

TEACHER'S PERCEPTIONS ABOUT THE USE OF TABLETS IN A STRATEGY TO INTEGRATE NEW TECHNOLOGIES ON PUBLIC SCHOOLS OF CUNDINAMARCA, COLOMBIA

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Abstract

Currently, mobile technologies are widely used on diverse fields and in daily life. In the educational environment, the use of mobile devices as an alternative tool in learning process has increased progressively. In this way, experiences related to mobile learning (m-learning) have been reported all around the world and tablets have become one of the most popular devices used on this type of learning. Recently, a strategy for a massive delivery of tablets to public schools has been developed in Colombia. This strategy, known as "Class-T" program in the region of Cundinamarca, is combined with a pedagogical accompaniment to foster the educational use of these devices. As part of this program, an instrument was designed and implemented to identify teachers' perceptions about the use and intention of use of tablets. The instrument was adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT) model according to the program context. The instrument consists on a survey with 27 items that inquires about performance and effort expectancy, social influence, facilitating conditions, self-efficacy, anxiety and behavioral intention to use the tablets. The survey was designed to be applied at the beginning of the program and once the intervention process is concluded. Results of the first application moment show an overall positive perception of teachers in performance expectancy, attitude toward using tablets and behavioral intention to use these devices.

Keywords: Mobile learning, tablets, teachers' perceptions, Unified Theory of Acceptance and Use of Technology, information and communication technologies.

1 INTRODUCTION

Many initiatives have been developed in order to include technology in different aspects of our current society. Education is one of the areas in which public policies have been oriented toward the integration of information and communication technologies (ICT). Nevertheless, despite efforts made on infrastructure matters and pedagogical strategies to include ICT in schools, studies intended to identify the effects of technology in education are scarce, particularly in Latin America. In Colombia, some programs have been proposed by different government entities to foster digital literacy [1], [2], [3]. The ICT Ministry has led one of the biggest strategies to provide tablets to public schools in the whole country. This program is oriented to strengthen the dynamics of student learning and promote social inclusion through technology integration in education [4]. Particularly, in Cundinamarca, the central region of the country, the program denominated "Class-T" is focused on the innovation of the educational practice with the use of tablets to foster basic competences on students of sixth and seventh grade. To achieve this goal, teacher training on ICT competences and *in situ* accompaniments of educational practices in schools are implemented in the "Class-T" program. In addition to these elements, another purpose of the program is to identify teachers' perceptions about tablet's use [5].

Identifying the variables that influence the process of accepting new technologies can be a determinant factor in the success of integrating technologies in education. Different models have been proposed to study the acceptance of new technologies in several fields. These models involved elements of psychology, sociology and information systems. Some of the most popular models are: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), Social Cognitive Theory (SCT) and the Unified Theory of Acceptance and Use of Technology (UTAUT) [6].

UTAUT incorporates components of different models such as the Theory of Reasoned Action and the Technology Acceptance Model. Due to the incorporation of several elements that are important to study the acceptance of technologies, UTAUT has become one of the most complete models on this field [7]. This paper presents the results of a survey based on the UTAUT model, applied to teachers of public schools that participate in the “Class-T” program, to identify their perceptions about the use of tablets.

2 LITERATURE RIEVIEW

2.1 The Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT model was proposed by Venkatesh et al. [6] after conducting an empirical comparative study of eight models: TRA, TAM, MM, TPB, C-TAM-TPB, MPCU, IDT and SCT. Main variables of the models were analyzed to identify the determinant elements that should be considered in a technology acceptance model. The variables under study included attitude toward technology, subjective norm, perceived usefulness, perceived ease of use, extrinsic and intrinsic motivation, perceived behavioral control, job-fit, complexity, affect toward use, social factors, facilitating conditions, outcome expectations, self-efficacy and anxiety [6]. According to the results obtained from the empirical comparative study, the performance and effort expectancy, attitude toward using technology, social influence and facilitating conditions have a significant role as direct determinants of user acceptance and usage behavior [6]. These constructs, along with variables such as gender, age, voluntariness and experience, were used to define the UTAUT model.

Performance expectancy is related to the degree to which individuals believe that technologies or a specific system will improve their performance in a particular environment. On the other hand, effort expectancy is associated with the perceived ease of use of a system, whereas the facilitating conditions refer to the degree to which individuals believe that an organizational and technical infrastructure is available to support the use of technologies or a particular system. Finally, social influence construct reflects the degree to which an individual believes that using technology is related to the importance that others (mainly significant people to them) give to that use [6], [7].

2.2 Mobile learning

Developments in communications and wireless technologies, have resulted in widely available, more convenient and less expensive mobile devices. With the increase in the productivity of mobile technologies, their application on different areas has increased too. Educational field is one of the areas in which mobile devices has expanded significantly. Mobile devices have been progressively integrated on teaching and learning activities, until being recognized as one of the main current trends of educational applications for new technologies [8].

Mobile learning (m-learning) can be defined as “any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, mobility of learners and mobility of learning” [9]. O’Malley et al. [8] incorporated an additional element in the definition of mobile learning, referring to m-learning as the process in which the learner takes advantage of learning opportunities offered by mobile technologies [8]. Ipods, cell phones, tablets, Ipads and PDAs are some of the mobile devices more frequently used for m-learning [9]. Many researches have been oriented to evaluate the effect of using these devices in learning and teaching processes.

In particular, some studies have been developed to report the use of tablets and their effects in learning environments. For example, Kaganer et al. studied the use of tablet computers to facilitate learning and collaboration [10]. Isabwe et al. investigated effects of learning mathematics with mobile tablet based solutions [11]. With a different approach, Walker et al. reported a case study on the perception of learning when Tablet PCs are used as a presentation medium in engineering classrooms [12]. In the same way, Rossing et al. developed a study to identify student perceptions on learning with mobile tablets [9], while Park and Pobil applied a technology acceptance model to identify key factors that influence on the use of tablets [13].

3 METHODOLOGY

3.1 Instrument design and validation

To identify teachers' perceptions about tablets use, a survey was designed based on the UTAUT model. In addition to the main constructs proposed in the UTAUT model (performance expectancy, effort expectancy, social factors, facilitating conditions and behavioral intention), factors related to self-efficacy, anxiety and attitude toward using technology, were also considered for the instrument design.

The original items proposed for the UTAUT model estimation were adapted for the investigation context and translated into Spanish. These items were designed to be measured with Likert scale ranging five points from "strongly disagree" to "strongly agree". Once the process of adapting and translating the items was concluded, experts in pedagogical and technology areas validated the instrument. Experts analyzed the instrument considering coherence (the statements are clear, precise and have appropriate language for the context), pertinence (items fall into the category intended to measure) and relevance (the items are essential for measuring the category or construct). Experts evaluated individually the instrument according to these criteria and then reached a group consensus against modification or validation of the items analyzed. As a result of this validation process, a survey composed of 27 items was consolidated. Main variations with respect to the original instrument were related to items quantity and language modifications.

In this way, the final version of the instrument measures teachers' perceptions about performance and effort expectancy associated to the use of tablets, facilitating conditions to use it, social influence, self-efficacy, anxiety, attitudes towards the use of tablets and intention to use these devices. Items included on the survey are summarized in Table 1 (Tab. 1).

Tab. 1. Items used to identify teachers' perceptions about the use of tablets

Construct	Code	Item
Performance expectancy	PE1	Tablets are useful in educative processes
	PE2	Using tablets enables me to accomplish educative activities more quickly
	PE3	Using tablets increases my productivity
	PE4	Using tablets makes it easier to do teaching activities
Effort expectancy	EE1	Finding or using applications and tablet's functions is easy
	EE2	Tablets are easy to use
	EE3	Learning to use tablets is easy for me
Attitude toward using technology	AT1	Using tablets is a good idea
	AT2	Tablets make teaching more interesting
	AT3	Teaching with tablets is fun
	AT4	I like teaching with tablets
Social influence	SF1	Head teachers think that I should use tablets
	SF2	People who are important to me think that I should use tablets for teaching
	SF3	The educative institution support the use of tablets

Facilitating conditions	FC1	I have the necessary resources to use tablets
	FC2	I have the necessary knowledge to use tablets
	FC3	Tablets are not compatible with other devices I use
	FC4	There is a support service or someone can help me if I have problems with the tablet
Self-efficacy	SE1	I need someone to help me to complete a job or a task using a tablet
	SE2	I need a lot of time to complete a job or a task using a tablet
	SE3	I need a guide or a help manual to complete a job or a task using a tablet
Anxiety	A1	It scares me to think that I could lose a lot of information if I execute a wrong command in the tablet
	A2	I hesitate to use the tablet for fear of making mistakes I cannot correct
	A3	I hesitate to use the tablet for fear of damaging it
Behavioral intention to use tablets	BI1	I intend to use tablets in the next two months
	BI2	I will use tablets on my next courses
	BI3	I have a plan to give an educative use to tablets in the next semester

3.2 Instrument implementation

The survey was applied to participating teachers of the “Class-T” program in public schools of Cundinamarca. Participating teachers belong to rural and urban schools; most of them teach on sixth and seventh grade and are linked to science, language, mathematics and technology areas. The instrument was designed to be implemented through an online application once the program starts and at the conclusion of the intervention process. The results presented in this paper refer to the first application moment.

4 RESULTS

In the first application moment, the survey was responded by 148 teachers of “Class-T” program. Before processing the general results, some items were recoded to facilitate the analysis. In particular, scales of items FC3, SE1, SE2, SE3, A1, A2, and A3, were inverted.

The results obtained in the first application are shown in Figure 1 (Fig. 1), which presents the percentage of teachers that have a positive perception in the items associated to the different categories included in the survey. According to these results, teachers have an overall positive perception towards the use and intention to use of tablets. Items related to performance expectancy (PE), attitude toward using tablets (AT) and behavioral intention (BI) to use tablets are the better rated. In particular, teachers seem to be aware that tablets can be useful in education and perceive their use as something positive in this area. On the other hand, results of BI category show that even though teachers report an intention to use tablets, there is a clear difference between the intention to use

tablets in short and long term. As can be observed in Fig. 1 (item BI3), teachers report with a lower frequency the intention to use tablets in the next semester and defining a plan in order to achieving it.

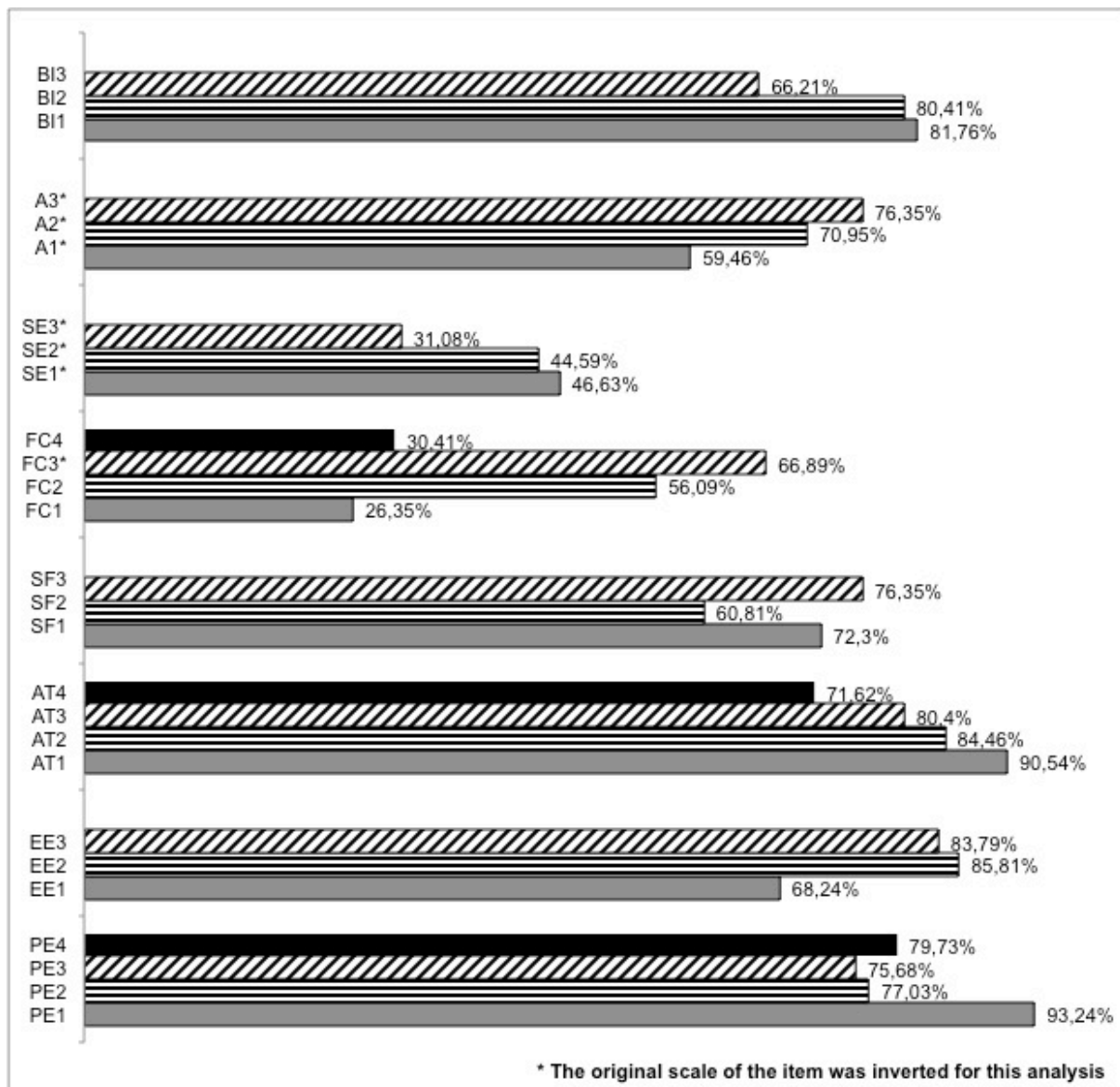


Fig. 1. Percentage of teachers with a positive perception towards the items included in the survey

Teachers also have a positive perception related to the ease tablets usage. A high percentage of teachers (85,81%) believe tablets are easy to use and about 84% of teachers believe learning to use it is easy too. In comparison with these results, a lower percentage of teachers consider that finding or using tablets' applications functions is easy (68,24%). This last result could be associated with deficiencies on internet availability, since this is one of the main resources for finding and executing tablets applications. The lack of the necessary resources to utilize tablets is also reflected in the negative perception towards the facilitating conditions for using these devices. In this category, items related to necessary knowledge to use tablets and tablets' compatibility with other devices are the better rated, whereas items associated with necessary resources (internet, electricity, etc.) for their use and support service, were rated positively by a low percentage of teachers. Barely 30,41% of teachers consider that someone can help them if they have problems with the tablet and just the 26,35% of teachers believe they have the necessary resources for using the device.

Self-efficacy is another category in which teachers don't have an overall positive perception. The results obtained for this category show that a considerable percentage of teachers perceive the need of someone assistance or a manual, to complete a task with a tablet. In addition, teachers believe that developing a task with this device could take them a lot of time.

Finally, teacher's perceptions related to anxiety feelings and social factors that could influence the use of tablets, are positive in a relatively high proportion. In this way, a high proportion of teachers seem not to be afraid of damaging tablets (A3) or making mistakes at using these devices (A2). Despite of these results, the positive perception related to anxiety category is slightly diminished because of the item A1, in which the percentage of teachers that feel confident using tablets and not being afraid of losing information (A1) is lower than the percentage associated to the other items (A2 and A3). On the other hand, a significant percentage of teachers report a positive social influence toward the use of tablets. Over 60% of teachers consider the educative institution supports the use of tablets and believe that for other people (significant for them) it is important that they use tablets for teaching.

5 CONCLUSIONS

A survey based on the UTAUT model was applied to identify teachers' perceptions about the use of tablets. The categories better rated by teachers were behavioral intention to use tablets, performance expectancy and attitude toward using these devices. This means a high proportion of teachers (about the 80%) believe tablets could improve their performance on teaching activities, have a positive attitude towards using this mobile devices and report the intention to use them for teaching. On the other hand, the positive perception toward other categories such as effort expectancy, social influence and anxiety, is not as strong as the presented for the previous categories. In this way, about 79% of teachers reported a positive perception related to the ease of use of tablets and the 69% perceive the social actors as potential agents that could influence them in the use of tablets. Results also showed that self-efficacy and facilitating conditions were the worst rated categories. For these categories, a low percentage of teachers (below 50%) believe they count with necessary resources (infrastructure) to support the use of tablets, while a similar teachers' proportion perceive they can achieve tasks by themselves using these mobile devices. This results show that despite efforts made in infrastructure matters, still there are shortcomings in this area that should be improve in order to guarantee the necessary conditions to use new technologies.

Finally, as a future work, further analysis could be done to trace most significant factors associated with teachers' perceptions that influence in the process of accepting new technologies. On one side, once the survey is applied at the end of the "Class-T" program, a comparative study between initial and final teachers' perceptions could be done. On the other hand, correlation analysis among different categories could be conducted to identify the dependence between variables and establish the determinant categories in the acceptance of tablets by teachers.

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