

# Technologically Reluctant Teachers. A TAM Based Study On Compatibility And Resistance To Change Among Pre-Service Teachers

José Carlos Sánchez-Prieto<sup>1</sup>  
Susana Olmos-Migueláñez<sup>1</sup>  
Francisco J. García-Peñalvo<sup>1</sup>

<sup>1</sup> *GRIAL Research Group, Research Institute for Educational Sciences, University of Salamanca*

Paper presented in *network 10- teacher education research* at the *ECER'16 Conference*.

**Keywords:** TAM, higher education, pre-service teachers, mlearning, primary education.

## 1.- Theoretical Framework

Although the process of integrating mobile technologies in schools in the European context is still in its initial stages, it is a rapidly growing trend, mainly supported in the possibilities offered by the new devices emerged in the past few years, such as smartphones and tablets, that can provide a wide range of solutions to educational problems.

The main advantages offered by these devices are (Traxler, 2009):

- **Overcoming time and space barriers:** Due to the portability of these devices, and thanks to their current ability to connect to the internet, it is possible to take the teaching-learning process anytime and anywhere.
- **Personalisation of content:** Because they are individual technologies they allow us to adapt the contents and teaching methodologies to the user's needs, also allowing for situated learning.
- **Supporting collaborative process:** The communication ability of these systems is especially useful to implement collaborative learning processes and to facilitate the tutoring process.

The teaching body plays a key role in the technology integration process, which makes it essential to know which are their attitudes towards these devices and the elements that influence their process of adoption of mobile information systems if we want to achieve success in this innovation process (Chen, Looi, & Chen, 2009).

The TAM (Technology Acceptance Model) (Davis, 1989) is currently the most extended technology acceptance model, largely thanks to the simplicity of both its theoretical model and its data collection instrument, and its ability to adapt to all kinds of technologies and contexts (King & He, 2006).

The model proposes two main constructs to explain the adoption process: perceived usefulness, understood as the extent to which the user considers that the use of the system improves the performance of a task, and perceived ease of use, understood as the subject's valuation of the degree of effort needed to use the tool.

These two constructs determine the attitude towards the use of the system, which in its turn leads to the behavioural intention of use which, finally, conditions the actual use of the system. To measure these constructs, Davis develops an instrument composed of a Likert-type scale with items for each of the constructs.

The use of the TAM model, or expanded versions, to study the technology adoption process is a growing trend that covers diverse topics from new technologies in organisations (Wu & Chen, 2005) to health sciences (Briz-Ponce & García-Peñalvo, 2015; Briz-Ponce, Juanes-Méndez & García-Peñalvo, 2016).

Our proposal intends to join the trend that applies thin kind of models to the study of the attitudes of pre-service teachers towards new technologies (Teo & Noyes, 2011). This way, this communication presents the results of a descriptive study on the intention of using mobile technologies in the future teaching practice of first-year students from the Primary Education Teacher Bachelor's Degree of the University of Salamanca. To carry out this study we developed a TAM-based model expanded with the constructs of Compatibility and Resistance to Change.

Below, following the proposed structure, we will detail the methodology and results obtained.

## 2.- Methodology

For the development of our expanded TAM model we start from Davis' two basic constructs, perceived usefulness and ease of use, both of which condition the behavioural intention of use in our proposal.

The model is extended with the addition of two other constructs: perceived compatibility, which is defined as the degree of adjustment of a given information system to a person's values and habits (Rogers, 1962). In our model, perceived compatibility acts as an antecedent of perceived usefulness and behavioural intention.

The second construct we added to the model is resistance to change, a relatively unexplored construct that we expect will contribute in a significant way to explain the acceptance of technology among teachers. Resistance to change is understood as the emotional stress caused by the expectative of change (Al-Somali, Gholami, & Clegg, 2009). In our model, given that it is an unexplored construct, we suggest that it might be located as an antecedent both to the three constructs from the TAM model and to the perceived compatibility.

The exogenous variables proposed for the study would be: perceived usefulness, perceived ease of use, compatibility and resistance to change. On the other hand, the endogenous variable is the behavioural intention. Finally, we propose three explaining variables: age, gender and school.

Starting from this theoretical model, we drew up an instrument divided in two sections. The first one is intended to gather the participants' identification data, while the second one is composed of a Likert-type scale of 16 items, with a scale of 0-6 (0 completely disagree; 6 completely agree). To assess the internal consistency of the instrument we have used Chronach's  $\alpha$  coefficient, which indicates a high internal consistency ( $\alpha=0.862$ ).

The population of the study is composed of the first-year students of the Primary Education Teacher Bachelor's Degree of the University of Salamanca, in its branches of Salamanca (N=120), Zamora (N=66) and Ávila (N=65).

The sample is composed of 202 students (100 from Salamanca, 52 from Zamora and 50 from Ávila). The mean age of the students is 19.52 years, and most of them are aged 18-20. Regarding the gender of the students, 63.9% are female and the other 36.1% are male.

### 3.- Results

The results obtained in the descriptive analysis of the students' scores show a positive attitude towards the use of mobile devices in their future teaching practice, given that we have obtained scores above 4 in the majority of items. However, two of the three items of the construct resistance to change have yielded scores of 2.48 and 2.04, which can indicate a future field of intervention.

After the descriptive analysis, we verified if there were significant differences between the means of the students according to their gender. To test the hypothesis, first we applied the Kolmogorov-Smirnov and Shapiro Wilk tests to determine the normality of the sample's distribution. The result of this analysis entailed the rejection of the normality hypothesis (s.l. 0.05) so we employed non-parametric tests to carry out the hypothesis testing. We used the Mann Whitney U test because it was considered the most appropriate test for a case of independent samples. The results indicated that there are significant differences in two items corresponding to the constructs of perceived usefulness and perceived ease of use respectively, for a significance level of 0.05. In both cases, male students present higher scores than their female counterparts.

Lastly, we verified if there were differences among the means of the students according to the branch they attend. To this end, we ran the Kruskal-Wallis test. The results show that there are significant differences in 11 out of the 16 items, including the all of the items items that refer to perceived usefulness, behavioural intention and perceived compatibility as well as two out of the four items that measure the perceived ease of use. In all cases, the students from the Salamanca branch obtain the higher scores.

### 4.- References

Al-Somali, S. A., Gholami, R., & Clegg, B. (2009). An investigation into the acceptance of online banking in Saudi Arabia. *Technovation*, 29(2), 130-141.

Briz Ponce, L., & García-Peñalvo, F. J. (2015). An empirical assessment of a technology acceptance model for apps in medical education. *Journal of Medical Systems*, 39(11), Paper 176. doi:10.1007/s10916-015-0352-x

Briz-Ponce, L., Juanes-Méndez, J. A., García-Peñalvo, F. J., & Pereira, A. (2016). Effects of Mobile Learning in Medical Education: A Counterfactual Evaluation. *Journal of Medical Systems*, 40(6), Paper 136. doi:10.1007/s10916-016-0487-4

Sánchez Prieto, J. C., Olmos-Migueláñez, S., & García-Peñalvo, F. J. (2016). *Technologically Reluctant Teachers. A TAM Based Study On Compatibility And Resistance To Change Among Pre-Service Teachers*. Paper presented at the ECER 2016, Dublin, Ireland, 22-26 August, 2016. doi: <https://dx.doi.org/10.6084/m9.figshare.3863205.v1>

Chen, F. -, Looi, C. -, & Chen, W. (2009). Integrating technology in the classroom: A visual conceptualization of teachers' knowledge, goals and beliefs. *Journal of Computer Assisted Learning*, 25(5), 470-488. doi:10.1111/j.1365-2729.2009.00323.x

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management*, 43(6), 740-755. doi:<http://dx.doi.org/10.1016/j.im.2006.05.003>

Rogers, E. M. (1962). *Diffusion of innovations*. New York: Free Press of Glencoe.

Teo, T., & Noyes, J. (2011). An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre-service teachers: A structural equation modeling approach. *Computers and Education*, 57(2), 1645-1653.

Traxler, J. (2009). Current state of mobile learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education and training* (pp. 9-25). Edmonton: AU Press.

Wu, I., & Chen, J. (2005). An extension of trust and TAM model with TPB in the initial adoption of on-line tax: An empirical study. *International Journal of Human-Computer Studies*, 62(6), 784-808. doi:<http://dx.doi.org/10.1016/j.ijhcs.2005.03.003>