

# Understanding Beliefs, Teachers' Beliefs and Their Impact on the Use of Computer Technology

Hacia la comprensión de las creencias, convicciones del educador y su impacto  
en el uso de la tecnología

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This theoretical review addresses the construct of beliefs in education and English as a foreign language, and their impact when integrating technology. A thorough definition and categorization of teachers' beliefs will be provided. In addition, studies conducted in various educational settings examining the effects of teachers' beliefs and the use of technology will be reviewed. Additional information on models attempting to explain human behavior and the use of computers will be presented as well in order to discuss these research results in light of local efforts made to solve the gap of integrating technology through the Computadores para Educar Program in Colombian public schools.

*Key words:* English as a foreign language, teachers' beliefs, using technology.

Este artículo gira en torno al concepto y la categorización de las creencias sobre la educación y la enseñanza del inglés como lengua extranjera, y se estudia cómo la tecnología incide en dichas creencias cuando esta se integra. Además de revisar varios estudios acerca de los efectos de dichas creencias respecto al uso de la tecnología, se presentan tanto los modelos investigativos y estudios que han intentado describir el comportamiento humano frente al uso de computadores como sus resultados. Estas investigaciones son relevantes para el programa Computadores para Educar, con el que se busca combatir la falta de acceso a la tecnología en Colombia, y beneficiar a los colegios públicos.

*Palabras clave:* creencias del educador, inglés como lengua extranjera, uso de la tecnología.

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This article was received on August 17, 2011, and accepted on June 26, 2012.

## Introduction

Computers and the Internet are becoming both widely used and widely researched in the language classroom. Computer technology in education is a new trend that seems to offer many advantages compared to traditional instruction. Specifically, Butler-Pascoe and Wiburg (2003) state that the use of computer technology fosters interaction and presents students' language in a graphically and linguistically enhanced manner. Also, computer technology can be used for task or problem-solving activities. Likewise, Chapelle (2003) states that using computer and Internet technology can enhance second language acquisition due to the differences as to how input and information processing takes place through the use of computer technology, not to mention the benefits attributed to distance education in terms of mobility and efficacy.

Unfortunately, the desire to use technology is not always as successful as wished due to first-order barriers hindering access to computers and the Internet. In fact, local efforts have been in action in order to fight the inevitable digital divide inherent to technology in education through the *Computadores para Educar* (CPE) program since 2002, in which thousands of computers have been collected from both the public and private sector in order to fight the lack of access to technology in low-income and rural communities in the Colombian territory. CEP not only collects, but also refurbishes and distributes computers to public schools.

Since computers are acquiring a decisive role in education and society in general, the implementation of computer technology and its success has become of particular interest, but its success does not merely depend only on abundant economic investments. In fact, in education, it has been found that final users (i.e. educators) have an influential role in the successful implementation of technology. One of the factors affecting the

implementation of computer technology is educators' own teaching profile, which refers to how an educator's performance fits into a pedagogical theoretical trend. Mainly, teaching profiles have been described to be either traditional or constructivist; Tondeur, Hermans, Van Braak, and Valcke (2008) have found that traditional teaching profiles are associated with low-computer use, whereas constructivist teaching profiles, in which students take an active role in learning, are associated with higher computer use. Surprisingly, researchers have found that teachers holding both a combination of traditional and constructivist teaching profiles represented the highest degree of computer use.

In a similar study, Windschitl and Sahl (2002) found that teachers' beliefs about the potential of their students, about teaching, and, particularly, the role of computers in education had a decisive impact on the success or failure of implementing technology. In addition, Windschitl and Sahl found that even if teachers abandoned the idea of implementing computer technology in the classroom, there was an a posteriori effect on their teaching practices, leading such practices to become more constructive as compared to before the use of computer technology in the classroom.

Beliefs are a major influencing factor in many areas of education (Borg, 2003), and technology is not exempt from this influencing phenomenon. In fact, teachers' beliefs have proved to be able to challenge government and school efforts to implement computer technology. Such beliefs have often served to be a deterrent in the use of computer technology in the classroom (Ertmer, 2005). For this reason, the main purpose of this paper is to provide a general overview of the effects of teachers' beliefs in the use of technology in the language classroom and some local considerations to bear in mind when encouraging educators to use technology. Due to the scarcity of studies in the area,

this paper will present both studies examining the effects of teachers' beliefs in using technology in general and in language education. It is hoped that this will bring to light the reasons favoring or inhibiting the development of positive and negative beliefs teachers hold about the use of computer technology, and how administrators and educational public policy need to address the complexity of beliefs in order to succeed in the implementation of computer technology in schools.

This paper consists of three sections. Section one will provide a review of the various attempts to define the construct of beliefs, plus a detailed explanation of the type of beliefs first identified by Rokeach (1968). Section two will present a review of studies examining the effect of beliefs in computer technology use in both general and language education. Section three will explore the interaction of beliefs, attitudes, intentions, and action. For this purpose, the Venkatesh, Morris, Davis, and Davis' (2003) "Unified Theory of Acceptance and Use of Technology" together with Lawrence's (2001) model of teachers' beliefs will be explained in detail in order to gain insight into beliefs being not as an isolated construct, but as one interacting with both internal and external factors. Section four will provide concluding remarks and recommendations for further research in the field of implementation of computer technology culture, and identity in relation to computer use.

### **Beliefs**

Pajares (1992) presents beliefs as a messy construct, and one difficult to disentangle from similar concepts. Pajares states beliefs usually overlap with close psychological terms such as knowledge, attitude, opinion and ideology. In this perspective, a definition for beliefs is "at best a game of player's choice" (p. 309). An early attempt to systematize the concept of beliefs was introduced by Rokeach

(1968), who provided a comprehensive model of individuals and their belief system.

Rokeach's (1968) model consists of the following four elements: existential vs. non-existential beliefs, shared vs. unshared beliefs, derived vs. underived beliefs, and beliefs concerning matter of taste. Existential and non-existential beliefs are defined by Rokeach as those beliefs that are related to existence in the physical and social world; shared vs. unshared beliefs relate to those shared with others; derived vs. underived beliefs refer to those beliefs internalized and not from direct encounter with a particular object. Finally, the author defines beliefs that are a matter of taste as those beliefs representing a matter of choice in an arbitrary way. Consequently, Rokeach states that existential vs. non-existential, and shared and unshared beliefs are those having functional connections and consequences on other beliefs.

Furthermore, in Rokeach's (1968) model a complementary categorization of beliefs is presented as follows: primitive beliefs (type A), primitive beliefs (type B), authority beliefs (type C), derived beliefs (type D), and inconsequential beliefs (type E). To better understand Rokeach's (1968) model, it is important to draw a line that separates changeable and unchangeable beliefs.

Changeable beliefs in Rokeach's (1968) models are referred to as primitive beliefs. These contain a 100% subjective intrapersonal agreement. Rokeach explains that these beliefs originate from direct encounters with determined objects, and have a "taken-for-granted character" (p. 6). Such beliefs are not open to discussion or change, and they belong to the most inner-core type of beliefs. It is worth noting here that prior to this categorization, Rokeach clarified central beliefs as precisely those that are not bound to change due to their incontrovertible nature. Rokeach also warns that these central beliefs (type A) are also associated with

self-identity and any disturbance affecting these can cause instability within an individual. Some examples of central beliefs are exemplified in statements such as “I believe this is my mother”, “I believe this is my name” (p. 6).

An additional type of belief is primitive beliefs consensus (type B). Rokeach (1968) explains that these beliefs only justify their existence within an individual. That is, no external factor could affect their *raison d'être*. Rokeach describes these primitive beliefs as being impervious in nature. An example of type B belief is “I believe... no matter what”.

In addition to beliefs type A (plus Rokeach, 1968 presents authority beliefs type C), which are described as those originating in the different spheres of society. Rokeach explains that family, class, peer groups, religious and political groups, and country itself shape authoritative beliefs.

In the same line, derived beliefs (type D) are presented. These beliefs are derived through second hand experiences, originating from an “institutionalized ideology” (p. 10). Rokeach states that individuals adopt or reject these beliefs by balancing between their personal identity and the validity of the belief itself. That is, individuals accept or reject beliefs depending on how well they identify with them and form a sense of “group identity” (p. 11).

Finally, Rokeach presents inconsequential beliefs (type E). These beliefs originate from indirect experiences with an object. Rokeach explains that if these beliefs are changed, they have few implications for other beliefs. This contrasts notably with both type A and type B beliefs, since these types of beliefs cannot be changed at all.

Classifying beliefs may facilitate understanding but not defining beliefs themselves. In principle, there is no agreement in the literature as to where the boundaries of the scope “beliefs” originate and finish. Because of this, finding commonalities among the different definitions appears

to be easier than isolating each individual definition. For this purpose, I am going to refer here to the commonalities found in the work of the different researchers such as Cuthbert, Sigel, Rokeach, and Brown and Coney (as cited in Pajares, 1992). Pajares states that one of the most common distinctions made between beliefs and knowledge is that beliefs are associated with subjectivity and emotion, whereas knowledge tends to be more empirical. Further, Sigel (as cited in Pajares, 1992) adds that beliefs are the mental constructs of experience often condensed and integrated into schemata. Similarly, Brown and Coney (as cited in Pajares, 1992) state that the main function of a belief is guiding and determining behavior. Finally, Harvey (as cited in Pajares, 1992) asserts that beliefs appear to each “individual’s representation of reality that has enough validity, for a particular purpose under any circumstance” (Abelson, as cited in Pajares 1992, p. 131).

Another definition of beliefs is presented by Alexander and Dochy (1995) who obtained a definition of beliefs by interviewing individuals from the U.S. and the Netherlands. Results suggest that individuals understand beliefs as being part of a level of perception, rather than constituting knowledge or being part of a tangible reality. These results also support Brown and Coney’s (as cited in Pajares, 1992) differentiation between beliefs and knowledge. Nevertheless, it appears to be problematic with what was found by Nisbett and Ross (as cited in Pajares, 1992), namely, considering beliefs to be a sub-category of knowledge and not a different isolated concept itself. Finally, Alexander, Murphy, Guan and Murphy (1998) provide cross-cultural research results from students and teachers in the U.S. and Singapore. Their results agree with Alexander, Murphy Guan and Murphy’s results in that they classify beliefs as subjective and knowledge as more factual.

### Self-Efficacy Beliefs

Bandura (1986) explains that circumstances represent variables of success or failure in individuals. In this perspective, an individual possessing determined skills may perform successfully or not in certain situations. Bandura explains that not only do individuals possess knowledge and skills to perform certain actions, but also they possess judgments in their ability to either have success or failure performing such actions. These judgments are referred to as "self-efficacy beliefs."

Self-efficacy beliefs as conceived by Bandura (1986) are reaffirmed by four factors: Enactive attainment, vicarious experience, verbal persuasion, and physiological states. Enactive attainment refers to the direct experiences in which an individual has obtained success in the mastery of new experiences that are reinforced by continuous experience; vicarious experience refers to the second-hand experiences that can either foster or deter the success of one's beliefs in the power of achieving a determined objective; verbal persuasion deals with the ability of awakening the beliefs that individuals possess certain skills that they are capable of using them. Bandura cautions that as much as these beliefs can act as a positive agent, they can also become a negative factor if they are not realistic. In this case, they would lead to failure and most likely future avoidance. The final type of factor is physiological states which are the effect of elevated, adverse emotions on performance, usually represented in the form of high arousal.

### Teachers' Educational Beliefs

The first attempt to define educational beliefs was made by Pajares (1992). Pajares acknowledges that the main weakness of educational beliefs is that these are context-free and broad. Despite this, Pajares mentions four main categories of educational beliefs, namely, teacher efficacy (affecting

student performance); epistemological beliefs (regarding knowledge); teacher's or students' performance (regarding the different motivational spheres), and self-efficacy (confidence when performing a task).

Porter and Freeman (as cited in Pajares, 1992) include teachers' beliefs as a sub-category of their concept "orientations to teaching". According to Porter and Freeman, teachers' beliefs encompass beliefs about related educational components such as the role of schools in society, beliefs about students, and the role of teachers in the education process. Porter and Freeman's definition seems to be consistent with the research results of Windschitl and Sahl (2002) about the effects of teachers' beliefs on implementing computer technology in a school context in that the different types of beliefs teachers had in the aforementioned study had to deal with most, if not all, of the components of educational beliefs presented by Porter and Freeman (as cited in Pajares, 1992).

The second attempt to define educational beliefs is found in Tondeur, Hermans, Braak, and Valcke's (2008) work. The authors included more recent studies that defined teachers' beliefs. The first of these authors is Richardson (as cited in Tondeur et al., 2008) who states that teachers' beliefs are the "psychological understandings, premises or propositions felt to be true" (p. 2543). Finally, Denessen (as cited in Tondeur et al., 2008) proposes that such types of beliefs could be specifically limited to the domain of education.

In addition, Campbell, Kyriakides, Muijs and Robison; Kagan; Nespor and Pajares (as cited in Tondeur et al., 2008) agree that teachers' beliefs are considered relatively stable and have a filtering role for new knowledge and meaning. Finally, Lowick (as cited in Tondeur et al., 2008) notes that educational beliefs underlie teachers' planning, teachers' decisions and behavior in the classroom.

Clark (1988) addresses what in terms of Pajares (1992) would be educational beliefs, as “Preconceptions and Implicit Theories” (p. 6). Clark collected the work of several scholars, and conceptualized beliefs as the implicit theories that teachers’ develop and hold about their students, about the target subject matter, and about roles and responsibilities. Moreover, Clark defines implicit theories as tending to be “eclectic aggregations of cause-effect propositions from many sources, rules of thumb, generalizations drawn from personal experience, beliefs, values, biases and prejudices” (p. 6).

Last but not least, Richards and Lockhart (1994) agree with Clark (1998) and Lowick (as cited in Tondeur et al., 2008) in that beliefs represent a major source of decision-making in education. Richards and Lockhart, however, state that beliefs can be both objective and subjective. Contrary to the subjective and commonly accepted notion of beliefs, Richards and Lockhart clearly state that beliefs can originate from academic and empirical concepts as well. As a final note, the authors emphasize that even experience in teaching turns into beliefs operating under the ‘*I have done before, I’ll do it again*’ formula.

To conclude, from the definitions above, one could state that teachers’ educational beliefs are understood as the different educational phenomena that have an effect on teachers’ decision making in the classroom. A possible weakness of stating the above is already pointed out by Campbell, Kyriakides, Muijs and Robison; Kagan; Nespor and Pajares (as cited in Tondeur et al., 2008), acknowledging that educational beliefs are relatively stable, but unfortunately this is not explained in detail. Also, it must be not ignored that even if Clark’s categorization of educational beliefs appears to be more accurate, it still reflects what Pajares (1992) calls a “too context-free” (p. 316) definition in which contextual variables are excluded.

### Teachers’ Beliefs and the Use of Technology in Education

In the next section, a set of studies examining teachers’ decisions about using technology will be reviewed. These studies were not conducted in language classroom settings; rather, they were conducted in different contexts and on different levels of education spanning from schools to universities. The first study was conducted by Windschitl and Sahl (2002), which examines teachers’ beliefs about technology, their own students, and ‘good teaching’. This study presents subsequent information about how beliefs have an effect on both the use of technology and teaching practices. This study is based on the premise that teaching is a social activity that is influenced by contexts and institutional cultures (Little; Minick, as cited in Windschitl & Sahl, 2002). The findings suggest that the participants’ beliefs about their students, their beliefs about what good teaching constitutes, and the role of technology in their students’ lives set the boundaries of feasibility and appropriateness in the classroom. Moreover, findings suggest that the implementation of technology in schools is rather a complex issue that has to be solved from the teachers’ repertoire of beliefs. Therefore, such a repertoire of beliefs should be earnestly considered.

A similar study conducted by Steel (2006) reports on the use of web technologies in higher education by experienced professors in areas of science and humanities. Beliefs were examined from two perspectives: beliefs about teaching and beliefs about web technologies. Results of this study suggest that teachers’ beliefs are clearly reflected in the web-based technology project the teachers designed for their classes and how they implemented it. In fact, from the three participants the following could be observed:

- Participant 1 created a website project in which information was provided only to students.

- Participant 2 created a website in which students had a more active role.
- Participant 3 created a website that allowed for student and teacher interaction.

Steel (2006) concludes from the findings above that teachers' beliefs are mirrored in how technology is used. Steel also states that these results reinforce Bates and Poole's (as cited in Steel, 2006) claims about the relationship between choices, use of technology, beliefs about knowledge and how students learn.

### Teachers' Beliefs and Use of Technology in Language Teaching

The following studies are specific to language teaching. These studies examined the role of teachers' beliefs, as well as the obstacles hindering the use of computer technology in the language classroom. Perhaps the most well-known of these studies is Lam's (2000). Lam examined teachers' beliefs and proposed a dichotomy between an excessive desire of institutions to use technology referred to as *technophilia*, and a presupposed rejection on the teachers' behalf to use technology referred to as *technophobia*. Lam found that her participants knew about the advantages of using technology, and that their personal convictions about the use of technology in the classroom highly influenced their use of computer technology. Lam concludes that the widespread misconception about teachers not using technology in the language classroom is due to their personal beliefs and conceptions and not to *technophobia*, because in her study teachers were computer-literate, but did not necessarily use computer technology because their beliefs about technology's usefulness were that it was limited. This leads Lam to believe that institutions may be suffering from unnecessary *technophilia*, but of particular attention in this study is that factors associated with the lack of use of technology could

possibly be teachers' ages and types of students. In fact, Lam noted that teachers actively using computers were in the age range between 25 and 35 years old, whereas the teachers not reporting any computer technology use were 35 and up. Results also revealed that teachers' high or low experience did not differ in the use of computer technology.

A similar study conducted by Yang and Huang (2008) in the Taiwanese-school context aimed at understanding what attitudes and behaviors teachers developed while striving to integrate technology in EFL teaching. Results suggest that inexperienced teachers struggled more to implement technology than did experienced teachers. This contradicts Lam's (2000) findings about age, but it simultaneously reinforces the importance of integrating technology in teacher education programs as done by Park and Ertmer (2008) in order to foster more familiarity and perhaps avoid the struggle that was detected in Yang and Huang's study.

Another important factor facilitating the use of technology in EFL was computer literacy. Yang and Huang (2008) reported that more computer literate teachers were found to score higher in being more liable to cooperate with other teachers and being more capable of refocusing. That is, they were more adept at implementing and troubleshooting technology. Finally, it was found that teachers holding more positive beliefs about technology were more likely to put more effort into integrating it, and that lack of information and training among teachers were factors that significantly deterred the integration of computer technology.

The results of the Yang and Huang (2008) study call attention to the importance of considering teachers' backgrounds when implementing technology, possessing well-supported school environments, having positive beliefs about technology, and paying attention to both first and second-order

barriers (Brickner, 1995). Furthermore, this study proposes that in order to change second-order barriers, teachers should be provided with further information about technology, incentives to integrate technology, and clearer explanations and demonstrations of the use of technology in the teaching and learning of EFL.

### Models Explaining Users' Beliefs and Intentions Toward Computer Technology

The studies presented above have given more reasons to assert that beliefs are a crucial factor to address when integrating technology in both general and language education. In light of this, Ertmer (2005) has acknowledged that teachers' beliefs are in fact the next issue to address on the agenda when it comes to integrating technology; however, there are more questions than answers in regard to the nature of teachers' beliefs, their origin, and their relationships to beliefs about technology, among other important questions.

One model that explains how teachers' beliefs originate is presented by Lawrence (2001). Lawrence bases his premises on a previous common model that examines the relationship between intentions and actions, namely, "The Theory of Planned Behavior" (Ajzen, 1991). Lawrence (2001) posits that a system examining the origin of teachers' beliefs has two starting points: "the perceptions of educational effectiveness of the innovation" and "attitudes towards that innovation" (p. 45). This dichotomy, explains Lawrence, consists of a cognitive element assigned to perceptions, and an emotional one assigned to attitudes.

Considering the above, Lawrence (2001) explains that the dichotomy of perception and attitudes toward innovation adds to three additional elements in the model, which are: perceived control (or the extent to which teachers think they are

going to control the innovation), perceived expectations (or the effect of innovation as perceived socially), and past experiences, which refer to how the innovation "influences a teacher's core perceptions about an innovation's effectiveness, while at the same time becoming part of the more affective, evaluative attitudes towards the innovation" (p. 45). Furthermore, Lawrence (2001) adds that the interaction of these elements should not neglect the fact that confidence and access also play a major role in that they complement high levels of motivation in teachers, and that with the absence of confidence and access, innovation could fail to be put into practice. Finally, Lawrence concludes that the interaction of the elements hereby exposed can lead to understanding the effects of teachers' beliefs when using technology in the classroom.

A more comprehensive model that examines the relationship among several demographic variables such as age, gender, experience as well as beliefs, and the effect of such variables on intentions of using technology is "The Unified Theory of Acceptance and Use of Technology" (UTAUT) proposed by Venkatesh et al. (2003). This theory does not relate specifically to education, rather it has been applied to the corporate world. The theory is a compilation of eight previous models that have attempted to explain user intentions to use computer technology, one of which is Ajzen's (1991) Theory of Planned Behavior. After simultaneous empirical validation of the eight models, Venkatesh et al. found that the following four elements play a significant role in all of the models: Performance expectancy, effort expectancy, social influence, and facilitation of conditions. It is worth clarifying here that each of these elements represents a mode of belief which will be explained later in this section. Further, Venkatesh et al. state that self-efficacy, anxiety, and attitude, although present, do not play a significant role in isolated



situations, but only when they interact with other variables. Consequently, such variables are not considered in their theory.

Venkatesh et al. (2003) focus on the four most significant elements in predicting intention in using technology. The first of these elements is the belief of performance expectancy, which is "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447). According to the researchers, performance expectancy has been found to be the most influential predictor of intention using technology in both voluntary and mandatory settings (p. 447) and this has been the case with other models proposed. Likewise, they explain that other variables play an important role as well in intention. For instance, men appear to be more likely to enjoy a task-oriented use of computer technology than women. Regarding this differentiation, Venkatesh et al. suggest that biological factors by no means play a role; rather, it appears that these types of differences are the results of shaping schemata during the socialization process of individuals (p. 447). Finally, the researchers state that age seems to play an important role in that extrinsic motivation posed by rewards in the work-force can have a greater effect on younger individuals.

By the same token, Venkatesh et al. (2003) explain that the second most influential difference is effort expectancy; the latter is the degree of comfort that a user experiences with a computer system. Once again, Venkatesh et al. highlight that gender plays an important role in women in both mandatory and voluntary settings. Additionally, Venkatesh et al. identify different periods in which effort expectancy is more significant, granting the first periods of approaching a computer system the most relevance, and the post-periods a low level of importance. Similarly, as in performance expectancy, age appears to be significant in that older

populations struggle more with more complex input and information attention on task (Plude & Hoyer, as cited in Venkatesh et al., 2003).

Another aspect addressed in the Venkatesh et al. (2003) study is social influence. This refers to the concern individuals have when they are perceived using technology. Venkatesh et al. found that social influence is not significant at all in voluntary contexts; nevertheless, differences are found in mandatory ones. Moreover, the researchers explain that social influence has three main sub-divisions which are compliance, internalization, identification. Compliance refers to simply using a computer system due to the social pressure on the individual to do so, whereas internalization and identification refer to the extent to which social influence has an effect on individual's schemata and belief structure. Gender differences in social influence have demonstrated that women are bound to be affected more by social influence, and this appears to impact negatively their intention when using new technology. (Venkatesh et al., 2003, p. 452).

The last element identified in Venkatesh et al.'s (2003) research is the facilitation of conditions. This is defined as the set of beliefs supporting the use of a computer system. A common example would be an adequate infrastructure. Venkatesh et al. clarify that facilitating conditions only influence behavior and intention when used simultaneously with effort expectancy. Besides, the authors state that facilitation of conditions plays a more significant role when they are measured simultaneously with experience of the user facing a system and age.

To conclude, Venkatesh et al. (2003) acknowledge that further research is required in understanding the influence of age on computer use. They speculate that the differences in age and adeptness in using technology may become blurry and temporary, especially with younger generations that have been raised in the digital age.

This leads Venkatesh et al. to state that computer literacy should be another variable of interest to understand it as a factor influencing intentions in computer technology as well as the socio-cultural background that users bring with them when first approaching a specific computer system.

Similarly, Venkatesh et al. (2003) state that the system characteristics, self-efficacy, levels of voluntariness, as well as the particular expectation of each organization regarding the use of computer technology are other aspects to examine in future research. Venkatesh et al. assert that other important aspects that future models should look into are productivity, job satisfaction, commitment and other performance oriented constructs (p. 469) and how these are altered (or not) by the implementation of computer technology.

### Discussion

The results obtained from different research studies reiterate that teachers' educational beliefs play a decisive role when integrating technology in the curriculum. For example, in the Windschitl and Sahl study (2002), beliefs about students and teaching determined the success of the use of laptop computers in the classroom. In addition, Steel (2006) found that teachers' beliefs about teaching and teaching profiles were reflected in the type of activities teachers developed for their classes.

Bearing this in mind, the research supports the notions that teachers' beliefs are behind the reasons as to why teachers use or do not use technology in the language classroom. This is congruent with what Ertmer (2005) states about the need of examining teachers' beliefs in order to determine specifically how beliefs influence technology use. Ertmer suggests that teachers' beliefs be exposed explicitly in education or professional development programs while introducing new information into the teachers' beliefs system. Furthermore, Ertmer proposes that

teachers' beliefs using technology can be changed through the following steps: "a) personal experiences b) vicarious experiences c) social-cultural influences" (Ertmer, 2005, pp. 32-34). (Further work on changing teachers' beliefs and teacher change, and problems facing beliefs can be seen in: Ertmer, 1999; Ma, Lai, Williams, & Prejean, 2008; Ertmer & Ottenbreit-Leftwich, 2010; Richardson, 1998; Apple Computer Inc., 1990a, 1990b; Dwyer, Ringstaff & Sandholtz, 1991; Dexter, Anderson & Becker, 1999; Hargreaves, 1994; Barret, Haslam, Lee & Ellis, 2005; Chan 2007. Also, see Raths, 2001, for the ethics involved in changing beliefs). Regarding personal experiences, Ertmer (2005) states that gradual change should be encouraged among teachers. She recommends using simple technology tasks to begin changing teachers' beliefs while questioning their own beliefs, "making assumptions explicit and using classroom as space for discussion and inquiry" (Ertmer, 2005, p. 33). Ertmer also states that no pressure should be exerted on teachers to change their teaching approaches and beliefs about technologies because this can bring about reluctance on their behalf.

The final element proposed by Ertmer (2005) is vicarious experiences. She states that vicarious experiences are when teachers observe other peers doing the same activities using technology so that the observers can improve their self-efficacy and be motivated. Schunk (as cited in Ertmer, 2005) suggests that these types of experiences should serve two purposes: informational and motivational. Furthermore, this seems to agree with Bandura's (1986) definition and importance of self-efficacy in that vicarious experiences are a source of fostering self-efficacy. However, Venkatesh et al. (2003) found in their research that self-efficacy does not play a direct role on intention when isolated, but when mediated by effort expectancy (p. 455). Therefore, the role of both vicarious experiences

after Venkatesh et al.'s research appears to hang loosely as a predictor of intention. Nevertheless, one wonders if it should be completely put aside, or if it should be included as teachers advance more in the use of technology. What it is known from Venkatesh et al.'s research is that self-efficacy does not directly affect intention.

Finally, Ertmer's (2005) model to address teachers' beliefs states that socio-cultural influences should foster environments in which teachers can obtain support from other peers by means of public conversations, small communities and ongoing technological and pedagogical support from schools. Venkatesh et al. (2003) found that certain socio-cultural variables such as gender and age have an effect on intention. Nevertheless, this happens only under the conditions of mandatory settings; that is, settings where the use of technology is not a choice, but a requirement. Venkatesh et al. have raised interesting questions with their results on social influence on behavior, since they state that social influence is significant only during the first stages of computer use, but as time goes by, this factor becomes insignificant.

Further, Venkatesh et al. (2003) point out that social influence has mainly three ways in which it affects the intentions of an individual: Compliance, internalization, and identification (p. 452). The authors explain that internalization and identification are two crucial stages because it is during these stages than individuals "alter their intention in response to social pressure" (p. 452). Thus, it is paramount that administrators learn to identify such stages bearing in mind that they could either mean, simply, obedience because of the pressure imposed, that is, compliance, or an actual change in the individual's belief structure. (For work on stages of technology integration see Dwyer, Ringstaff, & Sandholtz, 1991; Christensen & Knezek, 1999; Russell, 1995; Violato, Mariniz, & Hunter, 1989; Dias & Atkinson, 2001; Toledo, 2005).

One could speculate from the results of the different studies reviewed here that administrators may profit better from a compulsory approach when attempting to integrate technology in the curriculum. It is known from other research (Park & Ertmer, 2008) that exposure to technology does not necessarily result in ultimate usage in pre-service teachers. Still, questions remain as to whether pre-service teachers feel they have more freedom to choose, whereas in-service teachers do not. In any case, caution must be used when making the use of technology compulsory because as Zhao and Cziko (as cited in Ertmer, 2005) put it, teachers can show more resistance if something is imposed upon them.

Integrating technology in the classroom definitely needs to incorporate the teacher's belief system, past experiences (Lawrence, 2001) and individual differences based on gender and age. Gender and age from the research results appear to be problematic. In principle, based on the research results provided by Venkatesh et al. (2003), women are put in a more vulnerable position, and older individuals appear to be less motivated by rewards, whereas younger individuals seem to find motivation in this. Nevertheless, Venkatesh et al.'s research does not refer to any multicultural differences that may play a role in the use of technology. In fact, Yang and Huang's (2008) exploration of teachers' use of technology has reported that younger teachers are precisely those who are less likely to use technology. It should not be forgotten that Yang and Huang's study was conducted in Taiwan, and this obviously implies cultural differences not explored in the UTAUT model. Finally, Venkatesh et al. (2003) acknowledge the fact that further models attempting to explain user behavior should explore the socio-cultural background of users, and this is reinforced by the results of the Yang and Huang study.

### Local Implications of the Role of Teachers' Beliefs and Technology

If the relationship between individuals, beliefs and decision-making is impervious in nature, so is the relationship between culture and technology. Batteau (2010) warns about the success of adopting technologies, and the asymmetries that could be expected in the process if such technologies do not manage to go hand in hand with identity. This statement is similar to the findings of the Venkatesh et al. (2003) study in that successful implementation is founded on permeable identity transactions between individuals and a specific type of technology. As a result of this, local language program administrators and public policymakers should address carefully the issues not only of beliefs, but also those of identity and successful use of technology.

Regarding local public policy, it must be acknowledged that the CEP program has a positive set of beliefs regarding the vision and usefulness of technology. In fact, the use of technology and the need to spread it in public schools is associated with progress and development. Nevertheless, given the discussion in this article, one cannot help but point out the weaknesses present in the stages that schools and teachers have to go through after the donation of computers.

According to the CEP program, once schools acquire refurbished computers, teachers and school staff should go through an assistance period in which final users (i.e. teachers) are expected to relate their experiences after a 16-month process. While the objectives of the CEP program are congruent with the vicarious experiences proposed by Ertmer (2005), one still has doubt as to the gray areas of teachers' beliefs that are left unattended. Not to mention the ambivalence that compulsory approaches vs. process-oriented approaches pose

when addressing teachers' beliefs and the implementation of technology. Whereas the former may end up in simple institutional obedience, the latter does not necessarily guarantee any results and, additionally, generates lots of uncertainty. In sum, evidence is inexistent at this point as to how to address teachers' beliefs when attempting to successfully implement technology in education. Which approach is better and why?

Another aspect to examine in the CEP program is any tangible means that assure that the efforts made to solve the gap in computer technology in public schools actually end up in positive results. As discussed elsewhere, abundant investments are not tantamount to successful implementation and use of computer technology. Therefore, the CEP program could implement better control mechanisms that address not only teachers' beliefs but also control mechanisms that address identity, a priori experiences and ultimate computer use, and thus avoid false expectations based on the syllogism '*Teachers have computers, teachers will use computers appropriately (or not use them at all)*'.

Another question inevitably arises; this question has to do with the role of computers in schools and the promise behind them. In a recent report Sánchez, Rodríguez and Márquez (2010) have presented a solid research report investigating the benefits of computer use, standardized testing and areas of success in various countries worldwide. According to the authors, the most substantial success can be observed in results in the English language, but not in science or math. Given these results, one could say that local teaching institutions have an advantageous position to be able to research which types of computer practices have been associated with better results in the learning of the English language in the contexts reported by Sánchez, Rodríguez and Márquez.

### **Suggestions for Further Research**

The suggestions for further research refer to several aspects of language teaching. Therefore, these will be divided into subcategories of this section in the following lines.

#### **Further Research on Beliefs**

The approaches and models presented throughout this paper have posited various ways to address teachers' beliefs, more specifically, teachers' educational beliefs. As explained elsewhere, Ertmer (2005) argues that teachers' beliefs should be discussed in order to possibly change such beliefs by integrating new beliefs into an already-formed system. However, this approach appears to be problematic when taking into account the beliefs resisting change introduced by Rokeach (1968). Moreover, as acknowledged by Ertmer (2005), the nature of educational beliefs is a blurry area, and educational beliefs have not even been explored fully in nature. How can one know that educational beliefs do not belong to the already problematic set of primitive beliefs proposed by Rokeach (1968)? If this were the case, discussing beliefs would not lead to change in Rokeach's terms. It cannot be forgotten that Rokeach states that this type of beliefs cannot be changed, even if empirical counterarguments are provided. Hence, one could assume that Ertmer's proposal could eventually work given that educational beliefs do not fall under the category of primitive beliefs; however, here one is left with more questions than answers. Therefore, further research would need to tap into the origins of educational beliefs, and this would help determine if Ertmer's proposal of discussing beliefs in order to integrate new beliefs into a teachers' belief system would be a viable option.

By screening the origins of teachers' *negative* educational beliefs, administrators would be able to establish an action plan similar to the one proposed by Butler-Pascoe and Wiburg (2003) in which the more skilled students help those who are still in the process of acquiring computer literacy skills. In the case of teachers, administrators could create general profiles that allow matching those "holders" of positive beliefs with those whose beliefs are negative towards the use of computer technology. By doing this, administrators would not only be helping teachers whose experience and beliefs with the use of technology are not positive, but also, administrators would be contributing to what Venkatesh et al. (2003) pointed out to be the second most important factor in determining intentions to use computer technology, namely, effort expectancy. Further research could aim at understanding what results could be obtained by matching teachers holding opposite beliefs about computer technology, and if such activity could result in better effort expectancy in those holding negative beliefs or not.

#### **Local Studies**

##### **Examining Beliefs From Various Areas of Interest in TEFL**

Although research on beliefs appears to be nascent locally, one can already observe various studies emerging and addressing different areas and issues related to the role of beliefs in various spheres. An important clarification to make now is that the studies reviewed here have explored both beliefs and perceptions. Due to the ill-defined characteristics of beliefs, studies addressing both beliefs and perceptions have been included. The first study was conducted by Muñoz, Palacio, and Escobar (2012). These researchers have addressed the impact of teachers' beliefs on EFL assessment. Likewise, Melgarejo (2009) has explored students'

beliefs about EFL writing; Hernández and Samacá (2006) examined students' perception of culture in EFL; González (2008) addressed teachers' beliefs about the meaning of communicative competence. Other studies have been conducted on intercultural beliefs like Schulz' (2001), who studied the perceptions of teachers and students in the U.S. and Colombia about the role of grammar instruction. Other studies conducted locally have addressed issues regarding public policy and bilingualism. For example, Escobar and Gómez (2010) explored the perceptions indigenous people have about bilingualism and the role of English, among other thorny issues. As reviewed, local studies have examined various areas of TEFL and the influence of beliefs in such areas.

#### Local Studies Specifically Addressing Beliefs and the Integration of Technology

In what appears to be a preliminary and ongoing study, Benavides, Otálora and Hernández (2010) addressed pre-service language teachers' beliefs about the use of technology at a local university. Although unfinished, one can foresee great benefit on this study particularly for language teacher education programs in that this study allows understanding the pre-conceptions teachers have about the use of technology as proposed by Park and Ertmer (2008) in the U.S. context.

Another study conducted locally with in-service teachers at local public schools was conducted by Soto, Buitrago, and Pineda (2011). This study revealed that even if teachers have positive beliefs regarding the use of technology in the classroom, first-order barriers such as budget allocations, training, and infrastructure are some of the current challenges teachers at public schools face. In Soto, Buitrago and Pineda's study, a very controversial issue was discussed regarding whose budget and

time should be included in an attempt for technology inclusion, the teachers' or the institutions'? It appears that institutions have appointed teachers responsible for technology inclusion on their own budget and their own time. In other words, if teachers are planning to include technology in their classes, they will have to find their own means. This issue, plus the curricular constraints already mentioned by Galvis (2011) comprise more items to be considered when integrating technology in the classroom. In sum, even if positive beliefs are held about the use of technology in the classroom, first-order barriers can be significantly inhibiting as second-order barriers.

#### Further Research for Curriculum and Instruction

Other aspects to further look into are teachers' workload and time in the classroom, and how these interfere with the use of computer technology. The Yang and Huang (2008) study has revealed how powerful a deterrent lack of time is when integrating computer technology. Therefore, further studies could separate groups with different workload and time conditions in order to examine if facilitating conditions play a role in education, and if there is a co-relation between more facilitating curricular conditions and a potential increase in the use of computer technology. From the Venkatesh et al. (2003) study, it is known that facilitating conditions are the third most decisive factor in using computer technology.

Another aspect learned from the Taiwanese public school context (see Chang, 2007) and that should be highlighted is that time, workload and class size represent major deterrents as well. Therefore, one wonders if innovation, in general terms, is not being given sufficient space by the pre-established organization of curricula. In fact, previous academic work on curriculum and instruction has failed to include

or mention the role of computer technology in language education (see Ur, 1991; Brown, 1994).

### Further Research for Understanding Computer Use

Venkatesh et al. (2003) have provided a firm path to be explored regarding intentions in the use of computer technology. In spite of the fact that the Venkatesh et al. (2003) study was not specifically conducted for educational contexts, one cannot help but wonder if such research results can be extended to the field of education, or if similar studies need to be conducted in the field of language teaching in order to decide what the new direction would be in understanding teachers' beliefs and their intentions of using computer technology. Many questions still remain unresolved. It may well be that Venkatesh et al.'s (2003) study has simply put in a nutshell the universals of human behavior when approaching technology, or rather, their study has simply set the path for each field to begin its own area of investigation. It is still uncertain whether certain professions have more compatible profiles with technology than others.

Other aspects to further look into are the variables of age and use of technology, which are still inconclusive. Nevertheless, administrators can learn from the results thus far found that while there is a high correlation between younger generations and adeptness in computer use as demonstrated in Venkatesh et al. (2003), when it comes to the field of education, older generations have more ability to integrate computer technology in their teaching, while younger generations struggle more, apparently due to their lack of experience as found in the Yang and Huang (2008) study. Therefore, it appears that neither the younger nor the older generations have demonstrated to be better or worse than the other in the use of technology; however, it would be worth investigating which roles each generation

of teachers can better function in when it concerns the integration of computer technology in the classroom *locally*.

### Further Research for Computer Use, Identity and Culture

Another aspect in the relationship between culture and technology introduced by Batteau (2010) gains relevance. This aspect is related to identity. Batteau discusses how certain types of technology gain widespread acceptance when such innovations become iconic to a society. Further research could investigate the triangular relationship between culture, technology and identity. Such investigation could aim at understanding how local culture conceives technology and what factors facilitate or hinder the use of computer technology in daily life. Local generational contrasts could precisely reveal interesting data useful not only for language education but for other fields of knowledge as well. Finally, critical experiences (Block, 2007) that have an effect on identity could be utilized in order to dissect the effects and components of identities that facilitate the use of computer technology.

Briefly, as posited by Batteau (2010), the cultural fragmentation, segregation and preference for visual culture that neglect both orality and literacy could be investigated. Once investigated, more light could be shed on what aspects of technology are empirically beneficial or detrimental (see Bauerlein, 2009), especially when the culture of literacy is impacted negatively.

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