THE DEVELOPMENT OF ENTREPRENEURIAL COMPETENCIES THROUGH MOBILE LEARNING

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Abstract

Many individual entrepreneurs in developing countries start their businesses without preparation and have scarce resources to attend educational or training activities, because they usually work alone and many of them work on the move (e.g.: in street commerce or visiting clients). However, nowadays there is a broad range of educational possibilities with the spread of mobile ICT that can support flexible forms of learning. This paper explores how individual entrepreneurs can develop their entrepreneurial competencies via mobile learning. We conducted a Design Science Research (DSR) to create an artifact (an m-learning method) to support the development of entrepreneurial competencies by individual entrepreneurs in Brazil. We considered the situated learning perspective and the pedagogy of autonomy as the theoretical background to create the artifact. The 61 participants that tested the artifact perceived a set of m-learning affordances that helped them to develop some elements of their entrepreneurial competencies, such as financial management and operational management capabilities, and felt stimulated to improve and professionalize their businesses. We also discuss the limitations of mobile learning, generating suggestions for practical applications of this modality and questions for future research.

Key Words: Entrepreneurial competencies, Mobile Learning, Situated Learning, Pedagogy of Autonomy

1 - INTRODUCTION

It is nowadays taken for granted that entrepreneurship is a key driver of economic development (Naudé, 2010); it helps to create new jobs and can provide people with career opportunities that fit their preferences better than waged employment (OECD, 2017). There is also an acknowledgment that the success and growth of small enterprises are related to the competencies of the entrepreneurs (Bird, 1995; Man et al., 2002; Mitchelmore & Rowley, 2010). Policymakers recognize the importance of investments in entrepreneurial competencies development and entrepreneurship education for business and economic development (Mitchelmore & Rowley, 2010; O'Connor, 2013).

Entrepreneurial competencies involve elements that are rooted in a person's background (traits, personality, attitudes, social role, and self-image) and skills and knowledge that can be developed through practical experience, training and education (Man & Lau, 2005; Mitchelmore & Rowley, 2010). A combination of these elements is necessary; for instance, it is not sufficient to have the internal drive to start a business, it is necessary to organize and control it; entrepreneurial competencies also involve management skills (Man et al., 2002).

Many individual entrepreneurs start their business informally, especially in developing countries, facing difficulties to deal with technical issues and financial management, feeling marginalized in the economic system (International Labour Organization, 2017). Frequently, these entrepreneurs lack important elements of entrepreneurial competencies, such as management, planning or analytical skills (Bonnstetter, 2013).

However, nowadays there is a broad range of educational possibilities with the spread of mobile information and communication technologies (ICT), that can support flexible forms of learning, in times and places appropriate to individuals (Unesco, 2014). On average, 8 out of 10 people in the developing world own a mobile phone (World Bank, 2016). Mobile devices and tablets accounted for 51.3% of Internet access worldwide and exceeded desktop access (48.7%) in October 2016 (StatCounter Global, 2016). This spreading of mobile ICT and its

possible uses for learning activities originated the concept of mobile learning (m-learning). It refers to learning processes supported by the use of mobile ICT which have as fundamental characteristic the learners' mobility, who may be physically or geographically distant from formal educational spaces, such as classrooms or training rooms (Brantes et al., 2013).

Wu et al. (2012) made an extensive review of the literature showing that the majority of the studies on m-learning present positive outcomes (86% of 164 studies). However, there is a lack of research on m-learning practices in adult education and in organizations (Fulantelli et al., 2015). Most of the studies on this subject are concentrated in higher education and in elementary education, respectively (Wu et al., 2012). Considering this gap, this paper focuses on the following research question: *how individual entrepreneurs can develop their entrepreneurial competencies via mobile learning*?

We show data from a concrete experience of m-learning for the development of entrepreneurial competencies by individual entrepreneurs in Brazil. Brazil has one of the highest entrepreneurship rates in the world; 36% of the adult population runs their own business (Sebrae, 2016). In the last decade, the number of formalized entrepreneurs increased due to the "MEI law". MEI stands for Micro Individual Entrepreneur, a legal category of enterprise instituted by a federal law (Brazil, 2008). However, data show that 38% of these MEI have educational levels lower than high school, facing difficulties in the management of their businesses (Sebrae, 2016). We conducted a Design Science Research (DSR) to create an artifact (an m-learning method) aiming to support the MEI on the development of these competencies (Mitchelmore & Rowley, 2010).

Through the artifact application, we explored the educational affordances of m-learning (Liaw et al., 2010; Looi et al. 2009; Orr, 2010) perceived by the 61 MEI that participated in our study, which help them to develop some elements of their entrepreneurial competencies, such as financial and operational management capabilities, also stimulating them to improve and professionalize their businesses. We also discuss the limitations of mobile learning, generating suggestions for practical applications of this modality and for future research.

2 - THEORETICAL BACKGROUND

2.1 Entrepreneurial Competencies

Bird (1995) claims that entrepreneurial competencies refer to underlying characteristics of individuals, such as their generic and specific knowledge, motives, traits, self-image, social roles and skills that result in the creation, survival and/or growth of an enterprise. Several studies have addressed entrepreneurial competencies in developing countries, as in the case of this research, and some of them are commented next.

An in-depth analysis of entrepreneurial competencies by Man and Lau (2005), in Hong Kong points out for two different types of elements of these competencies: (1) external (skills, knowledge and experience), which can be acquired on the job, by training or practical learning and (2) internal (personality traits, attitudes, perceived social roles and self image); these ones are more difficult to change (Man & Lau, 2005; Garavan & Mcguire, 2001). Inyang and Enuoh (2009) define entrepreneurial competencies as a set of knowledge, attitudes, and skills that enables the entrepreneur to perform well in her/his business. The authors identified some of these competencies as crucial to business success in Nigeria: time management, communication, human resources management, marketing management, business ethics, social responsibility, leadership, decision making and financial management. Ahmad et al. (2010) analyzed the components of entrepreneurial competencies, based on the study of Man et al. (2002), in the Malaysian context, adding two more elements related to that context: ethics and familism - the importance of receiving advice and support from family

members to help the entrepreneurs to overcome the difficulties of managing their business.

Therefore, entrepreneurial competencies have different definitions in the literature and some of its components are related to the entrepreneurs' context. Mitchelmore and Rowley (2010) made a comprehensive review and synthesis of the literature on this subject identifying a specific group of relevant competencies for the exercise of successful entrepreneurship that affects the business performance. They involve management skills, including the ability to develop management systems and organization and coordination skills; conceptual and analytical competencies and idea generation, customer management skills; delegation and motivation skills; the ability to recognize and take advantage of opportunities, the ability to formulate strategies for taking advantage of opportunities; hiring skills; decision making skills; leadership skills; and commitment (Mitchelmore & Rowley, 2010:102). We considered these elements of the entrepreneurial competencies in our study.

We also considered a processual approach to study these competencies, because they are not something that one possesses, they can only be demonstrated by a person's contextualized practices (Man et al., 2002). We also considered that competencies are changeable and learnable (Man et al., 2002). Although internal elements, such as personality traits, are strongly related to the entrepreneurial competencies (being difficult to change), there are several other externalized elements, such as knowledge and skills, that can be taught (Henry et al., 2005).

Since competencies are manifested in action (Man et al., 2002) the development of entrepreneurial competencies must occur through practice, especially in real work situations, (Zarifian, 2012; Yazdanfar et al., 2014). We are going to explore how mobile learning can be a way for individuals to develop these competencies.

2.2 Educational Affordances of Mobile Learning (m-learning)

Mobile learning is related to the use of portable devices and wireless networks to support, improve and extend teaching and learning over time and space, especially when learners are in a context of mobility (Kukulska-Hume & Traxler, 2005, Wang et al., 2009, Hashemi et al., 2011, Stanton & Ophoff, 2013, Göksu & Atici, 2013, Martin & Ertzberger, 2013, Guler et al., 2014). Several definitions of m-learning highlight the importance of the learning context (Traxler, 2007; Kukulska-Hume et al., 2009; Frohberg et al., 2009; Diaz et al., 2015). This context is continually created by individuals interacting with others, with their environment, and with everyday tools and activities. By providing resources for learning and connecting individuals to peers, teachers, and other actors, m-learning allows for personal, spontaneous, opportunistic, informal and situated learning activities (Sharples, 2013). It corresponds to the educational affordances of m-learning. Affordance is what the environment, object or the technology offers to the individual, what it allows him to do or not to do (Gibson, 2014). Figure 1 presents a synthesis of educational affordances of m-learning.

Figure 1: Educational affordances of m-learning

Affordances	Definition	References
Access to multimedia	It allows individuals to access multimedia using mobile ICT, for example: documents, áudio, videos.	Churchill and Churchill (2008); Liaw et al. (2010).
Connectivity	It relates to the ability of learners to connect with others anytime, anywhere.	Churchill and Churchill (2008); Liaw et al. (2010); Looi et al. (2009); Orr (2010).
Information/ data capture	It is the ability to capture data or information (e.g. record videos) and share it with others anytime, anywhere.	Churchill and Churchill (2008); Looi et al. (2009).
Knowledge representation	It is the possibility for individuals to create representations of their knowledge and ideas, such as	Churchill and Churchill (2008); Looi et al. (2009); Orr

	using mind mapping tools, drawings, photos, etc.	(2010).
Acess to analytical tools	Through mobile ICT the individual can access a variety of analytical tools, such data sheets, math tools, etc.	Churchill and Churchill (2008).
Support for multiple learning paths	It refers to the learner freedom to engage in multiple entry points for learning and choose the most relevant path for learning.	Looi et al. (2009)
Social presence	m-learning can allow for a feeling of social presence due to the use of synchronous communication tools that can be accessed anytime, anywhere, even on the go.	Church and Oliveira (2013); Karapanos et al. (2016); Park et al. (2014).
Customized learning	It provides student-centered learning; learning resources can be accessed in the adequate time and space.	Liaw et al. (2010); Looi et al. (2009); Willemse (2015).
Interaction	m-learning supports interaction between learners and their peers, teachers, instructors or other actors that are relevant to learning activities.	Churchill and Churchill (2008); Liaw et al. (2010); Looi et al. (2009); Orr (2010); Rambe and Bere (2013).
Collaboration	It can support collaborative learning activities.	Liaw et al. (2010); Rambe e Bere (2013)
Motivation	It can contribute to increasing student's motivation for learning.	Rambe and Bere (2013).
Emotional expression	It allows learners to express their emotions (for example, through the use of emoticons in messages).	Park et al. (2014).

Although m-learning offers many possibilities, as showed in Figure 1, it also brings limitations for learning. There is a variety of technologies that can be used in m-learning, such as different devices (smartphones, tablets, etc.) but these technologies were not designed to be used in education. Also, the physical characteristics of mobile devices (size, weight, memory, battery life, interface limitations) or unavailable or slow wireless connections (Kukulska-Hume et al., 2007; Liu et al., 2010, Hashemi et al., 2011) can hinders learning activities. Besides, m-learning is still a relatively new concept, lacking pedagogical methods specifically designed for it. We need to be careful to not simply reproduce traditional forms of teaching in m-learning, using it, for instance, for the mere transmission of information, failing to explore the opportunities for contextual, informal and spontaneous learning (Brantes et al., 2013). Therefore it is necessary to consider innovative educational approaches in m-learning.

2.3 Educational Approaches in m-learning

The literature presents several educational approaches that can be applied in m-learning, such as: behaviorism, constructivism, situated learning, the Activity Theory and collaborative learning (Hedberg, 2014; Kearney et al., 2015; Liaw et al., 2010; Motiwalla, 2007; Naismith et al., 2004; Orr, 2010). We consider here the situated learning perspective (Lave & Wenger, 1991) and the pedagogy of autonomy (Freire, 1996).

The situated learning perspective is related to Vygotsky's (1978) social development. In contrast to classroom activities that involve abstract, out of context knowledge, we must consider that learning is always situated in social, cultural and historical terms, being inseparable from social practice and everyday life (Sense & Badham, 2008; Brown et al., 1989; Lave & Wenger, 1991). The situated learning perspective is similar and can be complemented with the pedagogy of autonomy (Freire, 1987, Freire, 1996; Vanzin, 2005). Both perspectives acknowledge that learning is historically and culturally constituted and happens in the social context of individuals. The principles of the pedagogy of autonomy were considered here to think the role of the teachers in m-learning activities. According to the pedagogy of autonomy (Freire, 1996), the role of a teacher is to help individuals to develop their critical thinking to transform their reality. Any educational activity must guarantee the respect for the ideas, thoughts, criticisms of every learner, giving them the freedom to act

and decide on their learning process, in order to become transformative agents.

The pedagogy of autonomy highlights the importance of the dialogue between teachers and learners. The problematization processes provoked by the teacher is a key feature to encourage learners to develop their critical capacity and to change their own condition. It reinforces the importance to consider the knowledge that the learner already brings with her/him, related to her social and cultural history (Freire, 1996). Therefore, the learners' context is key in Freire's work, as well as in the situated learning perspective. We considered these assumptions to design the artifact, as explained in the next section.

3 - METHOD

The Design Science Research (DSR) method is used to create and evaluate artifacts intended to solve organizational problems (Hevner et al. 2004). The DSR comprises several phases: problem awareness, suggestion, development, evaluation, and conclusion (Peffers et al., 2008). The way we conducted each one of these phases is detailed next.

Problem awareness (late 2014 and 2015) – It involved the study of the literature on entrepreneurial competencies, m-learning, and educational approaches to m-learning. In parallel with the literature review we conducted, in 2015, a survey via telephone interviews with a group of MEI to understand (1) their main learning needs (2) the types of training/educational activities they have been participating and by which means (face to face, online, etc.) and (3) to which ICT (especially mobile ICT) the MEI had access to, and if these tools were used in learning activities. The survey population involved 350 MEI that were enrolled in an extension program at a university located in a small city in the Central-Western region of Brazil, in which the first author works as a lecturer, and 206 answers were obtained.

The data from this survey showed that 55% of the MEI had smartphones, and the more used app was Whatsapp® (52%). Only 26% of the MEI had carried out some type of training in the past 5 years, and the most frequent learning needs appointed by 46% of them were related to financial management and operational management. These needs correspond to management skills, which are part of the entrepreneurial competencies, as pointed out by Mitchelmore and Rowley (2010). This was taken into account in the next phase of the DSR.

Suggestion (May-July 2016) - In this phase, considering the data from the problem awareness, we elaborated a first version of the artifact (m-learning method). The focus was the development of management skills, considering the most frequent learning needs indicated by the surveyed MEI. The first draft of the method was reviewed by an expert (full professor) in Education and passed through a series of revisions to be coherent with the educational perspectives considered and the m-learning affordances. It will be detailed in the next section of this paper (research results).

Development (September/2016 – February/2017) – In this phase we invited the MEI that participated in the previous survey to voluntarily test the artifact, those who had a smartphone with an Internet connection and were Whatsapp® users (107 people). We intended to engage two groups of MEI, to test the artifact with the first group, evaluate and improve the artifact and then apply it again with the second group. A minimum number of 30 subjects per group intended to obtain different views and comply with international sampling criteria in qualitative studies (Mason, 2010). Table 1 presents the profile of participants.

Table 1: Participants' profile

Profile		1st group		2nd group	
		# participants	%	# participants	%
Gender	Male	15	50%	15	34%
	Female	15	50%	30	66%
	Total	**30**	**100%**	**45**	**100%**
Age	Up to 20 years	01	3%	0	0,00%

	from 21 to 29 years	06	20%	11	25%
	from 30 a 39 years	12	40%	17	37%
	from 40 a 49 years	05	17%	11	25%
	from 50 a 59 years	05	17%	6	13%
	from 60 years -	01	3%	0	0,00%
	Total	**30**	**100%**	**45**	**100%**
Education	Elementary school inc.	01	3%	1	2%
	Elementary school comp.	04	13%	0	0,00%
	High school inc.	04	13%	4	9%
	High school comp.	12	40%	19	42%
	Undergraduate inc.	03	10%	13	29%
	Undergraduate comp.	03	10%	7	16%
	Postgraduate	03	3%	1	2%
	Total	**30**	**100%**	**45**	**100%**

The first author of the paper had the role of an "advisor" in the m-learning activity, not exactly a teacher, but someone who proposed questions, solved doubts and presented content for problematization. The second author was a silent observer, exchanging impressions and ideas with the advisor to improve the artifact.

Evaluation (November/2016 – March/2017) - The evaluation of the artifact (m-learning method) involved (a) the learning process/procedures and the m-learning affordances, as perceived by the participants; (b) the contributions of the artifact to the development of the entrepreneurial competencies by the participating MEI, according to their views. The evaluation occurred mainly in a processual way, observing the interaction among participants in the two Whatsapp® groups, the difficulties indicated by them, and their comments and impressions on the m-learning experience. In addition, an individual interview was held with the participants after the end of each one of the groups' activities. These interviews occurred at the MEI homes or at their businesses places; they lasted in average 1 hour and were recorded and transcribed to analysis. The qualitative data generated inside the Whatsapp® groups and in the individual interviews were analyzed using NVIVO®. First, it was inductively coded (open codification) (Strauss & Corbin, 2008). After, the categories resulted from the open codification were compared with theoretical categories: the educational affordances of m-learning (Figure 1), and the elements of entrepreneurial competencies (Mitchelmore & Rowley, 2010) developed through the m-learning experience.

Conclusion - At this stage of the DSR, we present and discuss the knowledge generated by the creation and use of the artifact (m-learning method), demonstrated in the next section.

4 - RESEARCH RESULTS

4.1 The m-learning method (artifact)

The artifact was designed based on the concepts related to the entrepreneurial competencies (Mitchelmore & Howley, 2010), the m-learning affordances (see Figure 1) and the approaches of situated learning (Lave & Wenger, 1991) and the pedagogy of autonomy (Freire, 1996). In terms of technology, the smartphone and the Whatsapp® were used because, as mapped in the "problem awareness phase", these were the most used technology by the MEI surveyed. Coherently with the perspectives of situated learning and the pedagogy of autonomy, we focused on the learning needs also indicated by the surveyed MEI.

The language and educational resources used considered the MEI's context and educational level and the m-learning affordances from literature. Most of the content was based on videos, charts, memes, anecdotes, in order to turn the technical content more accessible and playful to the participants and also to overcome ergonomic limitations of the

smartphones (Hashemi et al. 2011, Piasecki-Kahle et al., 2012). The resources came from diverse websites such as from the local press and popular videos on business management with an accessible language, complemented with short texts (with 150 characters on average).

The interaction between the MEI and the advisor and specially among the MEI was strongly stimulated, since learning is a social process (Lave & Wenger, 1991; Freire, 1996). Generative themes and questions, according to Paulo Freire's pedagogy of autonomy (Freire, 1996; Brandão, 1985; Brazil, 2005) were elaborated to stimulate the discussion, reflection, and critical thinking. Five thematic units were designed (see Figure 2), but there was not a rigid sequence to be followed, the questions and themes were approached according to the interaction, and additional themes were added according to the MEI's needs and curiosity.

Figure 2: Examples of generative themes and problematizing question

Parts	Generative Themes	Problematizing Questions
PART I How to establish my company?	Being a MEI; Rights and obligations of the MEI; What is a company?	• How did you become a MEI? How has been your experience as a MEI? • Do you know what a COMPANY means? • Do you know what you need to do to protect your rights as a MEI?
PART II How to take care of the formalization of my business?	Legal documents that have to be generated and kept by the MEI	• Have you delivered the income statement this year? Did you need the help of someone to make the statement? • How was your experience in requesting the annual license to work as a MEI?
PART III How do I control my business income?	Financial management process; How to save money, invest or reinvest.	• How do you manage your money? • What are your difficulties in controlling your company's money?
PART IV How to get loans and deal with financial institutions?	The different types of loans	• Have you ever taken a loan at the bank? How was your experience? • What are the problems you face with banks?
	How to use the debit and credit machine	• Do you use credit/debit card machines at your company? If yes, how did you get the machine? • What are your difficulties in using the machine?
	Opening and control of the company's bank account and personal account.	• Do you have a bank account? Is it personal or it's a company account? • How do you manage your banking activities?
PART V How to negotiate and avoid defaults?	Control and registration of term sales; Negotiation of customers' debts.	• In your company, how do you deal with term sales? How do you control these incomes? • How do you charge customers? What difficulties do you face to do this?

4.2 The first test of the artifact

The first group of MEI started its activities on the 1st of September 2016 and ended it on the 31st of October 2016. After inserting the participants in the Whatsapp® group, the advisor proposed some rules of interaction (e.g. posts with offensive content were not allowed), asking the MEIs to approve or suggest new ones. It was agreed that content had to be posted by the advisor in the morning so the MEI would have all day to see it and ask questions.

As an example, in the first day, around 8:00 a.m., the advisor posted a video called "How to bankrupt your business in 5.5 steps" (https://goo.gl/DiokbG), which points out frequent management mistakes. The intention was to problematize the difficulties faced by the MEI in the management of their business and what it means to run a company. This video had a significant impact on the participants, who mentioned that it mobilized them to think about the degree of professionalization of their businesses. Many of them acknowledge that they had already made some of the mistakes showed by the video, and reflected on how they could

engage in better management practices.

Following that, for each thematic unit, questions, videos, and documents were posted, always stimulating the MEI to reflect and act on their business practices. The advisor answered their questions regardless of a theme order. Anedoctal memes were also posted to make the content more pleasant, and generally had a positive effect, as the participants reacted with emoticons of joy. However, despite the stimulation for participation, the level of interaction among the MEI in the 1st group was low, only with short individual comments, few questions asked to the advisor and no dialogue among the MEI. After the 30th day, the participation decreased significantly; it was taken into account to improve the artifact.

4.3 Artifact's improvements

The individual interview to evaluate the m-learning experience in the 1st group had the participation of 24 out of the 30 MEI since 6 of them dropped out the activity. These 6 MEI were also interviewed, but differently, aiming to understand why they left the group. The results of this evaluation will be discussed later along with the results of the 2nd group. Here, the focus is the suggestions they have made to the artifact (m-learning method) improvement.

The most frequent suggestion, given by 15 out of the 24 interviewees, was to conduct face-to-face meetings with the group to complement the interaction via Whatsapp®. The second most frequent suggestion was a "daily online section" when the advisor could be available in Whatsapp® for synchronous interaction. The participants themselves acknowledged that the level of interaction in the group was low, most of the time they only viewed the posts made by the advisor or others, but have not commented on it. Four of them complained about the different degrees of knowledge about the MEI practices among the participants. Some MEI also stated that the participants did not know each other, and therefore they were afraid to expose themselves. They also asked for more videos instead of text, as they indicated difficulties in reading the (albeit short) texts and monitoring their thread. These suggestions helped to improve the artifact, as described next.

4.4 Second round of development of the artifact

The second group began its activities on the 9th of January 2017 and ended on the 10th of February 2017. The advisor emphasized to the participants that everyone could learn but also to teach something to others; that questions could be asked at any time, both privately for the advisor (it intended to reduce possible constraints in asking), and to the group. Besides, a synchronous daily "meeting" was proposed to happen between 7 p.m. and 8 p.m.

Taking into account the suggestions of the 1st group, a face-to-face meeting was proposed to stimulate the participants to better know each other and the method. This meeting was scheduled to the first day of activities but none of the participants attended it. The advisor then recorded a video of 1'5" in which she introduced herself and explained how the activities would develop. This non-attendance to the meeting was considered as an indication that, if face-to-face meetings were necessary, probably the level of attendance by the MEI would be very low. The justifications for non-attendance varied: *"I had another commitment", "I was busy", "I forgot",* among others. Therefore, no other face-to-face meetings were scheduled.

The 2nd m-learning experience was shorter also considering the results of the 1st group. The content shared was the same, aiming to intensify the interaction. The improvements made in the method according to the 1st group suggestions were effective because, in terms of interaction and collaboration, the results were much more satisfactory in the 2nd group.

The number of questions asked by the MEI was bigger than in the 1st group; it occurred daily; the advisor was also available synchronously in the "Doubt Time" (between 7 p.m. and 8 p.m) to answer any questions. If none of the participants appeared at that time, the advisor

had already prepared some content to present, which stimulated more interactions. The MEI also participated and helped each other. For instance:

11/01/17, 1:44 PM - Entrepreneur 03: Good morning! Although we work in different areas, I would like your opinion on advertising. I have a good experience with the Internet, but I think radio is also a good media. Could anyone share your experience about radio advertising and which channel is more viable?

11/01/17, 2:08 PM - Entrepreneur 30: I work with events, and I do all kinds of advertising ... it depends on the public to be targeted, for example, if I am going to bring a singer who is more "working class" I have to get some sound car advertisement in the neighborhoods and in the radios ...: Many of this public does not have access to the Internet, although we notice that today the Internet is something common to us…

There was evidence that participants were applying what they were learning in their businesses. For example, the deadline for submitting the income tax declaration was approaching; the advisor posted a vídeo and tips on how to do this declaration as a MEI, and a photo that called attention to the deadline. The comments in the group appeared, such as: Entrepreneur 03 - *"I have done it alone, thanks to your help"* and another entrepreneur also replied: Entrepreneur 08 - "*I just did it, I also followed the steps of the video posted here."*

Another situation in this group demonstrated the potential of m-learning to support situated learning. An entrepreneur discussed her experience of formalizing the issuing of invoices according to the municipality rules:

01/25/17, 6:57 AM – Entrepreneur 03: [name of the advisor]*, I think we already talked about this issue, but I'll return to it because I need some guidance issuing invoices.*

25/01/17, 6:57 AM – Entrepreneur 03: [name of another entrepreneur]*, you have said that you already provide these invoices to your customers, could you help me?*

Later on the advisor replied, and the Entrepreneur 03 was online at the city hall organizing other documents regarding her business and posted an audio in the group saying that she had already solved the problem, and commented: *"I love this group!".* It was also interesting to observe the participants' reactions on the "Popcorn maker" video. This video (https://goo.gl/2bf4eu) refers to a MEI who sells popcorn at the streets and have transformed his business in an innovation case due to the exceptional quality of the product, care, hygiene, among others. Several MEI mentioned that, after watching the video, they began to think about how they could improve their own business.

4.5 Evaluation of the m-learning process

In order to evaluate the artifact, we present, at Table 2, indicators of participation in the 1st. and in the 2nd groups, counted from the records inside Whatsapp®.

Table 2: Indicators of participation

Indicators of Participation	Results			
	1ª group		2ª group	
Active participants (*) who remained until the end	14	47%	31	69%
Participants who only "watched" and remained until the end	07	23%	09	20%
Active participants at first, but left before the end	02	7%	00	0%
Participants who only watched and left before the end	07	23%	05	11%
Total	**30**	**100%**	**45**	**100%**

Note: (*) Active participants are those who have posted a question, document, video.

As Table 2 shows, 14 out of the initial 75 participants dropped out (19%), more in the 1st group (30%) than in the 2nd group (11%). Besides, the level of interaction in the 2nd group was higher. It can be related to the improvements made in the artifact (method) considering the suggestions by the participants of the 1st group.

Regarding the visualization of posts, it was observed that, sometimes, it occurred one day or even three days after the posting, reinforcing that, in m-learning, the learning process can happen at the place and time when the learner is more available. In the individual interviews of evaluation there was a positive feedback about the advantages of m-learning according to the participants – see Table 3.

Table 3: Advantages of m-learning according to the participants

Positive feedback on the experience	# of citations (*)		Total
	1st group	2nd group	
Solving doubts wherever you are, without having to commute	12	42	54
Interesting, great, good training.	23	27	50
Comfort - ease of learning at home.	03	18	21
Quick access to information.	05	12	17
Enabling space for collaboration.	01	15	16
Access to information without having to leave work.	03	11	14
Opportunity to see a content/issue again.	02	12	14
Using Whatsapp® is a different way of learning.	02	09	11
Possibility to ask without embarrassment.	05	03	08
Planning of the training.	01	05	06
TOTAL	63	164	227

(*) Citations are not mutually exclusive; only categories cited by at least five (05) participants are presented.

The advantage of "*solving doubts wherever you are, without having to commute*" was the most cited, which is also reinforced in other citations such as *"comfort - ease of learning at home"* and *"access to information without having to leave work"*. they evidence the flexibility and convenience of m-learning. Another perceived advantage was *"quick access to information"*. *"Enabling space for collaboration"* was mentioned in the 2nd group, in which collaboration effectively happened among the participants.

The perceived disadvantages of m-learning are presented in Table 4. Almost half of participants have not perceived disadvantages in the experience but the lack of time was pointed as a barrier. Mostly in the 1st group the participants complained about the different levels of knowledge on MEI practices in the group; the shame of expressing himself and writing, and posts unrelated to the learning focus. Three participants mentioned the difficulty in following the thread of messages in the Whatsapp® group. Only one respondent in each one of the groups stated that m-learning was not feasible. Considering the comments of 8 people that dropped out on why they have left the groups, 3 indicated that they were closing their activities as MEI; 2 said they did not have "a good level of education" to understand the contents; 1 mentioned that he found the interaction in the group very low; 1 mentioned posts unrelated to the learning focus and 1 that he already participate in many Whatsapp® groups.

Table 4: Disadvantages of m-learning according to the participants

Disadvantages	# of citations (*)		Total
	1st group	2nd group	
No negative points perceived.	10	18	28
Lack of time	01	07	08
Different levels of knowledge on MEI practices in the group	04	00	04
Shame of expressing herself/himself and writing	03	01	04
Posts of inappropriate content by participants	01	03	04
Difficulties in following the thread of messages	01	02	03
Total	29	37	66

(*) Citations are not mutually exclusive; only categories cited by at least three (03) participants are presented.

4.6 Evaluation of the artifact's contribution to the development of Entrepreneurial Competencies

We consider that entrepreneurial competencies go beyond a set of fixed attributes, it involves effective actions in specific business contexts. Therefore, in order to evaluate the contribution of m-learning to the development of these competencies, we asked the participants about what was more meaningful for them in the m-learning experience and what they have changed in their practices during/after it. Regarding the more meaningful and useful subjects, several issues were mentioned, such as "loans" (cited by 23 participants); and "how to separate the company money from personal money" (cited by 11 participants). These issues are related to financial management, which was one of the main learning needs indicated by the MEI surveyed at the "problem awareness" phase of research.

Table 5 indicates some of the changes the MEI affirmed to have made in their business during or right after the m-learning activity; only 6 of them said they have not made any changes. As mentioned before, some contents, such as the vídeo of the "popcorn maker" provoked them to think about how they could improve their businesses. Improving services to clients and better managing the business finances were the most cited changes.

Table 5: Changes made in the business during/after the m-learning activity

Changes in the business	# of citations (*)		Total
	1st group	2nd group	
Improvements in the services to clients	**03**	06	09
Do not mix personal bank accounts with company accounts / Opening a company's bank account/ making some savings to not depend on loans	02	06	08
Starting a register of business incomes and expenses	01	04	05
Starting business advertisements	00	05	05
Making the MEI Income Tax declaration / Reorganization of paperwork / Paying back taxes to keep working as a MEI	01	04	05
Improving my self-esteem	00	04	04
Courage to make some changes	00	04	04
Changing the sales registration system	02	02	04
I did nothing	06	00	06
Total	**18**	**41**	**59**

(*) Citations are not mutually exclusive; only categories cited by at least three (03) participants are presented

Some MEI (4) also highlighted effects of the experience on their self-image and self-esteem. One of them said: "*I'm feeling more as a "PERSON", I think we are important, we are not just a backyard business there, we have value*" (Entrepreneur 20 – 2nd group).

These aspects of self-esteem and empowerment are important because, in the individual interview to evaluate the experience (which happened at the MEI businesses), it was noticed that they often feel excluded from the training provided by formal institutions, such as colleges or institutes that support micro/small companies. Due to their low/medium level of education, they think this type of training is difficult to follow due to its formal/technical language, mostly based on text, not considering their reality or previous experience.

5 – DISCUSSION AND FINAL REMARKS

The research results indicate that m-learning is a viable educational modality for individual entrepreneurs because most of them work alone; the nonattendance of the participants in the face-to-face meeting scheduled reinforces the difficulties they have to attend face to face educational activities. However, they carry out their mobile phones wherever they are. The context of work of the individual entrepreneurs is where they can put into action their knowledge, skills, and reflect on their attitudes, solving real business

problems and then effectively developing their entrepreneurial competencies (Man et al., 2002; Mitchelmore & Rowley, 2010). The exploration of the daily activities and the challenges faced by the MEI occurred in the two participant groups, especially in the second one. The questions involved the problems they experience in everyday life, which highlights the importance of the "authentic context" of learning, as indicated by Lave and Wenger (1991). For instance, the MEI that was solving a problem in the City Hall and asked for help in the group is an event that reveals the m-learning potential for situated learning needs.

The educational affordances of m-learning (see Figure 1) perceived during the activity, especially by the 2nd group, after the artifact improvement were: access to multimedia, connectivity/interaction, information/data collection, social presence, personalized learning, collaboration, motivation, emotional expression, knowledge representation and support for multiple entry points and learning paths. These affordances reinforce the results found in previous studies (Churchill & Churchill, 2008; Looi et al., 2009; Liaw et al., 2010; Church & Oliveira, 2013; Rambe & Bere, 2013; Park et al., 2014; Willemse 2015; Karapanos et al., 2016). highlighting the relational, flexible and contextual features of m-learning.

Regarding the contribution of the artifact (m-learning method) to the development of entrepreneurial competencies, the whole process was dependent on the understanding of the MEIs context and the discussion of issues they have appointed as relevant. As consequence, evidence of the development of these competencies, specifically those related to management skills (Mitchelmore & Rowley, 2010) appeared as the participants affirmed to have put into practice what they have learned in the groups. The changes they have made in their businesses, although small, signal the fact that it is possible to stimulate the development of competencies through m-learning, instead of simply sharing information. It was possible to observe that the interaction, especially in the 2nd group, stimulated the MEI to overcome feelings of inferiority. Some of them felt encouraged to improve and professionalize their businesses, realizing that they are running a company, not only a "backyard business" (as mentioned by one of the participants). Discussing real-world cases and examples of micro-entrepreneurship in similar contexts was highly effective.

On the other hand, the research revealed m-learning limitations. First, one point that cannot be neglected is the fact that only half of the MEI surveyed in the first phase of research (problem awareness), had a smartphone with an Internet connection. This connectivity can be taken for granted in developed countries, but in developing countries such as Brazil, many individual entrepreneurs have few resources and still cannot afford it. Therefore, the costs of connectivity have to be considered because m-learning can be unfeasible for the economically disadvantaged (Traxler, 2007; Saccol et al., 2011).

Other limitations faced generated a set of learned lessons. First, it is important to consider the duration of activities and the amount and format of the educational content, already discussed in the literature (Churchill & Hedberg, 2008; El Hussein & Cronje, 2010; Hashemi et al., 2011; Guler et al., 2014). Regarding the duration of activities "less is more"; in the 1st group the activities lasted 60 days, and it was evident that it was too long; reducing the activity to 30 days with the 2nd group intensified the pace of interaction, even with the same educational content. The format of the content is also very important: relying on videos is key; the amount of text should be minimal due to the ergonomic limitations of the smartphone screens and also because some participants feel uncomfortable in writing.

The biggest challenge relies on how to stimulate the interaction among the participants in m-learning. Some of them feel insecure to communicate with a group they are not familiar with, therefore they need the freedom to communicate privately with the advisor if they wish. It is also important to stimulate them to realize that everyone can "teach" as much as learn because their practical experiences are valuable and worth being shared. These are key

assumptions in the Freire's (1996) pedagogy of autonomy and also in the situated learning perspective (Lave & Wenger, 1991). Several assumptions of these approaches helped to design and improve the artifact (m-learning method) to increase the level of participation of the MEI. The changes made in the method considering the suggestions of the participants from the 1st group were also essential to improve the level of interaction in the 2nd group. Therefore, it is very important to evaluate and improve the pedagogical practices specifically designed for m-learning during its application.

This research contributes to literature and practice by showing m-learning affordances perceived by individual entrepreneurs that can support them in developing some of their entrepreneurial competencies (in this research, management skills). Educational approaches such as those considered in this study – the situated learning perspective and the pedagogy of autonomy – are essential for developing educational methods specifically designed to m-learning, in order to take advantages of the affordances of this modality.

As research limitations, we need to highlight that only some elements of the entrepreneurial competencies – specifically some management skills - have been considered in the m-learning method designed. It is also important to consider that developing competencies is a long-term process, therefore the application of the method is only a very small step. The high level of involvement of the first author with the MEIs, the specific location of the study - in a limited geographical area - are also limitations.

As future research we suggest more studies on m-learning in the business context; as already discussed, most of the research on this subject is still focused on formal education. We also suggest studies that help to generate knowledge on the preparation and the role of instructors and teachers that work in the m-learning modality. Studying m-learning activities with individual entrepreneurs with a low educational level is also an important topic, especially in developing countries. The use of voice messages was not intense in the groups, it can also be explored in future research. Studies that explore the use of apps for the management of small businesses and analytical tools as a resource for practice-based m-learning activities are also important.

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