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Behavioral intention, use behavior and the acceptance of electronic learning systems: Differences between higher education and lifelong learning

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ABSTRACT

Widespread implementation of e-learning systems – learning management systems, virtual learning environments – across higher education institutions has aroused great interest on the study of e-learning acceptance. Acceptance studies focus on the predictors of system adoption and use, with behavioral intention to use the system as a proxy for actual use. This study proposes a TAM3-based model – with the inclusion of two additional variables: personal innovativeness in the domain of information technology and perceived interaction – to study the factors influencing the acceptance of e-learning systems. Attention is also brought towards the role of behavioral intention, especially in its relation with use behavior. In order to do so, two different settings were considered: higher education and lifelong learning; data was gathered from a survey administrated to Spanish graduate and lifelong learning students, and partial least squares analysis was used to test the research model. Results supported TAM relations, except for the intention-behavior linkage, and unveiled a dual nature of perceived usefulness – with one component related to efficiency and performance, and another component related to flexibility. The adequacy of applying TAM3-based models in educational contexts and suitability of actual system usage measures are also discussed.

1. Introduction

Acceptance models aim to identify the factors that allow predicting user behavior and explaining the adoption process. Since the formulation of the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and the Technology Acceptance Model (TAM) (Davis, 1989), the constant search for a better explanation of technology acceptance and its antecedents has led to the development of models of increasing complexity.

Computer-mediated education, or electronic learning, has not been exempt from this kind of analysis. But the relatively recent development of learning management systems and virtual learning environments has caused a relative gap between acceptance models and empirical studies of educational technology acceptance. As a result, the different models have gradually been tested in e-learning contexts. Thus, most studies in the last decade were grounded only on TAM or the Theory of Planned Behavior (TPB) (Ajzen, 1991), with very few using more recently developed acceptance models, such as the Unified Theory of Acceptance and Use of the Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) – e.g. Teo (2010), Dueñas-Rugnon, Iglesias-Pradas, and Agudo-Peregrina (2012) – or TAM2 – e.g. Van Raaij and Schepers (2008) –, and close to none using the third version of the Technology Acceptance Model (TAM3) (Venkatesh & Bala, 2008).

Two important issues in technology acceptance research are related to the concept of actual use behavior. In the first place, acceptance models are based on the assumption that behavioral intention is a valid predictor of actual use behavior; this leads to many empirical studies just focusing on explaining behavioral intention as they take the linkage between intention and use behavior for granted; but recent literature (Bagozzi, 2007) has begun to question the validity of traditional acceptance models, and mainly the causality of this relation.

The second issue is related to the controversy about how to actually measure use behavior, as information technologies make it possible to collect objective usage data but many measurement instruments used in educational technology acceptance studies still rely on self-reported system usage. But when acceptance models are used to predict future adoption of a system in pre-implementation stages, objective usage data, and even self-reported system usage, may not be available; in these cases, it is still possible to explain behavioral intention, and it might be necessary to

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rely on other indirect measures of use behavior – such as past behavior.

In the light of the above mentioned, this study aims to answer two research questions:

- RQ1. Is TAM3 adequate to explain electronic systems acceptance and use by students?
- RQ2. Is the relation between behavioral intention and use behavior valid in a TAM3-based framework?

In order to address these two questions, we have designed an acceptance model based on TAM3, adapted to the characteristics of e-learning – understood as the use of learning management systems and virtual learning environments – and applied it in two settings with different contexts and samples, from which we expect to gain insight about the process of acceptance and use of electronic learning systems.

The remainder of this document is structured as follows: section two will present a brief note about technology acceptance models and then focus on presenting the different variables used in the research model, as well as the relations between them; section three will detail the study methodology, including a description of the two settings, sample and the measurement instrument used for validation of the research model; section four will show the results from the empirical analysis, which will be discussed in section five; finally, section six will summarize the main conclusions from this research.

2. Theoretical background and research hypotheses

2.1. Technology acceptance models and determinants of use behavior

As mentioned in the introduction, the last three decades have seen the emergence of some theoretical frameworks to study technology acceptance and use, starting with TRA and the rest of models stemming from it, such as TAM, TPB or UTAUT. They originate from the idea that salient beliefs of an individual determine his attitude towards a stimulus object, which in turn determines his intention to perform a certain behavior; and that behavioral intention is the ultimate predictor of actual behavior.

In TAM, attitudes and intention to use a given technology are predicted by perceived ease of use and perceived usefulness, offering a simple but effective way to evaluate technology acceptance. The latest evolution of TAM, TAM3 (Venkatesh & Bala, 2008), focuses on integrating the antecedents of perceived usefulness and perceived ease of use. But, although TAM3 addresses some of the issues pointed out by Bagozzi (2007) in technology acceptance research – e.g. the inclusion of elements related to emotions in the model–, it has barely been applied to the specific characteristics of technology-enhanced learning.

2.2. Technology Acceptance Model 3 (TAM3) and antecedents of use behavior

Since we will build upon the acceptance framework proposed by TAM3, adapting it to the case of educational technology, and following from the relation between behavioral intention and use behavior in TAM3, we posit that:

H1a. Behavioral intention to use e-learning systems positively predicts use of e-learning systems by students.

For this research, TAM3 has been adapted to address the specific characteristics of educational technology acceptance. Thus, from the original variables in TAM3, we have discarded three determinants of perceived usefulness – image or self-image, output quality and result demonstrability – and one antecedent of perceived ease of use – objective system usability–, but we have included two factors from e-learning acceptance literature: perceived interaction and personal innovativeness in the domain of information technology.

Of these, image was omitted because it was considered that course delivery mode does not affect the status of an individual – and that, in general, learning status is more related to academic records. With regard to output quality and result demonstrability, there is not yet enough evidence of their influence on the domain of e-learning; furthermore, this study is more oriented toward individual acceptance from a pre-adoption perspective than toward course final outputs, and therefore it was considered convenient to exclude them from the study. Finally, system usability is more oriented toward comparison of systems, with an emphasis on efficacy and efficiency, than to individual perceptions of the system; this fact, together with its objective nature, in contrast to the rest of subjective parameters of the study, advised against its inclusion in this study.

2.2.1. Perceived usefulness and perceived ease of use

Perceived usefulness was defined by Davis (1989) as the extent to which a person believes that a system may contribute to improve his work performance. In the educational context it may be redefined as the extent to which a student believes that the e-learning system may help to improve his or her academic performance, by facilitating the whole learning process in general and the completion of learning-related tasks in particular. According to Umrani-Khan and Iyer (2009), in the case of educational learning systems, perceived usefulness would additionally include the notion of flexibility, or the degree to which the tools and contents of an e-learning system fit the student's preferences; this includes preferred time, location/place and learning style, and favours the feeling of independence and self-directed learning. Therefore, from the original formulation of TAM3:

H2a. Perceived usefulness positively predicts behavioral intention to use e-learning systems by students.

Perceived ease of use was defined by Davis (1989) as the extent to which a person considers that the use of a system is free of effort. From this broad definition, it follows that perceived ease of use includes aspects related to ease of access and navigation (Park, 2009; Volery & Lord, 2000) and interface design (Selim, 2005, 2007). In sum, an easy access to the system and browsing, and a friendly interface will have an influence on the students' perception of complexity of an e-learning system.

TAM posits that perceived ease of use is not only a determinant of behavioral intention but it also influences the perceived usefulness (Venkatesh & Davis, 2000) – although there is some debate about this relation, especially in contexts where users have a high level of expertise or experience in the use of the system (Venkatesh & Bala, 2008). Thus:

H2b. Perceived ease of use positively predicts behavioral intention to use e-learning systems by students.

H3a. Perceived ease of use positively predicts perceived usefulness of e-learning systems by students.

2.2.2. Subjective norm

Subjective norm refers to the social pressure exerted toward a person by the opinions of other people – referents and significant others, such as family or friends – about whether or not performing a given behavior. Models derived from the original TAM proposed a double influence of subjective norm in behavioral intention, both directly and indirectly through perceived usefulness (Schepers & Wetzels, 2007).