Examining the Use of Text Corpora and Online Dictionaries as Learning Tools: Pre-Service Teachers' Perspectives

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Introduction and Theoretical Background

Factors That Influence Technology Integration in Education: Teachers' Role

A result of the invasion of Information and Communications Technology (ICT) in society is that the education agendas of world organizations and curricula of a lot of countries include the embedding of new technologies in schools. More than a few studies (Earle 2002; Eteokleous 2008; Angeli and Valanides 2005) evaluated ICT integration in different educational settings, suggesting that elementary teachers use technology rather extensively for personal and classroom preparation purposes and less frequently for teaching and learning purposes. Additionally, when they do use them in their classroom practices, it tends to be in a rather sporadic fashion, more as "extras" or fancy chalkboards than as true learning tools. Few teachers were found to use computers as learning tools in any sort of constructivist or progressive way. The above happens due to a number of factors such as: lack of equipment, support and help from the officials, inadequate training, teachers' pedagogical beliefs, knowledge, skills, and attitudes toward technology integration within classroom practices (Carvin 1999; Earle 2002; Eteokleous 2008). In addition, researchers (Ertmer 2005; Carvin 1999) argue that teachers' instructional styles, pedagogical beliefs, and teaching philosophies influence the way technology (patterns of technology) is integrated and the degree of technology integration success within classroom practices. A well-known differentiation related to the above is: teacher-centered and traditional-pedagogical beliefs, and learner/student-centered and constructivist-oriented belief (Schuh 2004). Thus, teachers whose philosophies favor constructivist-oriented beliefs and student-centered approaches

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are more likely to integrate technology in their classrooms in a substantial and intellectually fruitful way (Ertmer 2005; Eteokleous 2008). Finally, it is suggested that successful technology integration into classrooms requires the continuous and adequate professional development and training of teachers (Carvin 1999). More important than simply learning how to use technology is the training in technology curriculum-integration. Consequently, teachers who had received both kinds of training are likely to feel more prepared and comfortable to integrate technology in their classroom practices (Carvin 1999; Earle 2002). Given the above, in-service teacher training and pre-service teacher training are equally important. This study, therefore, qualitatively examined pre-service teachers' experiences, while using three online language tools within an interdisciplinary environment.

Technological Acceptance

Teachers' contribution is very important for the implementation and success of any innovation, thus the investigation of their perceptions and attitudes toward technology integration is extremely valuable (Mitra 1998; Rozell and Gardner 2000). A similarly important element in the literature related to technology and education is the acceptance and actual use of technology by school teachers. Another group of studies examined factors that affect teachers' attitudes toward computers (e.g., Seyal et al. 2002) and teachers' actual use of computers (e.g., Mitra 1998; Rozell and Gardner 2000). Studies examined the influence of numerous variables on computer use such as age, prior computer training, computer literacy (e.g., Seyal et al. 2002), gender (e.g., Whitley 1997), computer experience (e.g., Rozell and Gardner 2000), and openness to experience. Equally important is the investigation of future teachers' perceptions and attitudes toward technology integration. Several studies (Ma et al. 2005; Hu et al. 2003) consider in their findings and adopt the Technological Acceptance Model (TAM; Davis 1989), suggesting that teachers' perception in regards to the usefulness of new technologies is direclty related to the intention of use and indirectly with the ease of use. This model has been widely used to investigate various ICT integration approaches (computer, internet, or any educational software), as well as various factors that might influence users' perceptions regarding the ease of use and usefulness (see Fig. 1).

Technology and Literacy Education

An accumulating body of research has produced useful conclusions concerning the use of computers in various aspects of literacy education (Coiro et al. 2008; Koutsogiannis 2001, 2002). Furthermore, a number of studies highlight the connection between the broad diffusion of ICT and the notion of literacy (Cope and Kalantzis 2009; Lemke 1998). It is usually pointed out that because of the great changes in the
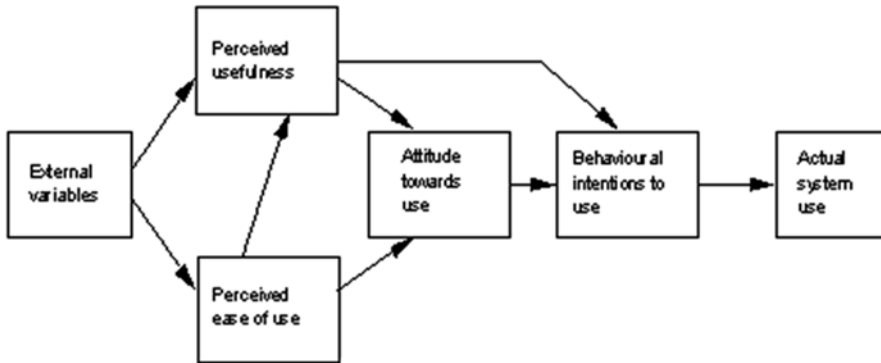
Fig. 1 The Technology Acceptance Model (TAM)

social and technological characteristics of communication, there is a need to extend the range of literacy pedagogy so that it does not unduly privilege alphabetical representations but bring into the teaching practice representations typical of the new, digital media. In a context like this, the familiarization with the use of tools like the online dictionaries (OD) and text corpora (TC), as well as the critical technological currency should become basic elements of a modern curriculum (Koutsogiannis 2007). According to Kazazis and Koutsogiannis (2002), the ultimate goal of the development of the Online Dictionary of Standard Modern Greek (2002) and the Modern Greek Text Corpora (2002) by the Centre for the Greek Language was not merely to serve current school practice but to help change it in accordance to modern trends in literacy education, or, in other words, to transform a closed teacher-centered approach into an open student-centered work environment conduced to the encouragement of discovery learning and the creation of a new generation of students, with skills such as analytical-critical thinking and combinatory-synthetic reasoning.

Concerning concrete pedagogical applications of TC, there is an accumulating body of research (Giagkou 2009; Tan 2002). According to Conrand (1999) at least until the 1980s publications addressed to teachers were focusing almost entirely on concordancing and lexical or lexico-grammatical studies and they were not introducing teachers to more comprehensive types of corpus-based studies. This changed in 1990s, where text corpora could be used in studying multiple characteristics (frequency, semantic category, grammatical structure, placement within the clause, the specific item used, and variation across registers) of English linking adverbials i.e., connecting expressions such as *therefore* and *in other words*. Applications like this made some researchers to speak about "corpus revolution" (Rundell and Stock 1992) or "pedagogical revolution" leading to a shift from the teacher seen as consumer to the teacher as participant in the corpus revolution: TC help teacher not only in deciding what he should teach but also to become a better coordinator or facilitator of the learning process and to stop pretending to be a source of absolute and limitless

knowledge or an authority which should be unquestionably trusted (Gavioli and Aston 2001). In Greece or Cyprus this "revolution" is indisputably connected to the development of three major electronic corpora: the *Hellenic National Corpus* (http://hnc.ilsp.gr/) by the Institute of Language and Speech Processing, the *MGTC* by the Centre for the Greek Language, and the *Corpus of Greek Texts* (CGT; http://sek.edu.gr) by the University of Athens and the University of Cyprus (Giagkou 2009). The pedagogical applications of these TC are related mainly with vocabulary teaching (Goutsos 2003; Goutsos and Koutsoulelou-Michou 2009), syntax, and morphology (Giagkou 2009) or, generally, every level of linguistic analysis (Chalisiani 2010).

Technology and Physical Education

In what concerns Physical Education (PE), recent studies: (1) have argued that, because its form includes instructional teaching, demonstration and movement activities' implementation, it seems to constitute a unique field where technology can be used as an instructive tool for teaching cognitive issues and motor skills both in relation to physical activity and sports, and (2) have shown that PE could benefit from the integration of ICT into the educational process, since New Technologies can be a useful tool, affecting and enhancing both the way of teaching and the learning result (Apostolakis et al. 2006; Antoniou et al. 2009).

Main Aim

The study aims to explore and evaluate the educational use of the text corpora and online dictionaries within the educational practice by pre-service teachers. Specifically, the research objectives of the study are the following: (1) to investigate and explain pre-service teachers' experiences, attitudes, and perceptions in relation to the use of the above mentioned electronic language resources for preparation, teaching, and learning purposes; (2) to examine the exploitation of these electronic language resources within the lessons of Literacy and Physical Education, employing an interdisciplinary approach; and (3) to identity the factors that influence teachers integrating technology in the educational practice.

Methodology

A case study design was applied, aiming to collect qualitative data through semi-structured interviews (Kvale 1996; Creswell 2003) as the primary source of data in order to gain thorough understanding of pre-service teachers' experiences. A questionnaire was also used in order to collect basic demographic data (i.e., gender, age,

computer use, and ownership). The study focuses on examining and conducting an in-depth analysis of a single process, which, in this case, is the use of the ODSMG, the MGTC, and the CGT as alternative tools for teaching basic notions of PE within a Literacy lesson. The sample of our study was 16 pre-service elementary teachers who were attending the modules of Educational Technology and of Specialization in PE in Frederick University Cyprus during the spring semester of 2010. During the module of Educational Technology, the students developed knowledge and skills related to technology integration within the teaching and learning process. Specifically, they were taught how to use the TC and OD, as well as study and discuss numerous exercises and applications of the TC and OD. During the module of Specialization in PE, the students got acquainted with basic concepts of PE and techniques regarding the teaching of PE in Primary Education. After four to five lectures in every module, a lecture was scheduled, where pre-service teachers (as if they were students in a Literacy lesson) used the TC and OD as learning tools to perform in-classroom activities. Specifically, the pre-service teachers were asked to: (1) search in the OD for entries related to concepts such as "physical activity," "athletics," "health," and "physical fitness"; (2) examine if these entries (or at least certain parts of them) could be used during the teaching or the explaining of the above mentioned concepts. In case that for some concepts there were not proper entries, the students were asked to compose an entry using the material of the Specialization in PE module and the TC, in order to find texts, phrases or sentences where the concept under examination appeared. Pre-service teachers had the chance to practice numerous uses of TC and OD for preparation and teaching purposes (see Figs. 2–4).

The data collection process took place in March 2010. Four semi-structured group interviews were conducted, where all pre-service teachers participated. On average, the duration of each group-interview was 1 h. Open-ended questions were included in the interview protocol in an attempt to provide the opportunity to pre-service teachers to freely express themselves (Kvale 1996). The interviews included questions such as: What are your impressions of the online language tools integration within the teaching and learning process? Did you face any difficulties in learning how to use the tools? Did you face any difficulties while using them as learning tools? Would you use them in developing learning environments enhanced with technology? Why yes? Why not? Would you use them for any other purposes? Follow-up questions occurred naturally to clarify answers and build on the responses. The group interviews were recorded and converted to text. After transcribing the digital audio files, the researchers analyzed pre-service teachers' responses using the method of continuous comparison of data (Maykut and Morehouse 1994). The researchers read and reread the transcriptions of the group interviews, assigning codes and classifying data into categories in order to identify emergent themes. As the analysis progressed, researchers needed to revise the coding system and the categories in order to reflect the emerged themes related to pre-service teachers' experiences. As aforementioned, 16 pre-service teachers participated in the interviews. Ten of them (63%) were girls and the rest six were (37%) boys. All of them were juniors (in their third year of study), and their age
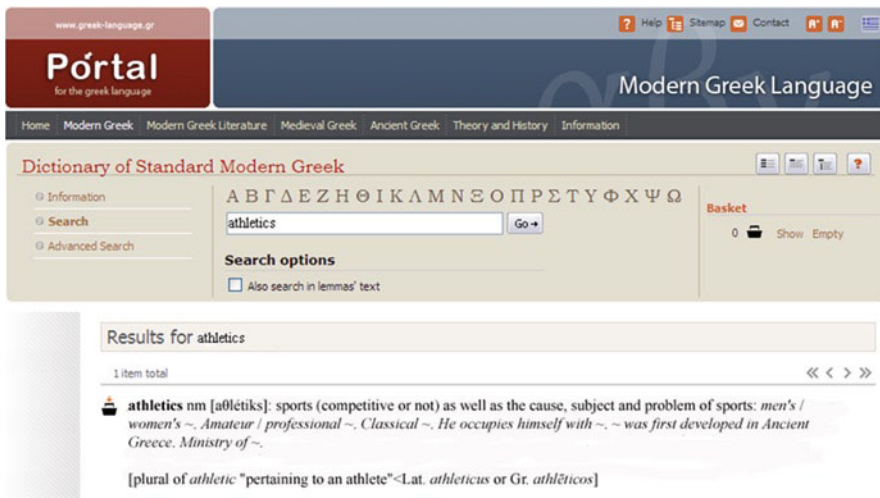
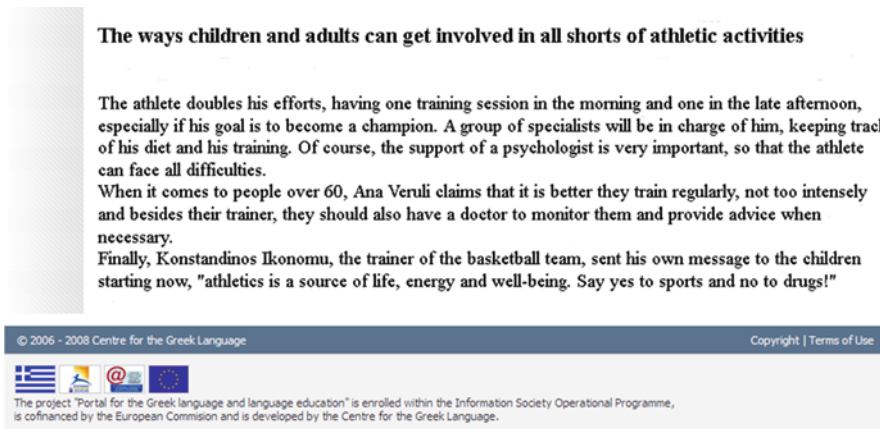**Fig. 2** The lemma "athletics" in ODSMG

Fig. 3 Data from MGTC concerning "athletics"

ranged from 21 to 25 years old. They were using technology from the age of 15 to 16. All of them owned a personal laptop for the past 3–5 years, using it daily for various purposes. Regarding computer training, they all attended computer lessons at high school and then through the university program of study, they attended the following two courses: Introduction to Information Communication Technology and Educational Technology.

Fig. 4 Data from *Corpus of Greek Texts* (CGT) concerning "physical activity"

Results-Discussion

Pre-Service Teachers' Attitudes Toward Technology Use

Pre-service teachers' responses can be grouped in parameters, where three of them seemed to influence their attitudes toward technology use and consequently their future actual computer use. Those parameters are: (1) pre-service teachers' views about the usefulness of the tools, (2) the difficulties concerning the educational use of the tools, (3) pre-service teachers' teaching philosophies and pedagogical beliefs, and (4) Educational use of the tools. Three of the above parameters are directly related to the TAM model (see Fig. 1). Also, the results of the study revealed two pre-service teachers' profiles. Five of the students participating in our study could be characterized as *technology-supporters* or *techno-positives* and the rest could belong to the category of *social-skeptics* or *techno-skeptics* (see Eteokleous and Pavlou 2010; Raptis and Raptis 2004). The study attempts to relate the aforementioned parameters and pre-service teachers' profiles (see Table 1).

Usefulness of the Tools

Overall, pre-service teachers realize the usefulness and value of both tools; however, several differences revealed between the two groups (see Table 1). Specifically, pre-service teachers, under the social-skeptics group found difficulties in realizing

Table 1 Relating the TAM model with teachers' profiles

Teachers' profiles/parameters (*TAM model*)	Technology-supporters or techno-positives	Social-skeptics or techno-skeptics
Pre-service teachers' views about the usefulness of the tools (*TAM model: Perceived usefulness*)	Realize the usefulness and value of both tools Having less difficulty in realizing TC's usefulness and value within the teaching and learning process More positive toward the TC as learning tool within the teaching and learning	Difficult to realize the added value and possible applications of both tools within the teaching and learning process OD is more user friendly and less time consuming than the TC
The difficulties concerning the educational use of the tools (*TAM model: Perceived ease of use*)	Did not encounter any serious difficulties in learning and using the tools Understood relatively easily the use of OD and TC within the educational practice Minimum trouble in performing the exercises using OD and TC as learning tools	Increased time needed in using these tools within the teaching and learning process/time-savers for preparation purposes/"tyranny" of the curriculum Found difficulties in giving examples of using the OD and the TC in other subjects besides Linguistics and Literacy Not easy for them to realize how PE could be related to Linguistics and Literacy
Pre-service teachers' teaching philosophies and pedagogical beliefs (*Internal Variables – Addition to the TAM model*)	More open-minded Focusing more constructivist practices and student-centered approaches Willing to deviate from the traditional way of teaching and the dictates of the curriculum Realized the effectiveness of using OD and TC in promoting the involvement of students in learning activities which engage in critical thinking and promote higher order skills	Thinking more traditionally and conservatively Focused more on traditional pedagogical beliefs and teacher-centered approaches Preferred to use what they had already learnt – were afraid of not following the "already-known" method of teaching Expressed concerns in integrating the TC and OD as educational tools – did not like to increase students' initiatives, flexibility and freedom and decrease teacher's control
Future use of the tools (*TAM model: Actual technology use*)	More for lesson preparation and less within the teaching and learning process Would use both tools within the educational practice More positive to use the TC within the teaching and learning process	Supported limited use of the tools and especially the TC within the educational practice Would only use the OD during teaching practice

the added value and possible applications of these two tools within the teaching and learning process. In addition, the social-skeptics stated that they would only use the OD during teaching practice, because it was more user-friendly and less time consuming than the TC. One of them mentioned that students using the TC, could not easily distinguish what they are looking for, in contrast to the OD, where they could be helped by the definitions provided in the lemmas. Generally, they argued that it would take the students too long to find and select from the TC, the data that could be relevant, with concepts discussed during the lesson. This point of view resembles traditional pedagogical beliefs and teacher-centered approaches (Schuh 2004). On the contrary, in technology-supporters' point of view, this "waste of time" was an advantage, because they believe that a teacher should give students the chance to search, investigate, select, decide, and choose. Going through the above process, students develop higher-order skills and specifically critical thinking skills (Kazazis and Koutsogiannis 2002).

Generally, their views about the TC as a tool within the teaching and learning practice were more positive, having less difficulty in realizing its usefulness and value. The technology-supporters also emphasized not only on what is taught but also on how it is taught (Gavioli and Aston 2001) focusing more on constructivist practices and student-centered approaches (Schuh 2004).

Difficulties Encountered

Pre-service teachers' responses in both groups were in great alignment regarding this parameter (see Table 1). Overall, they did not encounter any serious difficulties in using the OD and the TC, and they understood relatively easy the application of these tools within the educational practice. Although the vast majority of the pre-service teachers did not know and had never used a TC and many of them had never used an OD of such size and complexity, they easily realized their use and functions, and with not much trouble, they managed to find the answers to the exercises that were given to them during the lesson. Additionally, they reported that both tools would be user-friendly for the students, on the presupposition that they would be acquainted enough with ICT.

As mentioned above, both groups of teachers agreed that the increased time needed in using these tools within the teaching and learning process was another factor to negatively influence their in-classroom integration, however, supporting that these tools would be time-savers for preparation purposes. In addition, time was related to the "tyranny of the National Curriculum," that is, a high volume of educational material to be covered and a demand by education officials that it would be covered on a regularized nationwide basis, something which (in contrast to various government announcements about the need for integration of ICT into the teaching practice) is not aligned with progressive instructional practice and does not really support technology integration (Eteokleous 2008).

Finally, another difficulty revealed was that, although pre-service teachers were familiar with the interdisciplinary approach concept, they found difficulties in giving examples of using the OD and the TC in other subjects besides Linguistics and Literacy or in realizing how PE could be easily related to other subjects. The above could be explained because of pre-service teachers being used to view PE as an exclusively oral process which had nothing to do with the other subjects of an educational system where the emphasis is practically put on the written expression. We could say that the strength of PE's boundary, its classification in relation to the other subjects of Primary Education, leads students to keep a traditional view about "teaching" PE in Primary Education (Bernstein and Solomon 1999).

Pedagogical Beliefs and Teaching Philosophies

Pre-service teachers' pedagogical beliefs, and teaching philosophies were revealed through the data analysis, seemed to be quite different within the two groups of pre-service teachers (see Table 1). More specifically, pre-service teachers' already developed teaching-philosophies, or maybe what we – as teaching staff – had taught them in other modules, as well as the knowledge and the skills they achieved throughout their previous education (using a way of teaching which was similar to the traditional way of teaching in a school), were clearly showed through their approaches toward using the TC and the OD within their future profession as educators (for preparation purposes and as teaching and learning tools). The technology-supporters appeared to be more open-minded, preferring more constructivist practices and student-centered approaches (Schuh 2004), while on the other hand the social-skeptics were thinking more traditionally and conservatively, focusing more on traditional pedagogical beliefs and teacher-centered approaches (Schuh 2004). The social-skeptics preferred to use what they had already learnt and they were afraid of not following the "already-known" method of teaching, and not covering the curriculum. They expressed concerns in integrating the TC and OD as educational tools, since they would be implementing an approach which would increase students' initiatives, flexibility and freedom as well as provide them with the opportunity to search, discuss, choose, and at the same time decrease teacher's control. Consequently, they supported the limited use of the OD and especially TC as learning tools.

On the contrary, the technology-supporters even stated that they were willing to deviate from the traditional way of teaching or from the dictates of the curriculum. This is connected with the fact that they perceived more easily the added value of these tools for the students, since they believed that through the use of this kind of applications students acquire and develop skills and abilities which are important for our era and its challenges. The modern Greek school curricula and the educational legislations always place the development of critical thinking among the priorities of formal education. In practice, however, teaching is based most of the time on the mnemonic abilities of the students. Apparently the technology-supporters emphasized

on this matter and realized the effectiveness of using OD and TC in promoting the involvement of students in learning activities which engage in critical thinking (Koutsogiannis 2007).

Use of Technology

In accordance to the existing literature, both pre-service teachers' profiles stated that they would use the tools more for lesson preparation and less during the teaching and learning process (Earle 2002; Eteokleous 2008; Angeli and Valanides 2005). To support the above, they mentioned that through these applications a teacher not only could find a lot of language material which could be easily integrated into the already prepared teaching material, but also he/she could develop new ideas about how to teach, altering at the same time teachers' role to that of a knowledge facilitator (Gavioli and Aston 2001). The views expressed by the pre-service teachers in regards to the use of the technology-based tools are in alignment with the current literature and can be explained based on their pedagogical beliefs and teaching philosophies (Ertmer 2005; Becker and Reil 2000; Carvin 1999) where those that favor constructivist-oriented beliefs and student-centered approaches are more likely to integrate computers in their classrooms in a substantial and intellectually fruitful way (Ertmer 2005; Eteokleous 2008). In addition, the TAM model helps also in explaining and predicting pre-service teachers' use of technology in their practices.

The Suggested Model

Based on the aforementioned results, the study suggests a model (adjusting the TAM model) to be statistically tested (see Fig. 5) in order to measure the factors that influence pre-service teachers to use technology within their educational practice. The study suggests a number of parameters to be added to the original TAM model. Firstly, it recommends the addition of the internal variables such as teachers' pedagogical beliefs and teaching philosophies. Additionally, the model should be examined in relation to the social-cultural environment, the university program of study and the interdisciplinary approach. The above influence the rest of the model parameters (i.e., internal and external variables) and are vital to be included in the analysis in order to reflect society's social-cultural configuration and constant changes. The programs of study at the university should be re-designed in order to educate pre-service teachers on designing modern learning environments enhanced with technology, while employing the interdisciplinary approach. We are in the process of designing the appropriate questionnaire integrating elements from various studies (i.e., Roussos 2003; Pavlou and Vryonides 2009).
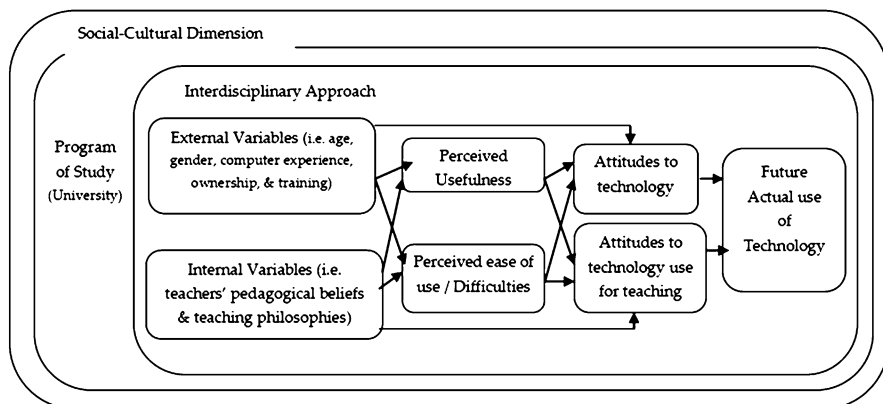
Fig. 5 Factors that influence pre-service teachers' future technology use

Conclusions

On the whole, a positive attitude from future elementary teachers was revealed toward the use of these tools, however, some of them appeared to be somehow hesitant in integrating technology in the teaching and learning process, confirming one more time their preference to using technology as a preparation tool instead as a learning tool. In addition to this, the study's results showed that pre-service teachers' personal teaching philosophies directly influence their beliefs/opinions toward the use, usefulness, and value of the using technology as educational tools. Consequently, it is extremely important for pre-service teachers (future educators) to experience the integration of these internet-based tools, and overall technology, in their teaching practice during their studies at the university. The above would create a strong foundation in developing the appropriate circumstances in integrating technology as a learning tool in their professional teaching career. To achieve the above, pre-service teachers need to further develop their technology literacy level, be trained on how to integrate technology within the curriculum, and realize its value and importance when enclosed in the teaching practice (Carvin 1999; Earle 2002).

Given the above, the study highlights the Schools of Education's decisive role in appropriately preparing pre-service teachers in integrating technology in their teaching practices (Carvin 1999; Earle 2002; Eteokleous and Pavlou 2010). Changes in the philosophy of the School of Education toward technology integration within their programs of study would help to achieve the above. Besides the Introduction to Technology and the Educational Technology courses, the following could also be suggested: offer "Teaching with technology" specialization courses, employ an interdisciplinary approach throughout the School of Education courses concerning technology integration as a learning tool by the lecturers, give the opportunity to the pre-service teachers to experience technology integration in their teaching and

learning practice in the elementary schools. It is vital that pre-service teachers make this new learning, communication, work, and collaboration culture their own reality on a personal and professional level prior to transferring it to their students. In this ever-changing, rapid-changing, high-tech, interconnected world we believe that the role of Schools of Education is vital and extremely important to be able to appropriately prepare pre-service teachers to face the challenges of their profession. The pre-service teachers should be provided with these opportunities and experiences since they are one of the most influential factors to technology integration.

Finally, the study not only suggests the need to develop an effective pre-service teachers' training program, but also proposes a model and highlights the need of a quantitative study, where the model will be statistically tested. It constitutes the foundation for further research to be conducted regarding the examination of the factors that influence future technology used by pre-service teachers. Additionally, there is a need to relate the suggested model and the factors that influence teachers to teachers' profiles regarding technology use and consequently reveal elements that might characterize each of the profiles based on the model parameters.

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