EVALUATING THE USE OF ICT IN EDUCATION: FACTORS AFFECTING TEACHING WITH TECHNOLOGY

Zoi Kaouri
Frederick University
Cyprus

Abstract

The purpose of this research was the implementation, measurement and control of the reliability and validity of a tool that measures the factors affecting the integration of information and communication technologies (ICT) from primary teachers in educational practice. Three-factor analysis performed for the variables of the three parts of the questionnaire to create factors whose reliability and validity was tested with certain statistical techniques. The factor analysis of the questionnaire variables produced ten factors: P1: The skills of teachers in the education of students to become competent users of ICT, P2: School climate and support, P3: Fear - reticence - technophobia to integrate ICT, P4: Positive perceptions of teachers about the value of ICT in teaching and learning, P5: the computer and technological means as a factor of change in teaching and learning, P6: Knowledge in the use of ICT to design teaching and management of the classroom, P7: Knowledge of common software, P8: Knowledge of advanced software, P9: Use of common software, P10: Use of advanced software. The coefficient Cronbach's Alpha was greater than 0.803. The content validity was ensured in the pre-audit stage. To examine the convergent and discriminant validity of the questionnaire multiple profiling was used. The results of correlation of the data with the cumulative scales to which they belong were satisfactory (greater than 0.40). The survey results are considered satisfactory with respect to the reliability and validity of the questionnaire.

Keywords: integration of ICT, attitudes of teachers, validity of a questionnaire

Introduction

The attempt for integration of the information and Communication Technologies (ICT) in the learning process is highly significant. The last decade a dramatic increase in the use of new technologies has been noted (Ioannou & Charalambous, 2004). The application of ICT in primary education can bring many innovations in the educational system (Tzimogiannis & Komis, 2004). Despite the multiple benefits that arise from the use of ICT, the incorporation of technology remains a complex issue and it is challenging for many teachers (Noor-Ul-Amin, 2013, Pelgrum, 2001; Papanastasiou & Aggeli, 2008). The role of the educator is crucial and it is highly important to examine the factors which influence his/her decisions regarding the use of ICT during the teaching and learning procedure (Bullock, 2004). Overall, the integration of ICT can be influenced either by external factors or teacher's personal characteristics. Personal characteristics refer to his/her knowledge, skills, perceptions, attitudes and beliefs (Wood et al., 2005, Papanastasiou & Aggeli, 2008; Paraskeva, et al., 2008), whereas external

factors mainly are related to the degree of support provided by the working environment, such as director, coordinators, colleagues and so on (Tearle, 2003).

Literature Review

Knowledge - Attitudes and Perceptions of Teachers to Integrate ICT

An effective integration depends not only on teacher's knowledge regarding the various technological means (Papanastasiou & Aggeli, 2008), but also his/her attitudes towards the use of ICT play a major role in the whole process (Huang & Liaw, 2005; Sanchez et al. 2012).

Attitudes. Attitude is a determinant factor which influences the integration of the ICT. The educators, which have adopted a positive attitude toward the new technologies, perceive different software tools as an auxiliary tool, which facilitates the learning process (Veen, 1993; Papanastasiou & Aggeli, 2008). Teachers shaped attitude**s**, is an indicator which can predict their willingness to use those tools during the teaching practice (Bakr, 2011). Although the majority of teachers have developed positive attitudes (Tsitouridou & Vrizas 2003), they are sceptical to use ICT (Tsitouridou & Vrizas 2003, Tzimogiannis & Komis, 2004).

Stress - technophobia in ICT. Many educators face difficulties in implementing ICT during the educational practice and feel uncertainty since they are not able to anticipate any unforeseen situations (Tzimogiannis & Komis, 2004). The educator feels technophobia and anxiety in every innovation and therefore perceives these innovations as a threatening factor which comes to disrupt the traditional structures of teaching (Panagiotopoulos et al. 2011; Jimoyiannis, 2008).

Confidence in the use of ICT. Confidence is an important factor that determines the involvement of teachers and students in ICT (Proctor, 2006). Examining the parameters that affect self confidence, it has been shown that the degree of focus of the educator on his/her goals and the expectations that the individual has from himself/herself are the main factors for its formation (Peralta & Costa, 2007). Additionally, the experience is another factor which can increase confidence (Wilson et al., 2015).

Perceptions. Many studies confirm that teachers' perceptions are important parameters, which often decisively influence the technology integration process in the classroom (Papanastasiou & Aggeli, 2008). However, in practice it can be clearly seen that teachers do not integrate ICT into their teaching (Rosen & Weil, 1995).

Abilities / Skills in the use of ICT

Teachers do not have the skills and experience of integration (Ottenbreit-Leftwich et al, 2010). For that reason, education and training of teachers in ICT is what allows them to have the ability to impart the skills and knowledge to students (Peralta and Costa, 2007).

Capacities regarding the teaching design. Self-efficacy of teachers is an equally important factor for the integration of ICT in the classrooms and can predict their behaviour and their teaching options (Bandura, 2006; Schoretsanitou & Vekyri, 2010). Self-efficacy of the educator is directly linked to the perception of the skills and confidence to perform specific activities (Schoretsanitou & Vekyri, 2010; Ropp, 1999).

Capacity in supporting students to use technology. A lesson, which is based on the use of ICT and in the educator's capacity to support students, contributes significantly to the acquisition of the basic skills (Anastadiades et al., 2010). A technological tool, such as interactive whiteboard, helps to the development of cognitive skills through the creation of appropriate knowledge for students. It also contributes to the cultivation of written and spoken language skills and the development of skills, such as problem solving, communication, collaboration, etc. The ability of the educator to design and support students through active participation activities, experimentation and interaction using the interactive whiteboard and other technological tools, greatly contributes to increasing attention and interest of students (Anastadiades et al., 2010).

School Climate and Support

Knowledge – training. The majority of teachers have inadequate training in ICT implementation in the educational process (Tzimogiannis & Komis, 2004) and as a result this constitutes an obstacle in the use of technological tools (Sabzian & Gilakjani, 2013). For this reason it is important to provide specialized technical training to teachers aiming at learning ICT integration practices in order to encourage them to use them in a professional manner (Vanderlinde & Van Braak, 2010)

Logistics. The poor technical support at school contributes to reduced access in various educational software (Mitkas et al., 2014). Proper support of technological equipment and direct access to the various technological means encourages the teacher to incorporate more easily ICT, surpassing any personal insecurity (Solomonidou, 2004). Unsurprisingly, teachers need organizational support, which includes not only the technical part, but mainly focuses on pedagogical support (Divaharan & Koh, 2010; Tondeur et al, 2008). Moreover, as Cuban (2001) claims in his book, no matter what the technology infrastructure is, it is still inadequate according to teachers.

Methodology

A valid and reliable measurement instrument was created after taking into account other relevant measurement tools (Sánchez, Mena, & Pinto, 2012; Hatlevik, 2016; Tondeur, Aesaert, Pynoo, Van Braak, Fraeyman, & Erstadt, 2016; Papanastasiou & Angeli, 2008). The various questionnaires and variables identified measured the factors that affect teachers in integrating technology in teaching and learning. Although many different tools in educational technology were found that can be used to collect data on the various aspects of the integration of ICT, not a single tool was detected that could be used to collect information on all aspects of this region. Therefore,

the purpose of this project was the development of a questionnaire to measure all the factors that affect the integration of ICT in teaching process.

The questionnaire, which consisted of closed ended questions expressed in 5-point Likert-type scale, was distributed to schools and completed the first half of December 2016. The questionnaire consists of three modules of variables which are divided into seven parts. Part A collected the necessary demographic data: gender, age, teaching experience, level of teachers' education and information about computer knowledge, source of computer knowledge, use of computer in the classroom, possession of personal computer and teacher participation in training seminars on integrating ICT in teaching and learning. Part B collected information about the knowledge of teachers in different kind of computer software (15 items). Part C provided information regarding the frequency of use of different kinds of software by the teachers for personal purposes (14 items). Part D to G collected information on the following issues: attitudes of teachers about computer and ICT integration in education (40 items), confidence of teachers using ICT in learning process (13 items), school politics and encouragement that teachers receive from various stakeholders in relation to the integration of ICT (13 items) and teacher competencies in managing and integrating of ICT in learning (18 items).

The final questionnaire was administered to 250 teachers of Primary Education. The survey population consisted of all primary teachers, who were teaching at the time the questioner was distributed and three of the five districts of Cyprus, Nicosia, Limassol and Paphos. Questionnaires were distributed to all teaching staff (250 teachers) in 15 primary schools, which were selected by stratified random sampling. The sample was representative of different types of schools (large/small, urban/rural) and teachers who taught in different grades and subjects. The 154 questionnaires were returned completed (rate of successful completion 61.6%) and served as the research sample.

We ensured face validity and content validity of the questionnaire through pilot distribution.

The analysis of quantitative data was done with the SPSS 21. The following techniques were used to assess the validity and reliability of the questionnaire:
(a) Regularity control, Skewness and Kurtosis index,
(b) Factorability of the data. Correlation analysis of the variables was contacted using Pearson method for export of the correlation ratio and the degree of importance (p) of this indicator.
To investigate the structural validity of each theme, exploratory factor analysis was use. Factor analysis and test of results was completed through the examination of appropriate indicators examined:
1) Principal Component Analysis with Orthogonal Rotation of the shafts with the Varimax method was used for the extraction of factors.
2) K.M.O. (Kaiser- Mayer- Olkin) test was used for measure sampling adequacy for each variable.

3) Bartlett's Test of Sphericity was utilized for further examination of the suitability of data for factor analysis.
(c) Cronbach's Alpha was used to measure the internal consistency of any factorial structure

Results

Our inferential statistical analysis gives the following results in order to ensure the validity and reliability of the questionnaire.

Skewness and Kurtosis index measurement is less than 2.5 for every variable of part B and C. This indicates that statements/variables have approximate normal distribution. Questionnaire normality test for Part D to G verified that 74 out of 84 variables have Skewness and Kurtosis index less than 1 ($-1<Skew<1$). The remaining variables had Skewness and Kurtosis index less than 2. Due to the supple size ($100<N<300$) we can accept values less than 2.58 ($Skew<2.58$) (Tabachnick & Fidell, 1996; Munro, 2001; Field, 2009). Correlation analysis for Parts B, C, D-G presented that most of the variables have statistically significant linear relationship between them. Most of them have correlation coefficient higher than 0.5 ($r>0.5$) and correlation significance (p value) less than 0.05.

In order to test the suitability of the sample, K.M.O. (Kaiser-Mayer-Olkin) was used. For the complete test of data suitability for factor analysis, Bartlett's Test of Sphericity was contacted. K.M.O index measurement and the Bartlett's Test of Sphericity for Part D to G (Factor Analysis [KMO = .903, Bartlett's (3486) = 12264.52, $p <.05$]), for Part B (Factor Analysis [KMO = .904, Bartlett's (105) = 1625.95, $p <.05$]) and Part C (Factor Analysis [KMO = .868, Bartlett's (91) = 1066.23, $p <.05$]), have showed that the sample was suitable and sufficient and that there is the potentiality to insert the data in an exploratory factor analysis.

In order to determine the construct validity of the constructs measured in this questionnaire, an exploratory factor analysis was performed. Since the questionnaire was divided into distinct sections that were not comparable to each other and which also had different measurement scales, the factor analysis was performed separately for each section of the questionnaire. The varimax rotation was used in these analyses for the clearer interpretation of the factors.

The first factor analysis that was performed was based on 15 items that asked the teachers to do a self-report on their knowledge regarding various computer software programs. The analysis produced two factors that explained 64.78% of the variance of these 15 items and have eigenvalues higher than 1.
The first factor, “knowledge of specialized software applications” (P7), that explained 39.83% of the variance is composed of ten items that measure teachers’ skills in using specialized software applications (e.g., FrontPage, EasyLogo, Kodu, StarLogoTNG, Scratch, Alice, Blockly, TurtleArt, EasyLogo, Model-It, Stella, Stagecast Creator, Interactive physics, Web 2.0 tools), which teachers infrequently use because either they do not know how

to use them or they do not have a need for them. The loadings of the variables of this factor were high and ranged from 0.533 to 0.877.

The second factor, "knowledge of common software applications" (P8), that explained 24.95% of the variance, included five items that measured teachers' self-reported ability to use common-use software applications. These common-use applications are those that one is most likely to learn how to use in a technology training course or a basic computing course. Such computer programs include Word, Internet, Email, PowerPoint and Kidspiration. The variables on the second factor have given loads of 0.538 to 0.879.

The second factor analysis that was performed examined 13 items that measured the frequency of using computer software for personal and educational purposes, as it was reported by the teachers themselves. This analysis also produced two factors, which explained 53.70% of this section's variance and have eigenvalues greater than 1.

The first factor that was composed of five items accounted for 32.80% of the total variance and named "use of common applications" (P9). The P9 included: email, internet, Word, play games, PowerPoint. All the loads of the first factor were higher than 0.504. The second factor was composed of nine items and accounted for 20.91% of the variance of this section of the questionnaire. This factor, which labeled "use of specialized applications" (P10) included the use of more advance and complicate software such as FrontPage, Kidspiration, Model-It, EasyLogo, Kodu, StarLogoTNG, Scratch, Alice, Blockly, TurtleArt, EasyLogo, Photoshop. The second factor loadings were greater than 0.612.

As shown in table 1, the remaining items of the questionnaire produced six factors that explained 61.2% of the variance while eigenvalues cut-off point for the creation of the factor was set to 2.1.
The first factor as we can see in table 1 was composed of twenty items (table 1), which measure whether teachers feel confident in those abilities and skills that enable them to teach their students in such a way as to become digitally literate. The first factor was named "ICT competencies of teachers in order to train students to become competent users of ICT" (P1) and explained 36.1% of the total variance. The P1 presents loadings higher than 0.711.

Table 1

Rotated Component Matrix of Computer Attitudes and Integration Factors

	Items	Factors					
		P1	P2	P3	P4	P5	P6
P1	I am able to support pupils to present information by means of ICT	.862					
	I am able to offer pupils opportunities to express ideas in a creative way by means of ICT	.856					
	I am able to support pupils in processing and managing information by means of ICT	.849					
	I am able to select ICT applications in view of a specific educational setting	.840					
	I am able to support pupils in searching information by means of ICT	.839					
	I am able to provide pupils with activities to exercise knowledge/skills by means of ICT	.829					
	I am able to provide pupils with activities on subject matters to learn with ICT	.826					
	I am able to support pupils to communicate with ICT in a safe, responsible and effective way	.819					
	I am able to support pupils to work together with ICT	.814					
	I am able to stimulate pupils to use ICT in a critical manner	.813					
	I am able to motivate pupils to use ICT in a positive way	.812					
	I feel comfortable with the idea of the computer as a tool in teaching and learning	.780					
	I am able to educate pupils to use ICT in a conscious way (respecting ergonomics, intellectual property)	.777					
	I can teach my students to select appropriate software to use in their projects	.771					
	I am able to use ICT to differentiate learning and instruction	.762					
	I am able to design and redesign ICT applications in view of a specific educational setting	.762					
	I can design technology-enhanced learning activities for my students	.749					
	I am able to select ICT applications in view of a specific educational setting	.723					
	I can select appropriate software to use in my teaching	.720					
	In spite of the existing limitations, I think I have a positive attitude towards the integration of computing resources in the teaching-learning process	.711					
P2	I often exchange ideas about technology integration with other teachers		.603				
	The ICT consultant encourages me to integrate computers in teaching and learning		.607				
	Teachers in my school are well informed about the value of computers in teaching and learning		.652				
	The ICT coordinator encourages me to integrate computers in teaching and learning		.678				
	Other teachers encourage me to integrate computers in teaching and learning		.721				
	The principal encourages me to integrate computers in teaching and learning		.728				
	The inspector encourages me to integrate computers in teaching and learning		.732				

	In faculty meetings, we frequently discuss the subject of integrating computers in the school curriculum	.736				
P3	Working with ICT in the classroom is something that overwhelms me		.750			
	The use of computer in teaching and learning scares me		.737			
	The idea of using a computer and ICT in teaching and learning makes me skeptical		.681			
	The use of computers in teaching and learning stresses me out		.660			
	The computer is not conducive to good teaching because it creates technical problems		.634			
	The computer is not conducive to student learning because it is not easy to use		.626			
	Students are usually better prepared than me in the use of computing resources		.599			
	As a teacher, the use of new technologies is still difficult for me		.587			
P4	New technologies help me to improve the academic performance of my students			.348		
	The use of ICT increases my satisfaction as a teacher			.445		
	Students are more motivated when ICT in the classroom			.488		
	New technologies help me to obtain more resources to evaluate students' performance			.362		
	Unmotivated students with traditional methodology improve their learning by using computers in the classroom			.503		
	Students reading abilities are improved by the use of computing resources learn more easily when using ICT			.495		
	The use of ICT increases my motivation as a teacher			.591		
P5	The computer will change the way I teach				.316	
	The computer will change the way students learn in my classes				.364	
	The integration of computing resources in the classroom encourages the improvement of the teaching learning process				.562	
	The computer helps students understand concepts in more effective ways				.323	
	The computer helps students learn because it allows them to express their thinking in better and different ways				.327	
	The computer is a valuable tool for teachers				.337	
	Students learn more easily when using ICT				.541	
	Computers, Interactive Digital Whiteboards and projectors are really necessary in my classroom				.353	
	The use of informational technology at school is unstoppable				.664	
P6	I can use collaborative writing tools on the Internet					.393
	I am able to track the learning progress of pupils in digital way					.305
	I can edit digital photos or graphic					.517
	I can download and install programmes					.528
	I can use a spreadsheet to draw a graph					.523
	I can teach my students how to make their own web pages					.379

All items loaded less than 0.3 are omitted.

The second factor, "school climate and encouragement from colleagues" (P2), included eight items (table 1) that explained 6.32% of the variance of this

section of the questionnaire and exhibit loadings higher than 0.603. P2 is constructed from items that concern support and encouragement that teacher receives to integrate ICT in teaching practice by colleagues (head teacher, inspector, counselor, other teachers) and the technology infrastructure of the school.

The third factor, labeled "anxiety - skepticism - technophobia" (P3), measured teachers' comfort level in using ICT at school class. This factor was composed of eight items (table 1) that explained 5.53% of the variance of this section of the questionnaire. All items that compose the P3 are negative and have loads higher than 0.587.

The fourth factor, "Positive beliefs regarding the value and utility of ICT in the classroom" (P4), was composed of eight items and explained 3.44% of the variance. The loadings on this factor range from 0.348 to 0.591.

The fifth factor, "The computer and the technological means as an agent of change" (P5), reflects the beliefs of teachers about the value of the computer and technological means that are used in the educational process. P5 was composed of nine items (table 1) and explained 3.25% of the variance. In this factor, loadings occur from 0.316 to 0.664.

The last factor (P6), "Knowledge in the use of ICT for lesson planning and management of the classroom", was composed of seven items and explained 2.95% of the total variance. The loadings of variables for this factor are higher than 0. 379.

All items loaded less than 0.3 are omitted. Five or more items with high loadings are desirable and suggest a strong factor (Costello & Osborne, 2005). All factors consisted of six or more items.

The intercorrelations of the ten factors that were created in this questionnaire were also examined. According to the overall results of this analysis, with the exception of two pairs of factors, the rest of the factor pairs were significantly correlated with each other ($p<0.05$).

After creating each factor, we estimated its internal consistency with Cronbach's alpha (table 2). The Cronbach's Alpha index ranged from 0.803 to 0.972, with all factors charged higher than 0.8, values which are considered highly satisfactory.

Table 2.

Cronbach's Alpha Index for the Factors P1 to P10

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Cronbach's Alpha	0.972	0.913	0.902	0.866	0.917	0.912	0.921	0.830	0.803	0.880
Cronbach's Alpha Based on Standardized Items	0.973	0.913	0.906	0.865	0.917	0.912	0.925	0.863	0.804	0.894

Discussion

Technologies of Computer Information and Communication (ICT) have become an integrated part of our daily life and are very close to become an inseparable part of students' and teachers' lives as well. However, the integration of technology in the curriculum is a complex, difficult and challenging process (Cooper, 1998; Papanastasiou & Aggeli, 2008), during which numerous socio-technical factors, such as teachers' competencies and skills in ICT, beliefs of teachers about the value of ICT in teaching and learning, attitudes towards ICT, the use of ICT in teaching and learning, school climate, colleagues support etc. must be taken into account.
The results of this study show that the responses to the questionnaire have a reliability coefficient that is adequately high. Also, the results and the statistical techniques used to assess the validity and reliability of the questionnaire proved that the questionnaire shows sufficient reliability.

Regarding the reliability of the questionnaire, Cronbach's Alpha index was found to be high (Cronbach's Alpha = 0.961) and the Cronbach's Alpha for each of the factors is higher than 0.800. In addition, the construct validity evidence is based on a factor analysis that created ten easily interpretable factors, namely, P1: ICT competencies of teachers in order to train students to become competent users of ICT, P2: school climate and encouragement from colleagues, P3: anxiety -skepticism – technophobia to integrate ICT, P4: Positive beliefs regarding the value and utility of ICT in the classroom, P5: computer and the technological means as an agent of change in teaching and learning, P6: Knowledge about the use of ICT in lesson planning and management of the classroom, P7: knowledge of specialized software applications, P8: knowledge of common software applications, P9: use of common applications, P10: use of specialized applications.

Thereby, it becomes apparent that the integration of ICT by teachers should not be treated as one-dimensional concept and that the most important factors that lead in successful integration of ICT at schools are those of teachers' actual knowledge and use of various computer software / applications for professional and personal purposes, teachers' confidence and attitudes toward

technology, support provided to them in schools and beliefs of teachers about the use of technology as an agent for change.

The reliability and validity of questionnaires is crucial in order to ensure good results by conducting a survey. When a measurement tool is used, regardless of whether it has already been weighed or created for the purposes of a survey, it must be tested for reliability and validity.

A limitation of this study lies in the fact that this was a self-report, and it is likely that some of the teachers may have responded in socially desirable ways. It would be useful and interesting to perform a test-retest reliability on the questionnaire. Cross-validation is also essential to establish the congruence between the teachers' beliefs about their ICT skills and ICT use with the opinion of an external observer. Once congruence is established, more detailed research would have to be performed on this dataset to determine how ICT can be integrated in schools more effectively.

he questionnaire under examination evidenced to exhibit adequate reliability and validity. Face and content validity were also satisfactory. The questionnaire is easy and understandable. Therefore it could be safely used as a measuring tool of ICT integration factors in the classroom. The existence of a questionnaire in the Greek language, which measures those factors that determine the integration of ICT in the school process, is essential.

Additionally, it would be very contributive for research if the questionnaire is administered also to secondary education teachers in order to collect and compare this data with data from Primary teachers.

Further research can be done in order to export results that highlight relationships or significant differences between the various factors of ICT integration and relationships or significant differences between the factors of ICT integration and independent variables such as gender, level of education and years of service.

In addition, the use of this questionnaire could provide important information to competent bodies in order to organize and upgrade the curricula, so as to incorporate to a greater extent ICT in education or build training seminars for teachers, who don't possess the skills / competences to integrate ICT in the classroom.

Overall, it is important for further research to examine the relationship between self-efficacy, use of ICT and digital competence with a longitudinal research design. Further, more research is also required on how to develop teachers' self-efficacy, their strategies to evaluate information and their digital competence according to the competence aims in the curriculum.

We hope that the findings of this research prove useful for Cyprus and other contexts where the integration of educational technology is still in embryonic form and the research in the area is limited.

References

Anastasiades, P., Micropoulos, A., Sofos, A., & Fragkaki, M. (2010). *The interactive board in school class: Pedagogical approaches – didactics*. Athens: Pedagogical Institute.

Bakr, S.M (2011). *Attitudes of Egyptian Teachers towards Computers*. Ministry of Education, Egypt 2(4), 308-318.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares, & T.Urdan (Eds.), *Adolescence and education*: 5, 307–337.

Bullock, D. (2004). Moving from theory to practice: an examination of the factors that pre-service teachers encounter as they attempt to gain experience teaching with technology during field placement experiences. *Journal of Technology and Teacher Education*. 12(2), 211-237.

Cooper, J. R. (1998). A multidimensional approach to the adoption of innovation. *Management Decision, 36*(8), 493–502.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom.* Cambridge, MA: Harvard University Press.

Divaharan, S. & Koh, L., 2010. Learning as students to become better teachers: Pre-service teachers. *IWB learning experience,* 26 (4), 553- 570.

Field, A.P. (2009). *Discovering statistics using SPSS.* London, England: SAGE.

Hatlevik, O.E. (2016). Examining the Relationship between Teachers' Self-Efficacy, their Digital Competence, Strategies to Evaluate Information, and use of ICT at School. *Scandinavian Journal of Educational Research,* 1-13.

Huang, H. M., & Liaw, S. S. (2005). Exploring users' attitudes and intentions toward the Web as a survey tool. *Computers in Human Behavior*, 21(5). Pp.729-743.

Ioannou, I., Charalambous, K. (2004). *The attitudes and opinions of Primary Education teachers in Cyprus for internet use as a learning tool.* 4th Conference ETPE, 29/09 – 03/10/2004, University of Athens.

Jimoyiannis, A. (2008). Factors determining teachers' beliefs and perceptions of ICT in education, in A. Cartelli & M. Palma (Eds). *Encyclopedia of Information Communication Technology,* 321-334.

Jimoyiannis, A., & Komis, B. (2004). Attitudes and perceptions of secondary education teachers about integration of ICT in their teaching. Minutes of 4th Pan-Hellenic Conference Toumpanakis *Πρακτικά 4ου Πανελληνίου Συνεδρίου. Toumpanakis, N.,* (2016). Attitudes of teachers towards ICT. Greece.

Mitkas, K., Tsoulis, M., Pothos, D. (2014). Utilization and implementation of ICT in teaching practice. The role of school unit. Case study. *"Utilization of ICT in teaching practice": 3rd Pan – Hellenic Educational Seminar Imathias* (233-246).

Munro B.H., (2001). *Statistical methods for health care research* (4th Edition). Lippincott, Philadelphia.

Noor-Ul-Amin, S., (2013). An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education. *Scholarly Journal of Education*, *2*(4), 38-45.

Ottenbreit-Leftwich, A., Glazewski, K., Newby, T. & Ertmer, P. (2010). Teacher value beliefs associated with using technology: addressing professional and student needs. *Computers & Education*, 55, 1321– 1335.

Panayiotakopoulos, C. Koustourakis, G., & Papapanayiotou, C. (2011). Ανίχνευση της τεχνοφοβίας και των επιδράσεών της στην περίπτωση των προπτυχιακών φοιτητών πολιτιστικών προγραμμάτων του ΕΑΠ. *6th International Conference in Open and Distance Learning.*

Papanastasiou, C.E., & Angeli, C. (2008). Evaluating the Use of ICT in Education: Psychometric Properties of the Survey of Factors Affecting Teachers Teaching with Technology. Factors Affecting Teachers Teaching with Technology. *Educational Technology & Society*, 11 (1), 69-86.

Paraskeva, F., Bouta, H., & Papagianni, A. (2008). Individual characteristics and computer self-efficacy in secondary education teachers to integrate technology in educational practice. *Computers & Education,* 50, 1084-1091.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & Education,* 37, 163-178.

Peralta, H., & Costata, F. A. (2007). Teacher's Competence and Confidence regarding the use of ICT. *Journal of Educational sciences,* 3, 75-83.

Proctor, R.M., Burnett, C.P., Finger, G., & Watson, G. (2006). ICT integration and teachers' confidence in using ICT for teaching and learning in Queensland state schools. *Journal of Educational Technology.* 22(4), 511-530.

Ropp, M.M. (1999). Exploring individual characteristics associated with learning to use computers in pre-service teacher preparation. *Journal of Research on Computing in Education*, 31(4), 402-423.

Rosen, L.D., & Weil, M.M. (1995). Computer Anxiety: A Cross-Cultural Comparison of University Students in 10 Countries. *Computers in Human Behavior,* 11(1), 45-64.

Sabzian, F., & Gilakjani, A.P. (2013). Teachers' Attitudes about Computer Technology Training, Professional Development, Integration, Experience, Anxiety, and Literacy in *English Language Teaching and Learning,* 3(1), 67-75.

Sánchez, A.B., Mena, J., He, G. & Pinto, J. (2012). In service Teachers' Attitudes towards the use of ICT in classroom. *Procedia: Social and Behavioral Sciences*, 46, 1358–1364.

Schoretsanitou, P., & Vekyri, I. (2010). Integration of ICT in education: Factors that predict the educational use. *7th Pan-Hellenic Conference Study Minutes.*

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. New York, NY: Harper Collins College Publishers.

Tearle, P. (2003). ICT implementation: what makes the difference?. *British Journal of Educational Technology,* 5, 567-583

Tondeur, J., Keer, H., Braak, J., & Valcke, M. (2008). ICT integration in the classroom: challenging the potential of a school policy. *Computers & Education*, 51(1), 212–223.

Tondeur, J., Aesaert, K., Pynoo, B., Braak, J.V., Fraeyman, N., Erstad, O., (2015). Developing a validated instrument to measure pre-service teachers' ICT competencies: Meeting the demands of the 21st century. *British Journal of Educational Technology*

Tsitouridou, M., & Vryzas, K. (2003). Early childhood education teachers' attitudes towards computer and information technology: the case of Greece, *Information Technology in Childhood Education Annual*, 187-207.

Vanderlinde, R., & Van Braak, J. (2010). The e-capacity of primary schools: development of a conceptual model and scale construction from a school improvement perspective. *Computers & Education*, 55, 541–553.

Veen, W. (1993). The role of beliefs in the use of information technology: implications for teacher education, or teaching the right thing at the right time. *Journal of Information Technology for Teacher Education*, 2(2), 139–153.

Wood, E., Mueller, J., Willoughby, T., Specht, J., & De Young, T. (2005). Teachers' perceptions: Barriers and supports to using technology in the classroom. *Education, Communication & Information*, 5, 183-206.

Wilson, S., Lydiah, N., Pachomius, W. (2015). Gender Differences in Pedagogical Interaction of Information Communication Technology among Science and Mathematics Teachers in Public Secondary Schools in Kieni West Subcounty, Nyeri County, Kenya. *International Journal of Education and Research,* 3(1), 443-462.

Author Details

Zoi Kaouri
kaouri.zoi@gmail.com