

Company	Quotes
B	<i>"(...) we have had growing care of adding to our development and training that the employee is responsible for is development, it's a mutual responsibility between Company B and the employee ... between the head and the employee ... they define development plans, but more than, Company B tries to give access to different types of content to its employees ... The fact that they have access makes them responsible for their development."</i>
E	<i>"(...) the employee. The training is for his self – development."</i>
G	<i>"Interviewer: Who is responsible for learning? (...) Interviewee: I would say both, there is a compromise between both. The organization, because it must provide the training. It must set conditions to give training to its employees. Allow for them to have time, so they can study. But it is also the responsibility of the employee"</i>

4.1.5. Trainee's views of technology-based training

More than half of the participants addressed how trainees in the organization saw mobile learning. Trainees feedback from each company diverges significantly. Some reported lack of time, others about it being too impersonal and, lastly, fear over it replacing opportunities for classroom training.

Company	Quotes
B	<i>"(...) there are a lot of complains for lack of time ...it's not that ... and we have tried to promote that it's a matter of putting it in the agenda, making space for it, have the heads in the same speech, in fact there is always a lot of work, it ends up being something that is left for later, isn't it?"</i>
F	<i>"There are several types of people, including those who like classroom training. People felt that with this they would stop having classroom training. So, in that sense, there was some resistance. It was like "ah okay, this is all very good, but they don't want to give us classroom training"</i>
G	<i>"E-learning should be a breath of fresh air ... The training department has modernized itself and there is a new technology here. As incredible has it seems there was negative feedback which surprised me. "ah, this is so impersonal"</i>

4.2. Current practices of mobile learning

Interviewees experience in training planning, organization, and technology used for mobile learning in the organization. The category aggregates evaluation processes in mobile learning, system characteristics, providers for system and content, description of content provided, and adaptations made specifically for mobile learning and engagement techniques and collaboration tools available in the system for trainees.

4.2.1. System Used and Content Provider

Every participant addressed mobile learning system used and listed content providers. As such, platforms stated included Lynda (Linkedin E-learning platform), Skype for Business, Harvard Management Mentor, Success Factors, Pluralsight, SAP Learning Hub, Degreed and Moodle. Each company uses its own system/platform.

Most participants are pursuing customization of contents either by the company, for global consumption, or in the local subsidiary to respond to local needs. Such is justified by managers to reduce costs and to share the knowledge created inside the company. There are some

companies which mentioned external providers. Providers revealed included SABE online and colleges as INSEAD and Cegoc.

Company	Quotes
A	<i>“We even have some training in e-learning which are made in collaboration with INSEAD and other known institutions (...)”</i>
B	<i>“In 2001 we did the trainings through a third-party platform, beginning in 2003 we started to develop our own content, related to our products, services, and solutions”</i>
C	<i>“Besides the e-learning modules being available through the mobile phone we had other two initiatives. We bought modules from Lynda and Pluralsight for a group of six people”</i>

4.2.2. Description of content provided, and adaptations made specifically for mobile learning

All the interviewees described content existing in the mobile learning platform and the adaptations that are done to assure the effectiveness of the learning process of trainees. The predominant format of the content is video. Additionally, some managers mentioned that Mobile - Learning is used to address mandatory topics by law, for instance the GDPR, as well as for processes specific to the company or, in the case of retail companies, products and services commercialized by the company as mobile learning serves to reach all employees independent of their location.

Managers stress that content as to be clearly divided by functional topics, be more segmented in smaller modules, videos should not surpass three or four minutes to retain attention, releases of modules according to with timings of completion, usage of techniques like storytelling, animation and importance of having content created by employees.

Company	Quotes
B	<i>“(...) each module has a lot of content, which consists of a lot of videos which are easy to see because they are small videos, videos which don’t go beyond the two minutes and the results were very, very positive”</i>
B	<i>“Interviewer: Are there some adaptations that you have made to the learning process, especially for mobile? Interviewee: ah we did ... It is a question of the video, and when we say video, it’s the multiple sides of the video. It can be a video with real people. It can be a product manager talking. Or it can be the development of flash videos. Specifically, animations that can pass the content... We have, for example, don’t know if you know it ... that hand that draws. We have in fact that solution. It is an option that is budget-friendly compared with a video with a real person”</i>

D	<i>“For example, in the case of the Samsung S9 we have content available 24 hours after the launch, in a concept, we call shot-training. Small videos of 3 minutes that speak about the products and include sales pitches”</i>
E	<i>“We are an organization which has to bet on training. Our business is influenced by a strong legal component (...) Our training courses over sales and Marketing support are open to everyone. There is a lot of training content, mostly online. In 100%, 70% is online. We have had e-learning for more than 15 years (...) 70% of our employees have an I-PAD. Our sales force has such a big importance that mobility is key.”</i>

4.2.3. Evaluation Processes in Mobile Learning

Some participants presented the mechanisms in place to assure that training is done and learning transfer occurs. Nevertheless, these mechanics differ between companies. In company E, B and F the trainee starts by doing an assessment in his first entry to the platform to have contents customized to his learning needs. Furthermore, in company A e B the trainee’s manager is involved for approval in trainings which have a cost. In company A, all trainees must finish trainings they are enrolled in if it involves having trainers involved online, otherwise the cost is inputted to the area. In company G, the trainee cannot advance to new contents until he has finished previous ones. In company B and E, there are quizzes in modules and at the end of the courses which have a minimum mandatory score for the trainee to be able to pass the course.

Company	Quotes
B	<i>“With the upgrade, we made to the platform we have the possibility for the person to customize their homepage to their topics of interest (...)”</i>
B	<i>“The employee has to be able to assess what he was learned, is it not? We make questions that allow him to consolidate the information reviewed. Almost every course has a quiz in the end which demands a minimum score to pass. Our score is 80%. Between 70% to 80%. If I don’t reach that score, we give two other tries. So, we give three chances for the person to be able to reach the minimum score and that forces the person to review the content”</i>
E	<i>“At the beginning of the training, we have an online assessment, which creates a customized plan. We have a group of courses which are mandatory. We have training actions by business area. Some have costs, some don’t. When they have costs, you must have your manager approval. In the end, there is an evaluation and certification.”</i>

4.2.4. Engagement techniques and collaboration tools available in the system for trainees

More than half of the companies said to have in place engagement techniques for trainees. In detail, techniques mentioned included virtual classroom forums with trainers, communication of advantages of mobile learning usage, on-site help for technical issues with the platform, events at closing of courses for idea sharing plus celebrating and use of *gamification*, where points are attributed to trainees for the usage of the platform in a visible space to drive competition, ultimately raising awareness and fun for trainees.

Company	Quotes
B	<i>“Besides doing e-learning training, we also do a lot of virtual classrooms (like forums, where trainees can interact and there is a moderator).”</i>
F	<i>“For each training people make they win a point. This stirs some competition (...) Gamification... we start to play with each other ... there is offline competition between teams. “My team members all have a minimum of 100 points. You don’t?” It is fun. It started to build some mini rivalries between teams. It was great because it created more effort and a stronger engagement”</i>
F	<i>“We have built some core messages to pass to people. “In your way home, or to the office, take advantage of these times” If the person uses public transportation or someone is driving. She or He can make some courses”</i>

4.2.5. System characteristics

Participants from companies F and B provided some information over the mobile learning platform and its functionalities. In company B, the mobile learning platform sends several communications according to the due dates for modules, it allows to do links for external data sources, and it holds augmented reality features for certain courses. In company F, the platform allows for profile customization, selection of customized training plans, following other trainees, comments of content, likes and dislikes, adding external content later reviewed by the learning and development team, creation of groups with other trainees and peer and manager content plan recommendation.

Company	Quotes
B	<i>“(…) we do a previous communication preparing the setup, afterward, in the day the course starts, the platform sends an email, with the access to the course and the due dates to do it. Then the system sends out alerts if the person does not finish accordingly. The closer it gets to the due dates, the more recurrent are the alerts”</i>
F	<i>“Company F has launched a new training platform, called “My Learning; it uses degreeed application... Deep down it’s a social network for internal training. Each person has their profile, they put up their picture, says what are their knowledge areas, their skills, their capabilities, which they already have or want to learn. People can create their learning paths both professionally and personal (...) they can follow people (...) they can include content inside the platform (...) it is all registered (...) then it is analyzed by a team at Company F (...) Each content also has comments, they also have a like and not like button”</i>

4.3. Advantages of mobile learning

Managers views on the positive aspects of the usage of mobile learning in their organization. Advantages raised include access to knowledge anytime, access to knowledge anywhere, matching younger generations expectation, easy collaboration between trainee’s, adaptation to individual trainees needs and reduction of training time.

4.3.1. Access to knowledge anytime

Participants from company F and G stressed that mobile learning serves a great purpose by enabling trainees to access knowledge at the time more suited to them, enhancing flexibility.

Company	Quotes
F	<i>“What e-learning also brings something fantastic. People can do their trainings in the schedule more suited to them. We know perfectly and there are a million different studies about it: people work in different rhythms and at really complicated schedules.”</i>
G	<i>“Imagine, sometimes that a person is in the hospital, or is somewhere. “Well, I could have brought a book to read” She goes into the application she has on her phone. I speak about the phone because it is generally with people have with them, not a tablet. “Look, let me read a bit about health and safety at work. While they don’t call me it is taking advantage of the time”</i>

4.3.2. Access to knowledge anywhere

More than half of the participants agreed that mobile learning brings added value by making knowledge available to all the employees of the company independent of their location. This is more noticeable in global companies and/or in the retail sector.

Company	Quotes
B	<i>“So, people who are where, in Italy, in Spain, in Germany, in the UK. They had a spot in training session”</i>
G	<i>“We had to rethink our training processes, especially methodologies, so we could reach all employees. Obviously, that was only possible with an e-learning platform.”</i>
A	<i>“Because it is like this, Bárbara, e-learning is something totally embedded in the way we learn, how we share contents and share information. It’s is the best way the company has to scale in order to reach 120 000 employees, actually 124 000, if I am not mistaken, in 120 countries. E-learning is an amazing platform that allows to share content and develop people ... we know that people have the same level of information”</i>

4.3.3. Reduction of training time

Another advantage appointed by some participants was the reduction of training time. It implies that trainees can do learning activities in time slots which without mobile learning would not be possible, hence leaving time for trainees to focus on job-related tasks.

Company	Quotes
C	<i>“The main reasons to use mobile learning? Interviewee: It is essentially the portability. Here people don’t have much time and mobile learning comes to mitigate that”</i>
F	<i>“It is important, it’s good. It an advantage, people spent less time in training, or they don’t take that much time doing specific courses”</i>

4.3.4. Possibility for adaptation to individual trainees needs

Some managers addressed how mobile learning gave the opportunity for trainees to have their individual learning needs meet, going as far as pursuing their personal interests, while also allowing the company to save costs.

Company	Quotes
B	<i>“With the upgrade, we did to the platform we have the possibility for the trainee to customize his entry page according to with his interests, both professional and personal”</i>

F	<i>“This is one of e-learning’s advantages, usually to do training we have to have a minimum number of people who have that specific learning need. We can’t do it for one person, it is too expensive. E-learning came to change that”</i>
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4.3.5. Easy collaboration between trainees

In company B, it was stressed that gamification could be a trigger for collaboration between trainees.

Company	Quotes
B	<i>“With gamification, being able to create groups and so much so. It ends bringing a lot of collaboration”</i>

4.3.6. Matching younger generations expectation

The manager from company G stressed that mobile learning has a way to respond to younger generations expectation.

Company	Quotes
G	<i>“To the new generations, it is good, because it shows that the company also evolves”</i>

4.4. Blockers for mobile learning

Participants opinions on the main pain points of mobile learning in their organization. The grouping includes Hardware and Infrastructure limitations, Lack of possibility to socialize and interact for the trainees, Lower control of learning process, Low engagement and concentration by trainees and Low technology skills by trainees.

4.4.1. Hardware and Infrastructure limitations

Half of the participants mentioned that mobile learning has inherent constraints due to factors linked with the equipment (battery limitation, screen size) as well as infrastructure issues linked with internet access. The manager from company F went on to link the lack of usage of mobile learning to device limitations.

Company	Quotes
B	<i>“Yes, there is the question of the size of the screen. These are in fact limitations. For example, in the case of the battery. We should have almost wireless charging, isn’t it? The phone should be around and being able to charge”</i>
C	<i>“There are people who don’t have mobile data.”</i>

F	<i>“I think it is a disadvantage of mobile so much so that not everyone uses it. Devices have small screens, camera resolution is weak, there is the matter of the storage space, battery limitations...”</i>
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4.4.2. Lack of possibility for trainees to interact and socialize

Close to half of the participants mentioned that mobile learning undermined the possibility for trainees to establish relationships during training moments. Participants from company G and A emphasized that mobile learning didn't allow to establish relationships in comparison with classroom training. Moreover, the manager from company A stressed that it was particularly hard for trainees which are introverts.

Company	Quotes
B	<i>“I can tell you that when we started to invest more in e-learning people would say, “oh, e-learning, we won't have there someone to help us”</i>
G	<i>“I think there which is lost: the interaction e the social component. While in classroom training there is socialization, interaction, mutual help. There are relationships formed. Here there is none of that, is null. And it is like that in most of the e-learning platforms. Even if there is a chat, you cannot convince me.”</i>
A	<i>“It is easier if it is classroom training that e-learning. I am going to explain why... there are people who are more introverted. Sometimes, behind a pc, it is easier for them to interact that expose themselves in a classroom, but a lot of times, not even in that way they interact”</i>

4.4.3. Low engagement and concentration by trainees

Half of the managers claimed that trainees felt that mobile learning trainings were not a priority compared to their job activities. The participant from company F further explains this feeling by comparing mobile learning with classroom training. The last one is seen by trainees as an opportunity which will not repeat itself and, during it, trainees are more focused. In company C, participants difficulties with the platform are identified has another possible factor for low engagement with mobile learning.

Company	Quotes
C	<i>“People say that they have difficulty accessing certain browsers, that they don’t have a lot of time, that the platform isn’t user-friendly”</i>
F	<i>“When we do classroom training, it is in that day, at that time and it does not repeat itself. It always brings more results because people are focused on that, they are thinking about that. They are not distracted by other matters, so they can focus. Have more commitment, like it more, be more satisfied, learning more and putting in practice what they learned”</i>

4.4.4. Low technology skills by trainees

Half of the managers spoke on the lack of necessary skills by trainees to use the mobile learning platform. The key reason associated by the managers was the age of the trainees, prompting the idea that trainees which are older needed more support to use the platform. Additionally, the participant from company F accentuated that technological skills were critical as part of the on-going trend for the trainee to take higher responsibility for his self-development.

Company	Quotes
D	<i>“There is some resistance. Our population goes from 18 to 54. We have families that work for us. To mitigate that we have several support channels”</i>
E	<i>“People who are older have more difficulty”</i>
F	<i>“It is more and more in people’s responsibility, the seeking of knowledge, training, this recommendation to their peers. So, not knowing how the platform works is a big disadvantage. Because I want it to pass to their side, but there are some difficulties and questions”</i>

4.4.5. Lower control of the learning process

Close of half of the managers presented concerns over the learning process in mobile learning although for different reasons. The participant from company G addressed uncertainty about knowledge acquisition. While the manager from company A stated that it’s not possible in a mobile learning environment to respond to situations where the trainee shows signs of difficulties, favoring classroom training. Lastly, in company F, the participant stresses that its harder to get feedback in mobile learning because people don’t respond to feedback requests over the courses attended thwarting improvement measures to be taken.

Company	Quotes
G	<i>"I cannot know for sure what the person really knows. If we think it through, that is exactly why classroom training has a better reputation."</i>
A	<i>"If we are in a room, the trainer can see the person, maybe he can encourage her"</i>
F	<i>"This can be a mini disadvantage of e-learning. It constantly asks us for feedback and comments. Not that classroom training does not do the same, but it is in the end (...). As soon as we finish it, we do it. In e-learning, we spend some much time in front of the computer that we don't feel like evaluating it, and this is clear in the dispersion of training evaluations. We can clearly see that people say "okay, I will do it later" and then they end up not doing it"</i>

4.5. Opportunities for the adoption of Mobile Learning

Managers perception of what could be done to improve mobile learning adoption in their organization and emerging technologies which could leverage the trainee's experience. The section holds Improvements for the mobile learning platform and technology trends associated with mobile learning with potential for implementation in the organization.

4.5.1 Improvements for the mobile learning platform

More than half of the managers indicated possible improvements for the existing mobile learning platform. In sum, ideas spoken by managers revolved around content production. In more detail, enhancements included more content developed in partnership with top universities, have more employee produced content, create local content in the case of global organizations. Other improvements involve adding a chat for trainees in the system used and communicating more clearly timings for module completion.

Company	Quotes
A	<i>"Maybe in 3 years, there will be a bigger connection with universities, for example, INSEAD or Harvard, so they can also make available more online training"</i>
D	<i>"We would like for employees to be the main content creators"</i>
F	<i>"We would like it to be more interactive. Had more videos. Have someone on the other side. That the platform would have a chat, for instance."</i>
C	<i>"We plan to keep using e-learning but we will set up timings for people to finish their courses and contents will be adapted to Company C reality"</i>

4.5.2. Technology trends associated with mobile learning with potential for implementation in the organization.

Almost every manager expressed himself over emerging technologies that could be implemented in their organization. Technologies discussed included artificial intelligence to provide push content according to trainee's job tasks, having personal assistants giving suggestions according to with the calendar of the trainee, geolocation combined with augmented reality, apps for specific learning events like onboarding, chatbots to simulate discussions with clients, virtual reality, immersive experiences, and gamification.

Company	Quotes
A	<i>"I am working and being able to tell my personal digital assistant to schedule my trip. And she can say "You know you have a new training in the platform about that matter" Or say, if you are having a meeting with that client that then there is an article available in the library that can help you"</i>
B	<i>"Or geolocation. We have the idea of doing a digital peddy-paper to new employees that will use augmented reality"</i>
D	<i>"Forward down the road we have the ambition of launching an application with gamification"</i>
E	<i>"Augmented reality. I am curious to see what we can achieve with this new technology"</i>

V. Discussion and Conclusions

The present study seeks to contribute to filling the existing literature gap on how managers perceive mobile learning for training and development purposes in organizations and describe current practices in Portugal.

The main research question concerns the differences in managers' perception of learning and development when comparing mobile learning to e-learning and classroom training. There is a homogenous view of mobile learning as an extension of e-learning, with the use of it in devices such as tablets and smartphones.

However, when looking at learning concepts deeply associated with mobile learning and which, theoretically distinguish it from e-learning, perceptions of managers disperse. Few associate mobile learning with pervasive and autonomous learning, not taking advantage of the possibility of using it for on-the-go training needs and triggering self-reflection and peer interaction. These factors are critical for the creation of informal learning moments. In contrast, participants made a clear link to ubiquitous learning, for learning and anytime and anywhere as also mentioned on the advantages of mobile learning.

In comparison with classroom training, participants find mobile learning more effective when a blended method is deployed. Salas *et al.*, (2012) had emphasized that the delivery mode isn't critical compared with the pedagogical features of content for the effectiveness of the technology-based training.

Lastly, when looking into the expected role for the trainee, just about half the participants place the trainee as the primary agent for his self-development. The premise of the trainee as an active agent is critical for technology-based learning. Noe *et al.*, (2014) and Ellingson and Noe (2017) stated that only when the learner is considered an active agent and his social needs are met can he be fully embedded in the learning environment. As such, trainees would benefit from more opportunities for social interaction. Additionally, the trainee benefits from participating in the learning goals definition and guidance through his learning journey in the mobile learning environment. Feedback from trainees in the different companies stresses this idea. There is feedback from lack of time to do mobile learning training and an impersonal environment.

A look into current practices of mobile learning provides further detail into best practices. This is key for technology-based training as its pedagogical features, with a focus on learner control, are ultimately what drives its effectiveness (Bell *et al.*, 2017). Content development mentioned by participants goes in line with information design strategy recommended for

mobile learning. Currently, managers are opting for segmented contents, use of short-time videos and employment of storytelling techniques. The tendency to take over production of contents locally, including requesting users to contribute with content, can increase information quality which contributes to user satisfaction and use of mobile learning. In detail, it fosters applicability and reliability of the information as it depicts situations that are closer to the trainee reality. However, the employment of these practices still differs significantly among the seven companies. Hence companies which are now starting to use mobile learning can benefit from initiating content development with these principles pinned.

The starting evaluation process done by trainees for customizing the mobile learning contents shown to them are approached in literature has the key to fulfill cognitive needs as described in the UGT theory. Trainees go into the platform expecting to find information that answers their specific questions and that influences their adoption of the platform. As for final training assessments of modules and courses approached, these are consistent with learning and development evaluation standards (Bell *et al.*, 2017). Moreover, it's important to consider that these assessment moments should be diversified, which according to the IS Success Model impacts user satisfaction, leading to higher usage of the platform.

One of the most important factors for mobile learning adoption is satisfying the social needs of trainees as expressed in the UGT theory and the IS Success Model. In accordance with UGT theory, social needs have the highest influence over user adoption. Furthermore, affective needs which translate into personal fulfillment, are also determinant for user adoption. As in the IS Success Model, Learner perceived interaction with others is a driver for user satisfaction, which influences the use of the platform. More than half of the companies have in place engagement techniques and collaboration tools for trainees. Participants mentioned some examples like Virtual Classrooms and Gamification, which are critical to attend to both social and affective needs of the trainees and trigger Learner perceived interaction with others but it's not widespread in companies studied. When we look to systems used in companies B e F, the system used in company F includes a range of functionalities that respond to social needs and that serve as example of platform characteristics for this purpose: following other trainees, comments of content, likes and dislikes and creation of groups.

Participants followed by describing the advantages of mobile learning with little consensus among them. A small group of advantages was selected in comparison with those described in the literature. From the group introduced by participants, "access to knowledge anywhere" was the advantage most mentioned. This is particularly significant as this advantage matches the core concept of mobile learning of mobility and flexibility.

Companies also indicated several pain points with a stronger agreement among them. In most cases, participants tend to compare classroom training with mobile learning, especially when addressing “lack of possibility for trainees to interact and socialize”, “low engagement and concentration by trainees” and “lower control of the learning process”. Measures in place by companies which use mobile learning for a longer run, described in the paragraphs above over current mobile learning practices, can be used to surpass such limitations.

When addressing opportunities for mobile learning, participants already convey will to invest in more collaboration tools, like chats within their mobile learning platforms, and also mention adapting in a higher measure their contents to the local context.

Another subject approached by participants when discussing opportunities was emerging technologies with the potential for implementation in the organization. Most of the mentioned technologies are aligned with those mentioned by published authors in literature but participants extend possibilities for mobile learning with the mention of immersive experiences or chatbots. Nevertheless, participants didn't mention MOOC'S. MOOC'S could help companies save resources while serving more learning opportunities for trainees. These courses are usually free, have external platforms with collaborative techniques already set up and are done in partnership with recognized universities like Harvard and Stanford. Learning and Training professionals could analyze the current offer in the market and discuss the possibility for enrolment with trainees in the performance review process or have learning needs arise in their context.

In general, practitioners' perception and experience diverges significantly. Yet companies which use mobile learning for a long time and adoption models covered in literature review can provide insight into working practices that leverage the learning experience for companies which have started using mobile learning more recently.

In outline, the main takeaways to drive mobile learning adoption are:

- It has greater utility perceived in companies with a higher number of employees which are usually dispersed by different locations. In detail, it has the potential to take knowledge anywhere in both a standardized and customized way, which is the main advantage for Mobile Learning in Manager's perceptions. This perceived utility serves as a driver for user satisfaction, establishing a foundation for use;
- Creation of opportunities for on-the-go training needs, producing more content directed at microlearning;

- Increase use of mobile learning to support classroom activities or pivotal moments in the career of the employee-related with the company and his business area strategy, functional tasks or cross-functional projects by pushing moments of self-reflection and peer interaction based on informal and autonomous learning principles;
- Take the opportunity to create blended training moments which introduce trainees to mobile learning platforms and enable the transfer of positive feelings towards classroom training and relations formed in that setting into the technology learning process;
- Create guided journeys for trainees, include mobile learning as an option when defining trainees learning goals, communicate the most important upcoming learning events, release modules in a segmented way according to with expected completion and use gamification challenges that direct trainees to activities that must be done while fostering collaboration. Such measures can also balance blockers related to the perception that mobile learning creates a lower control over the learning process;
- Opting to create content for mobile learning locally in line with instrumental design principles: employing storytelling, a shorter but high volume of modules, visual information, condensed text prompting higher information quality and, ultimately, user satisfaction and use of mobile learning;
- Diversify training assessment moments which can be achieved by introducing peer reflection and gamification techniques to quizzes for knowledge acquisition;
- Leverage more opportunities to fulfill users social and collaboration needs, as a pivotal driver for user satisfaction with mobile learning and adoption of the platform. In that sense, more collaboration functionalities should be deployed in systems used as, for example social media inspired functionalities, usage of virtual classrooms, or other technologies that managers see has opportunities like chatbots.
- MOOC'S are little disseminated among managers interviewed and could be a source which allows companies to save resources while accessing quality material and systems which take into consideration collaborative needs. There is a possibility to review existing MOOC'S and integrated them into the learning offer, according to needs assessment which triggers the learning process.

In sum, mobile learning is recognized as a key element in the corporate learning and development landscape in the face of a currently expanding and diverse workforce. However, current practices diverge, and while some companies are striving in this learning technology

adoption, others struggle in taking full advantage of the method. At present, managers can benefit in focusing on pedagogical features within the learning process and investing in fulfilling the social needs of trainees as a key driver for adoption and effectiveness of the training activities.

VI. Limitations and future research

The present study suffers from some limitations which should be highlighted and sheds light into possible paths to be explored for researchers in the mobile learning field.

The standout limitation is the scarce sample size. Only seven companies felt comfortable in participating in the study due to the sensitivity of the information being collected and the requirement of having e-learning and being aware of the mobile learning concept. Hence, the sample does not allow for generalization of results to the Portuguese reality.

It would also be relevant to apply the IS success model to the corporate learning reality. While conclusions of the present study address several variables of the model like Information Quality and Learner Perceived Interaction With Others for clues into measures that can trigger adoption, it's not possible to know the full extent of the variables influence and prioritize such measures without a comparable study in the same setting. The quantitative nature of the study would allow for a better understanding of the variables influence adoption and strengthen confidence in the measures to be taken.

Future studies for mobile learning could also consider other stakeholders such as trainees, middle managers, which play a significant role in development activities, and suppliers for mobile learning platform and content to provide a complete picture of the perceptions of this learning method. The inclusion of suppliers would allow doing a match between the current offer in comparison with what organizations are pursuing. Moreover, a study case over the implementation of the platform in the form of a longitudinal study, from the study initially conducted to 3 to 5 years after deployment, would provide significant clues for improvement of this process for other organizations interested in launching mobile learning initiatives.

In summary, the present study is a small contribution to the mobile learning body of knowledge with clear limitations in sample size and research techniques. Studies in the future can benefit from employing quantitative methods, involving other stakeholders, and accompanying the process for implementation in an end-to-end perspective filling a persisting gap of mobile learning research applied to the corporate training field.

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VIII. Appendix

APPENDIX I - INTERVIEW GUIDE



Data collection for thesis in Management

Mobile Learning for Corporate Training in Portugal: Current Challenges and Future Directions

Script for interview

(Great the interviewee and appreciate the availability)

I. Context

Currently, there is a lack of information about mobile learning applied to the working adult context. This interview is part of a master project that aims to provide an outlook on mobile learning applied to corporate training in Portugal. Current changes in companies' workforce and technological advancements have added emphasis to the need to study mobile learning in the corporate context. To fulfil that purpose, several interviews will be held with professionals in the Training and Development area in Portugal.

II. Interview procedures

The conversation will focus mainly on the evolution of training and development in your organization. We foresee that will take about 40 to 50 minutes. Feel free to ask any question that comes to mind.

I ask if the interview can be recorded for future analysis.

You have the right to end the interview at any time if you wish to do so.

The data collected will be confidential. The name of the present company will be replaced for an alias. The results of the study, that will include a literature review and a qualitative analysis, will be sent to you in September of the present year.

III. Script

Description of the training department

1. Can you describe to me the evolution of the training and development department in *(name of the organization)* in the last 3 years?

Probe questions:

- Do you aim at been recognized as a learning organization? How?
- If there is no training department, how is training evolved in the organization?
- What were the main priorities of the department in the last 3 years?
- What were the main results of the training department in the last 3 years?

2. What importance does top management attributes to learning in the organization?
3. Who is the main responsible for learning in this organization: the organization or the employee?
Probe questions:
 - How is the organization responsible? How is the employee responsible?
 - Why?
4. What is the importance of technology enhanced training in the overall strategy/program of the training development department?
Probe questions:
 - Did you have e-learning initiatives in the organization in the last 3 years?
 - Why did you launch these initiatives?
 - How do these initiatives come to be? What was necessary to launch these initiatives?
5. What are the advantages you see in e-learning?

Advantages in the adoption of e-learning		
Advantages listing	Please add a cross if the phrase applies to your context:	Priority
Reduction of training time (Bell <i>et al.</i> , 2017)		
Lower maintenance costs than classroom training (Noe <i>et al.</i> , 2014)		
Highly customizable to learner needs (Kimiloglu <i>et al.</i> , 2017)		
Key for the company to obtain a learning organization profile (Kimiloglu <i>et al.</i> , 2017)		

6. What were the main blockers/hinders in your adoption of e-learning?

Blockers in the adoption of e-learning		
Blockers listing	Please add a cross if the phrase applies to your context:	Priority
High development and implementation costs (Noe <i>et al.</i> , 2014)		
Lower control of learning process (Noe <i>et al.</i> , 2014)		
Lack of internal knowledge to accompany the implementation and maintenance of the platform (Kimiloglu <i>et al.</i> , 2017)		
Lack of possibility to socialize and interact for the trainees in the e-learning training (Kimiloglu <i>et al.</i> , 2017)		

Views on mobile learning

7. How do you define mobile learning?

Probe questions:

- What devices do you associate with mobile learning?
- Can you give me examples of use of mobile learning that you identify has great case studies?
- What differences do you think it has in comparison with e-learning?

8. Would you consider using mobile learning? / What are main reasons to use mobile learning?

9. Currently, does the organization use mobile learning?

Probe questions:

- What was/would be necessary to launch a project like this?
- Can you give me a quick overview of the existing initiatives ?

10. What were the employees' reaction to mobile learning?

Probe questions:

- What drove users to adopt mobile learning?
- How did you mitigate negative reactions?

11. Were there adaptations made the learning process? What adaptations were there?

12. How did this affect the learning content?

Probe questions:

- How did you produce this content?

13. What benefits did the organization perceive with mobile learning?

Advantages in the adoption of mobile learning		
Advantages listing	Please add a cross if the phrase applies to your context:	Priority
Access to knowledge anytime and anywhere (Pappas <i>et al.</i> , 2017)		
Promotion of interactivity between trainees and instructors (Pappas <i>et al.</i> , 2017)		
Easy collaboration between trainees (Pappas <i>et al.</i> , 2017)		
Matching younger generations expectation (Noe <i>et al.</i> , 2014)		
Possibility for adaptation to individual trainees needs (Hashim <i>et al.</i> , 2015)		
Promotion of informal learning (Chee <i>et al.</i> , 2017)		
Support for on-going classroom initiatives (Terras and Ramsay, 2012)		

14. What limitations came up by using this method?

Probe questions:

- What limitations did you foresee in using mobile learning?

Blockers in the adoption of mobile learning		
Blockers listing	Please add a cross if phrase applies to your context:	Priority
Lack of financial resources to purchase mobile devices (Chee <i>et al.</i> , 2017)		

Lack of security (Mohammadi, 2015; Shuib <i>et al.</i> , 2015)		
Dependency on the internet connection (Mohammadi, 2015; Shuib <i>et al.</i> , 2015)		
Access through devices with low quality (include small screen size, camera resolution, touch screen technology, storage space, battery limitation) (Mohammadi, 2015; Shuib <i>et al.</i> , 2015)		
Costs with material adaptation and tutor preparation (Terras and Ramsay, 2012)		
Low engagement and concentration by trainees (Terras and Ramsay, 2012)		
Low technology and informational literacy skills by trainees (Terras and Ramsay, 2012)		
Not identified as a priority by upper management (Pappas <i>et al.</i> , 2017)		

15. How effective are the mobile learning initiatives?

Probe questions:

- What do you think would be necessary to guarantee the effectiveness of these initiatives?

16. Do you have future mobile learning initiatives planned?

(Anticipate that the interview is almost ending)

17. What developments do you anticipate for mobile learning in the next 5 years?

IV. Interview closing

18. How many workers does the company has?
19. What the average age of the workforce in this company?
20. What is your tenure in the organization?
21. What is your function in the organization?
22. Please select an age interval below:

[20,30[; [30-40[; [40,50[; [50,60[

(Appreciate again the availability)

APPENDIX II - PARTICIPANT COMPANIES GENERAL PROFILE

Company Code	Headcount (In Portugal)	Sector	Operating Areas	Number of years using e-learning	Average age in the company	Tenure of the interviewee	Function of the interviewee	Age interval of the interviewee
A	600	Technology	Local Subsidiary	>5	38	6	HR Manager	[40,50[
B	1500	Telecommunications	Local Subsidiary	>5	38	18	Learning and Development Specialist	[40,50[
C	1600	Public Sector	National Company	<5	49	10	Didactical Coordinator	[40,50[
D	8500	Retail	Local Subsidiary	<5	35	11	Training Director	[40,50[
E	120	Industrial and Pharmaceutical	Local Subsidiary	>5	38	16	Head of Human Resources	[40,50[
F	500	Consumer Goods	Local Subsidiary	>5	40	3	HR Specialist – Learning and Development/ Talent Programmes	[20,30[
G	1000	Consultancy	National Company	<5	35	12	Training manager	[40,50[

APPENDIX III – CODING FRAME IN EXCEL

Total number of quotes	134
Subject	N° of quotes
General Perceptions of mobile learning	30
Comparison between classroom training and technology-based training	4
E-learning and mobile learning definition	7
Learning perspectives (ubiquitous learning, pervasive learning, informal learning)	9
Trainee role	5
Trainee's views of e-learning and mobile learning.	5
Current Practices of mobile learning	53
Description of content provided, and adaptations made specifically for mobile learning	16
Engagement techniques and collaboration tools available in the system for trainees.	7
Evaluation processes in mobile learning	6
System characteristics	9
System Used and Content Provider	15
Advantages of mobile learning	13
Access to knowledge anytime	2
Access to knowledge anywhere	5
Easy collaboration between trainees	1
Matching younger generations expectation	1
Possibility for adaptation to individual trainees needs	2
Reduction of training time	2
Blockers of mobile learning	20
Hardware and Infrastructure limitations	4
Lack of possibility to socialize and interact for the trainees	3
Low engagement and concentration by trainees	4
Low technology skills by trainees	3
Lower control of the learning process	6
Opportunities for mobile learning	18
Improvements for the e-learning/mobile learning platform	6
Technology trends associated with mobile learning with potential for implementation in the organization.	12

APPENDIX IV – ANALYTICAL FRAMEWORK

Category	Sub-Category	Meaning
General Perceptions of Mobile Learning	E-learning and mobile learning definition	Access if mobile learning is seen as part of the e-learning of or stands has a separate concept.
	Learning perspectives (ubiquitous learning, pervasive learning, informal learning)	Validate if mobile learning is associated with learning perspectives that focus on learning anytime and anywhere (ubiquitous learning) and learning as needed both formally and informally (pervasive and informal learning).
	Comparison between classroom training and technology-based training	Validate the importance given to classroom training in comparison to technology-based training and compare the perceived effectiveness of both methods. Validate the existence of blended training methods.
	Trainee expected role	Access if the learner is seen as the primary responsible for his development.
	Trainee's views of technology-based training	Collect trainees' feedback on technology-based training.
Current Practices of Mobile Learning	System Used and Content Provider	Identify the main mobile learning systems used and content suppliers
	Description of content provided, and adaptations made specifically for mobile learning	Depict the type of content shared in mobile learning and specific adaptations made to influence knowledge transfer
	Evaluation Processes in Mobile Learning	Access how the training and learning processes are affected by the usage of mobile learning

	Engagement techniques and collaboration tools available in the system for trainees	Collect how Human Resources and Learning Managers are fostering engagement for mobile learning and enabling collaboration between trainees
	System characteristics	Identify the main functionalities (actions that can be performed by trainees) of the mobile learning system used
Advantages of Mobile Learning	Possibility for adaptation to individual trainees needs	Grasp if mobile learning facilitates responding to individual trainee needs when compared to classroom training
	Access to knowledge anytime	Evaluate if mobile learning enables access to knowledge at the time more suited to trainee
	Easy collaboration between trainees	Access if mobile learning encourages collaboration between trainees
	Reduction of training time	Analyze if mobile learning enables time savings for trainees
	Access to knowledge anywhere	Understand if mobile learning is recognized as an enabler for knowledge in any place, fostering mobility
	Matching younger generations expectation	Validate if there is an association between mobile learning and younger generations
Blockers of Mobile Learning	Hardware and Infrastructure limitations	Confirm if device shortcomings and network access limits mobile learning usage
	Lack of possibility for trainees to socialize and interact	Denote if mobile learning is associated with fewer opportunities for trainees to engage than classroom training
	Lower control of the learning process	Access the perception than mobile learning reduces the control over trainees learning process than classroom training
	Low engagement and concentration by trainees	Validate if there is an association amongst mobile learning and lower engagement and concentration by trainees in comparison with classroom training
	Low technology skills by trainees	Pinpoint if low technology skills by trainees are identified as a limitation for mobile learning usage

Opportunities for the adoption of Mobile Learning	Improvements for mobile learning practice	Collect possible actions to increase efficiency and effectiveness of mobile learning in organizations
	Technology trends associated with mobile learning with potential for implementation in the organization	Identify emerging technologies which could leverage mobile learning usage