Mobile Learning Perception Scale: A Short Version for the Italian Context

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ABSTRACT
Mobile-Learning techniques represent new horizons within the educational field that enhances more learner-centered pedagogical approach in front of the more typical educator-centered. Knowing teachers' perception and attitudes toward the use of M-Learning could facilitate a more successful implementation in the learning environment. The aim of this study is to propose a first validation of a short version of the Mobile-Learning Perception Scale (MLPS)for an Italian Context. To accomplish this, the items of the instrument were first back-translated from English into Italian. A survey among Italian primary, middle, and high school teachers (n = 985) was constructed in order to explore the psychometric properties of the Italian short version (13 items). Results of the EFA revealed, in accordance with our expectations, a three-dimensional structure underlying the 13 items. Specifically, the first factor extracted explained 44.04% of variance (Flexibility/Convenience). The second (Communication) and the third factor (Classroom Strategies/Techniques) explained 10.86% and 8.16% of the variance, respectively. All Cronbach's alphas were satisfactory ($\alpha > .70$). In addition, MLPS subscales were found to be significantly associated with a scale of school orientation to student empowerment and a scale of teacher frequency use of mobile device within school, providing evidence for both predictive and convergent validity. Overall, these results suggested the validity and the applicability of the instrument in an Italian educational context.

Key words: Learning, Mobile learning, Learning environment

INTRODUCTION
Today's students are considered "Digital Natives" whereas many today's teachers, who did not grow-up in the digital age, are considered "Digital Immigrants" (Prensky, 2001). As a consequence, the employment of mobile technologies in the educational field, with the aim of facilitating learning processes and improve students' readiness demands and challenges, has been only recently started (Al-Emran & Shaalan, 2015). One of the new research trend in this sector is Mobile Learning (M- Learning).

M-learning may be considered a new platform of distance learning which is the natural evolution of e-learning, giving to end-users, students and educators, the opportunity to learn more into short time frame. (Mostakhdemin-Hosseini, & Tuimala, 2005). It refers to "handled technologies enabling the learner to be on the move, providing anytime and anywhere access for learning" (Price, 2007; pp. 33-34). As a technology, it offers all the benefits of e-learning by allowing people to connect and interact using any other portable devices (e.g., notebook, smart phones, tablets, PDAs) to exchange information (Georgiev, Georgieva & Smirkarov, 2004). Among its many other benefits, M-learning is said to: 1) help learners improve literacy and numeracy skills; 2) encourage both independent and collaborative experiences; 3) help learners identify areas in which assistance and support are needed; 4) help to bridge the gap between mobile technology, Information and Communication Technology; 5) help remove some of the formality from the learning experience and encourage reluctant learners; 6) help learners

remain focused for longer periods; and 7) help raise students' self-esteem and self-confidence (Attewell, 2005). Another significant advantage in using M-Learning is making it easy for disabled students to participate in learning process (Beaton, 2006).

Using M-Learning techniques has the potential to enhance the typical educator-centred classroom into a more learner-centered classroom (Holzinger, Nischelwitzer, & Meisenberger, 2005; Keskin & Metkalf, 2011). Consistent with the Constructivist Learning Approach, teachers become facilitators of the learning process, encouraging students to co-operate through their active role in solving problems.

Most studies related to Mobile Learning in education, focus on development of Mobile Learning materials but little is known about the attitudes of teachers towards Mobile Learning (Al-Fahad, 2009). In addition, students stated that one of the main obstacle to use technology at school is represented by the rules against the use of their personal devices such as cell phones, smartphones, laptops and MP3 players (Project Tomorrow, 2010). As stated by Corbeil and Corbeil (2007), the presence of technological tools during class activities does not imply automatically an enhancement in the pedagogical approach and, subsequently in the learning outcomes. To overcome this gap, it should be determined how teachers perceive the use of technology within the educational context. Knowing teacher perceptions and attitudes toward the use of M-Learning could facilitate a more successful implementation in the learning environment. Moreover, considering that teaching is a high-stressful occupation *per se* (Converso et al. 2015; Guidetti, et al., 2015; Guidetti, et al., 2017; Viotti et al. 2017; Sottimano et al. 2017) often burdened by the school climate as well (Orsi et al., 2016), m-learning could represent another source of stress for teachers whose are not accustomed to use technology as a pedagogical tool. Knowing teachers' M-learning attitudes before the implementation could prevent resistance attitudes or negative outcomes on teachers' wellbeing.

The M-Learning Perception Scale (MLPS) (Uzunboylu & Ozdamli, 2011) represents to date, a promising measure of teachers' perceptions and readiness to successfully implement M-learning strategies. This tool is based upon a literature review of the construct as well as an analysis of feedback from teachers' responses, including their feelings, opinions and attitudes toward M-learning. In Uzunboylu & Ozdamli's perspective (2011), M-Learning is specifically focused on the use of both school purchased and student-owned mobile devices (for example, cell phones, Smartphones, iPods, iPads, Kindle) and wireless hand-held computers in the classroom (Uzunboylu & Ozdamli, 2011). The MLPS was constructed with the premise that a positive perception about M-learning will support student success and increased achievement (Roche, 2013).

Validity and reliability of the scale were proved by Uzunboylu & Ozdamli (2010) in a sample of Cyprian secondary school teachers. The questionnaire is composed of 26 items divided into three dimensions. The first dimension is "Aim-Mobile Technologies Fit" (A-MTS) which describes the fit between traditional and m-learning goals. "Appropriateness of Branches" (AB) is the second dimension, which describes the appropriateness of M-Learning materials with the subject taught. Finally, the last dimension, "Forms of M-learning Application and Tools' Sufficient Adequacy of Communication" (FMA and TSAC) describes how M-learning could be placed in the educational context and its role in enhancing communication in learning environments.

Moreover, from this study emerged that male teachers' perceptions of M-Learning technologies were comparatively higher than female teachers whereas no significant differences were found among different branches (Uzunboylu & Ozdamli, 2011). Within the Cyprian context and consistently to these results, Serin (2012) has not found, in a sample of prospective teachers, neither gender difference nor differences between departments. Another study was carried out by Roche (2013) involving a sample of U.S. K-12 teachers. This study aimed at evaluating the psychometric properties of a modified version of the MLPS for the U.S. context, and to determine whether there were significant associations between the teacher perceptions of M-learning and the teacher self-reported technology skill level (i.e., novice, beginner, competent, proficient or expert. Roche (2013) found a factorial structure slightly different from the original structure identified by the Authors (Uzunboylu & Ozdamli, 2011). Possible explanations for these results may be the cultural differences between samples (Turkey vs U.S.) and the item translation. The emerging factors were: 1) "Flexibility/Convenience" which underlies the possibility of m-learning technologies in facilitating the sharing of material; 2) "Communication" which underlies the facilitation of communication processes; 3) "Classroom/Strategies Techniques" which underlies how m-learning could improve the learning process.

Both the aforementioned studies seem to indicate that the instrument, whether in its original or modified form, measure similar constructs and that both samples of teachers showed above medium/neutral levels of perception toward m-learning.

In Italy, similarly to other European countries, educational policies are giving growing importance to the use of M-Learning in the teaching context, as it was documented from the REACH project. This project took place from

2011 and 2013 and aimed at showing teachers how to use mobile learning to increase students' participation and motivation in learning activities.

Despite this, to date, no studies have been carried out in an Italian context to evaluate teacher perceptions about impact of mobile technologies on educational environment or teacher attitudes toward M-Learning. Based on the modified version of the MLPS proposed by Roche (2013), we developed a shortened version consisting of 13 items. This could be an easily accessible tool from school leaders planning for targeted professional development in M-learning, or to assess perceptions pre- and post- implementation of a M-learning platform.

This study represents the first contribution to the development of the Italian version of the Mobile-Learning Perception Scale (MLPS). Specifically, it has the aim to examine the psychometric properties of a shortened version (13 items) in a sample of Italian teachers.

MATERIALS AND METHODS

Teachers from public school institutions of a region of Northern Italy were involved during the academic year 2016/2017. Presentation of the project, sharing of content, objectives and modalities of research implementation were firstly presented to School Leaders, and consequently to all the participants involved into the project.

The self-reported questionnaire was administered, anonymously, to a sample of 1220 teachers (expected questionnaires). The questionnaire was filled out individually during the working hours, while a researcher of the Department of Psychology (University of Turin), was available to the participants for clarification about the completion. Data were anonymously processed, and privacy protection was ensured in all research stages, in accordance with the country (Italy) legislation.

Participants

In total, 985 teachers filled out correctly the questionnaire and therefore they were considered valid for the present study. Of them, 407 (41.3%) were teachers of primary school, 199 (20.2%) of middle school, and 379 of secondary school (38,4%). Regarding gender, 80.4% (n=792) were females and 16.5% (n=163) were males. Participants were aged between 23 and 63 years with a mean age of 45.69 years (DS = 9.65). The job tenure of participant in the Italian public school system ranged from 1 to 43 years (M = 19.55; DS = 11.23). The majority had a permanent (74.9%) contract.

Instruments

The data were obtained by means of a self-report questionnaire including a socio-demographic section and the short revised version of Mobile-Learning Perception Scale (Uzunboylu & Ozdamli, 2011) proposed by Roche (2013) and translated into Italian.

Student Orientation (SO) was measured with a subscale from the Italian version of the School Organizational Health Questionnaire (SOHQ) (Guidetti, Converso & Viotti, 2015). The frequency of use of PC and other portable devices within the school context was measured through an *ad-hoc* measure.

The items from MLPS (Uzunboylu & Ozdamli, 2011; Roche, 2013) were translated from English into Italian using the back translation method (Brislin, 1986) and included in the present questionnaire. After the translation process, the scale consisted of 13 items adapted for an Italian teaching context (e.g. *M-Learning techniques allow discussion with no limit of time and space*). Response were given on a four-point Likert scale ranging from *1 = Totally disagree to 4 = Totally agree.*

School's Student Orientation consisted of 4 items derived from the SOHQ (Guidetti et al., 2015) aimed at measuring school orientation to students' empowerment through a four-point Likert scale ranging from *1 = Totally disagree to 4 = Totally agree* (e.g. *Students in this school are encouraged to experience success*).

Finally, frequency of use of PC and other portable devices within the school context were measured with a 4 items scale (e.g. *How frequently do you use tablet at school? α=.69*) (Likert scale ranging from *1 = Never, to 3 = Often*).

RESULTS

Data analysis were performed using SPSS Statistical Package version 24 in four steps: a) testing factorial validity of the MLPS through Exploratory Factor Analysis (EFA; Method of Estimation: GLS; Rotation method: Oblimin); b) item analysis (mean, standard deviation, skewness and kurtosis); c) assessment of score reliability of the MLPS sub-scales (Cronbach's alpha and alpha if item is deleted); d) Pearson's correlations between MLPS, and Student Orientation and frequency of use of portable devices in order to analyze convergent and predictive

validity. We hypothesize that MLPS positively correlates with higher level in school orientation in promoting student empowerment and to higher teachers' use in portable device at school.

Exploratory Factor Analysis (EFA)

The Kaiser-Meyer-Olkin measure (KMO =.89) and Bartlett's test of sphericity (χ^2=5016,12; df=78; p < .00) indicate that the factor model is appropriate.

As expected, a three-dimensional factor-structure was found underlying the 13 items. Overall, the amount of variance explained is 63.06%. Table 1 presents the items loadings on the three factors. The first factor explained 44.04% of variance. It consisted of five items. Consistently to what emerged from the study of Roche (2013) we called this factor "Flexibility/Convenience".

Table 1: Factors, items loadings, variance explained of MLPS

Item	Factors		
	I	II	III
11) **Provide access to content related materials**	**.85**	-.13	-.074
10) **Convenient to share with colleagues**	**.65**	.06	-.03
12) **Materials could be sent out in many ways**	**.65**	.01	-.03
9) **Remove traditional limitations of time/space**	**.56**	.13	.04
13) **Used as a classroom discussion tool**	**.46**	.04	-.24
3) **Provides convenience for class discussions**	-.04	**.81**	-.06
4) **Good method for interaction in my class**	-.06	**.75**	-.08
2) **Facilitate more efficacious student-student communication**	-.02	**.68**	-.01
8) **Facilitate teacher-student communication**	.27	**.42**	-.14
1) **Facilitate student-student communication**	.19	.36	.06
6) **Effective method in my content/classroom**	-.06	.013	**-.94**
7) **M-learning technologies can be used as a supplement in all classes on all subjects**	.22	.002	**-.60**
5) **Effective method in my content/classroom**	.08	.14	**-.55**
% of Variance	44.04%	10.86%	8.16%

Note 1– Bold type indicate Value ≥ .40.

On this dimension, factor loadings were always greater than .40 (the lowest value is on item 13 "used as a classroom discussion tool" with a value of .46). The second factor was called "Communication" with 10.86% of variance explained. It consisted of 5 items. The lowest factor loading was reached by item 1 "facilitate student-student communication" with a value of .36. The third factor, "Classroom Strategies/Techniques" explained the 8.16% of the variance. It consisted of three items and the lowest factor loading was reported by item 5 "Effective learning method in my content/classroom" with a value of -.55.

Internal consistency

For all items, the corrected item-total correlation achieved values equal or greater than r = .50. All values of skewness and kurtosis are comprised in the range −1.0 to +1.0, suggesting no violation of normal distribution (Table 2).

The internal consistency of the three sub-dimensions were satisfactory as the values of Cronbach's alpha reached respectively .79 for Flexibility/Convenience subscale and .82 for both Communication and Classroom/Strategies Techniques (Table 2). In addition, all items seem to give a relevant contribution to the subscales they belongs.

Table 2: Descriptive Statistics of MLPS Items.

	M (SD)	Corrected item-scale correlations	Skewness	Kurtosis	Alpha if item deleted
Subscale Item					
Flexibility/Convenience (α=.79)					
11) **Provide access to content related materials** (Consentono di disporre immediatamente di materiale utile nel corso delle lezioni)	3.22 (.64)	.67	-.55	.70	.73
10) **Convenient to share with colleagues** (Facilitano la condivisione di conoscenze e informazioni tra colleghi)	3.02 (.67)	.63	-.42	.48	.74
12) **Materials could be sent out in many ways** (Mi consentono di condividere e inviare materiale scolastico ai miei studenti)	2.91 (.84)	.58	-.53	-.20	.75
9) **Remove traditional limitations of time/space** (Programmi come Messenger e Skype facilitano il confronto senza limiti spazio-temporali)	2.72 (.83)	.51	-.54	-.02	.78
13) **Used as a classroom discussion tool** (Possono essere uno strumento da utilizzare durante una discussione in classe)	2.93 (.80)	.54	-.39	-.29	.76
Communication (α=.82)					
3) **Provide convenience for class discussions** (Le nuove tecnologie facilitano la creazione di un ambiente comunicativo)	2.51(.80)	.69	-.05	-.45	.77
4) **Good method for interaction in my class** (Possono facilitare la qualità delle relazioni all'interno della classe)	2.25 (.78)	.62	.30	-.20	.79
2) **Facilitate more efficacious student-student communication** (Gli studenti comunicano più efficacemente grazie alle nuove tecnologie)	2.56 (.85)	.64	.09	-.64	.78
8) **Facilitate teacher-student communication** (Facilitano la comunicazione tra professori e studenti)	2.57 (.78)	.55	-.12	-.35	.81
1) **Facilitate student-student communication** (Gli studenti possono comunicare più facilmente grazie alle nuove tecnologie)	3.02 (.79)	.61	-.58	.02	.79
Classroom strategies/Techniques (α=.82)					
6) **Effective method in my content/classroom** (Aumentano la qualità delle lezioni all'interno della classe)	2.85 (.72)	.54	-.35	.07	.69
7) **M-learning technologies can be used as a supplement in all classes on all subjects** (Possono essere un importante supporto per tutte le classi e per tutte le materie di insegnamento)	3.07 (.69)	.67	-.50	.41	.74
5) **Effective method in my content/classroom** (Sono un affidabile strumento di apprendimento)	.274(.68)	.61	-.33	.14	.81

Correlations Among Subscales

The three subscales showed high positive correlations in the expected direction (see table 3). Even if the correlations indices with Student Orientation and frequency of use of portable devices were quite low (below .20), they were significant and in the expected direction. These findings suggest an adequate convergent validity with the measure of Student Orientation and predictive validity for the use of portable device at school.

Table 3: Pearson's correlations among subscales

	FXC	COM	CST	SO	Smartphone	Desktop PC	Laptop PC	Tablet
FXC	1	.56**	.59**	.12**	.17**	.11**	.13**	.12**
COM		1	.53**	.15**	.11**	.11**	.10**	.12**
CST			1	.15**	.08**	.06*	.18**	.10**
SO				1	-.05	-.02	.05	-.03
Smartphone					1	.09**	.13**	.18**
Personal Computer						1	.02	.19**
Notebook						,016	1	.08*
Tablet								1

** p <.001; * p<.05

CONCLUSIONS

The purpose of this study was to examine the psychometric properties of the Italian version of MLPS. The results obtained indicate that MLPS is an adequate tool for assessing teacher attitudes toward m-learning technologies in the Italian educational context. In line with previous studies (Uzunboylu & Ozdamli, 2011; Roche, 2013) our study shows the presence of a three-factor structure of the MLPS. Specifically, the factor structure emerged is in line to what has emerged in the U.S. context. Moreover, our study highlights the reliability of a short version of the instrument that could be a useful tool in the Italian context for measuring teacher m-learning perceptions. Knowing teachers' attitudes could improve future outcomes and a more informed process toward m-learning.

This study has some limitations. The most important are that the data collection was extended to only one Italian Region, and that participants were selected in a non-random way. Future study should adopt representative samples in order to provide stronger evidence for the adequacy of the psychometric proprieties of a short version of the MLPS for an Italian context.

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