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Marketing Perception of Educators on the Mediation Role of Ease of Use in Predicting the Relationship between Teacher Competence and Use Behaviour

Abstract:

This paper analyses the relationship between the teacher technology competence and their use of technology under the mediating influence of ease of use. The paper presents a set of results that are empirically tested on a sample of 387 high school and higher secondary school teachers from across 14 districts in Kerala, a southern state in India. A majority of these respondents had a teaching experience of more than eleven years and had been using computers for more than five years. The results reveal that technology competence among these teachers was moderately but positively correlated to their actual use of technology and this relationship was found to be mediated by ease of use of technology.

The paper discusses the implications of these findings and makes recommendations to leverage these relationships so as to achieve greater technology integration.

Keywords:

Teacher technology competence, use behavior, ease of use, mediation, technology integration

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VALLIS AUREA

Introduction

Educational technologies have brought about fundamental differences to the teaching learning environment in schools. While application of appropriate technological processes and the practice of ICT facilitates learning in students and elicits improved performance, there is an ongoing debate on the varied roles of teachers in ICT Integration[1][2][3]. Although these educational technologies donot curb the existing teacher roles, they do introduce some newer redefined responsibilities for teachers of being more than mere instructors to becoming facilitators and co-creators of the learning environment.Teachers now have the onus of mediating and collaborating between the students and the vast ocean of information made available by the digital world so that students are able to model appropriate ICT behavior[4].

Researchers have pointed out that teachers' attitude towards technology as well as their technology competencies impact the extent of use of digital tools[5].Technophobic teachers could pose a great threat to the smooth implementation of ICTs in schools as they focus on a large set of variables prior to the acceptance of technology.The continuance of technology acceptance by teachers concentrates on fundamental aspects like ease of use and usefulness of technology. This paper attempts to gauge the relationship between teacher competence and use behavior under the mediating influence of ease of use [6].

Literature Review

For teachers to be able to successfully integrate ICTs into teaching,they would require a vast new array of ICT competencies which include creativity, flexibility and logistic skills for assigning work to student groups and collaborating with them. To assume the new roles, teachers would need to upgrade their existing ICT competencies and acquire new pedagogical skills to be able to successfully integrate technology in the classroom[7]. Research reveals that several teacher level factors influence the implementation of innovative ICT usage in education. Teachers who are 'personal entrepreneurs' are important for the integration of ICT in education [8].

While there are mixed opinions on the policydesign relating to implementation of ICTs in schools versus their actual use of digital technology in the classrooms,several studies suggest a close correlation between teachers digital competenciesand their professional use of technology and there are others who point out the close correlation between teacher attitudes' towards technology and the actual use of digital tools in the classrooms[9].

Though there is a lot of literature pointing out the array of facilitating factors like access to technology, training for teachers, favourable policy environment that would ensure smooth ICT integration into teaching learning paradigm there is little proof to establish the high level technology use by the teaching community. This suggests that teachers' pedagogical beliefs may also have a great impact on the way they improvise on the use of technology in the classroom environment[10].

As there is a strong relation between teachers' pedagogical beliefs and the actual technology integration practices a deliberate initiative may be required to change these beliefs along with a focused emphasis on teachers' professional

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development[11].It was found that the Teachers' creative use of technology in classrooms are guided by environmental, social, personal and curricular issues[12].

Teachers are dependent on the school administrators for technology equipment resources as well as other support facilities to successfully integrate technology in to their classroom and have expressed the need for computer integrated training as many among them are limited to using internet from among the wide pool of computer application tools for teaching and learning[13].

To successfully integrate technology, there is agreement in the literature that a change in pedagogical practices that make ICT less peripheral in classroom teaching[14] would be required. In another attempt to study reasons for slow progress in technology integration by teachers the researcher found that perceived usefulness of computer technology had a direct and significant impact on the intention to use it while the ease of use of technology had an indirect yet significant impact on the intention to use it. The studyalso reiterated that subjective norms, emerging from the influence of external expectations had no direct or indirect effect on the intention to use technology [15].

Teacher Technology Competence

Teacher Technology Competence is the teachers' perception on ability to use ICT for personal and professional purposes. Teachers' ICT skills and ICT competence are critical factors that determine their decisions to apply ICT in their instruction.In the paper titled "Teachers' Decisions to Use ICT in Classroom Practice: An Investigation Based on Decomposed Theory of Planned Behavior " the authors pointed out that primary factors determining the use of ICT in classroom practice relate to facilitating conditions in the schools and teachers' self-efficacy. On the other hand, perceived usefulness of ICT, perceived ease of use, compatibility and normative beliefs seem to have minor impact on teachers' actual usage of

ICT in classroom settings [16].Teacher professional development could be viewed as a schematized, early, perpetual, unswervingand stage-wise process of professional development of educators in accordance with professional competency standards and frameworks. Teacher professional development would also include training in the adaptation to the evolution of change of the profession of teachers to managers of education systems. Professional development in the context of ICT can be placed under three broad headings, namely learning how to use ICT, learning through ICT and integration of ICT in teaching and teacher learning .

National policy on ICT in School Education, MHRD, India (2009, revised 2012) presents three stages of ICT literacy that constitute set of competencies for students and teachers: basic level includes ability to operate a computer, manage data, word and data processing tasks, troubleshoot basic storage, use input output devices, email - web surfing - search engines, anti-virus, operate- manage content from external devices (sound recorders, digital cameras, scanners etc.); intermediate level includes ability to create and manage content using software applications, use digital devices, websites, search engines; advanced level includes capability to use database applications, use of ICT for problem

339.565; DOI 10.2507/IJVA.4.1.1.43

solving, audio-video communication, research, documentation, presentation, cooperative - collaborative learning and handle cyber - copyright issues. These levels or stages constitute set of ICT competencies for teachers and students. [17]Based in Netherlands a study explored the factors that stimulated or impeded the innovative use of ICT by teachers in schools,defined innovative use of ICT as the applications supplementing the educational objectives derived from the needs of the current knowledge society. The paper emphasized the need for teachers to act as personal entrepreneurs more than anything else for successful integration of ICTs in schools. The paper highlighted school level factors and involvement of teacher training institutes having limited importance in such implementations.

Research has shown that will (positive attitudes), skill (technology competency), and tool (access to technology tools) are all essential ingredients for a teacher to effectively integrate information technology into classroom practices.The results indicated that lack of teacher anxiety was the most important dimension of attitude that impacted the integration process, and that skill was the strongest predictor of classroom integration of technology by the teachers[18]. [19]Listed 20 basic technology skills that all educators should now have. These include word-processing skills, spreadsheet skills, database skills, electronic presentation, Web navigation, e-mail management skills, file management and Windows Explorer skills, Farrell & Isaacs (2007) ascertained that some of the new computer literacy skills are electronic gaming, synchronous and asynchronous communication, weblogs, webpages, and multimedia text production. UNESCO (2002) said that training and professional development will need to focus on the ability to know why, when, where, and how ICT tools will contribute to teaching objectives and how to choose among a range of ICT tools. UNESCO also emphasized training in the ability to analyze, use, and evaluate CD-ROMS, websites, video, audio, courseware, and to assist students to find, compare, and analyze information from the Internet and from other sources related to subject areas.

Ease of Use

Perceived ease of use refers to the degree to which an individual believes that a technology is easy to understand and operate or the degree to which using the particular technology would be an easy task, free of additional efforts (Davis, 1989). Technologies that are perceived to be less complex in using have higher possibility of adoption by potential users.[20]found that there was an increasing teacher confidence and motivation which were crucial mediating factors on teacher use of ICT. They also suggested in the report that teacher attitudes, including their confidence and willingness to use ICT, were changing as a result of the network upgrade. As with the provision of laptops, learning to use the network and realizing what it offered, all had a positive impact on both their skill levels and on their willingness to use ICT. Increased use followed increased confidence, which led to increased use.

From previous studies there are a number of factors which have been identified relating to the perceived ease of use of ICT, which in this case is for experienced practicing ICT/IT users. As

UDK 37.091.33-028.26:339.138(540); DOI 10.2507/IJVA.4.2.1.51

identified by the impact project [21]. Some of these are given in Table1.

Positive factors	Negative factors
regular use and experience of ICT outside the classroom	difficulties in using software/hardware
ownership of a computer	need more technical support
confidence in using ICT	not enough time to use ICT
easy to control the class	is too expensive to use regularly
easy to think of new lesson ideas	insufficient access to the resources
can get help and advice from colleagues	restricts the content of the lessons

Table 1.Positive and negative factors influencing perceived ease of use, Source:(Cox, Christina Preston , & Kate Cox, 1999.)

[22]while investigating factors affecting users perception over adoption of technology found that communication channels played a critical role in determining usefulness perceptions towards IT adoption. Also influential in this regard was the quality of relationship between managers and peers as well as the self-efficacy of the users in deciding the perceived ease of use.

Use behavior

[21]stated that, while teacher use of ICT for report writing, communication, planning and creating resources showed an overall increase, likewise did the integration of ICT into daily teaching and learning increase. The findings clearly indicated an increase in pedagogical and professional use of ICT. This increase was attributed to the presence of strong and reliable network and other ICT resources which were now more readily available than before and robustness of the upgraded systems.

[22]elaborated on users' beliefs and attitudes changing over a period of time and impacting their IT usage .Several other literatures have also confirmed that experience with the use of technology had an influence on intention to use and actual use of information technology [23].

[24]indicated that there are differences in technology integration and technology uses based on the grades where the implementation was taking place in the school. Teachers at the various grade levels differed in how technology was integrated and used in their classrooms. Research indicated that professional development opportunities were important to bring teachers together to discuss and share ideas for integrating technology and also showed that teachers needed to learn to integrate technology within the context of their classroom through practice, reflection, and sharing of teaching practices.

[25]in their study titled, "Exploring the link between teachers' educational belief profiles and different types of computer use in the classroom", analyzed the relationship between teachers' educational beliefs and their typical approach to computer use in the classroom. A cluster analysis attempted in the research showed four distinct

teacher profiles, based on varying levels of traditional and constructivist beliefs teachers held about education. Overall results indicated that teachers with relatively strong constructivist beliefs who also had strong traditional beliefs reported a higher frequency of computer usage. In addition, results pointed at a specific relationship between teachers' belief profiles and the way computers were used in their classroom. The teacher beliefs were significant determinants in explaining why teachers adopted computers in the classroom.

[26]in the study titled, "Attitudes and knowledge level of teachers in ICT use: The case of Turkish teachers", tried to determine teachers' influence in the use of information and communication technologies (ICT) at schools. Variables like years of experience, gender, the duration of computer and internet use, were analyzed to determine the attitude, level of knowledge on and the frequency of ICT use among teachers. The study was conducted with 1540 primary school teachers using the knowledge, use and attitude scales of ICT. The results revealed that the most commonly used and well-known ICT types among teachers were the Internet, e-mail and word processing features, and teachers' attitudes towards computers and the Internet were generally positive. It was also found that their attitudes varied with their years of experience and levels of knowledge.

[27]investigated the acceptance of different types of ICT applications across genders and ethic groups and found that across genders females were found to be less positive in their computer attitudes when compared to the male counterparts. Literature shows that effective use of computers is dependent on the teachers' intentions, personal beliefs and attitudes towards teaching with technology [28];[29]. Teachers' attitudes towards technology greatly influenced their acceptance of the usefulness of technology and its integration in teaching.

Relationship between Teacher Technology Competence and Ease of Use

Teachers need sufficient ICT skills to implement the technology and to have high confident level to use it in a classroom setting. Besides, teachers require insight into the pedagogical role of ICT, in order to use it meaningfully in their instructional process [30]. According to [31] teachers who have gone through ICT courses are more effective in teaching by using technology tools as opposed to those that have no experience in such training. A school in Ireland reported that teachers who did not develop sufficient confidence avoided using ICT. Similar case happened in Canada, some teachers admitted they were reluctant ICT users because they worried they might get embarrassed that the students knew more about the technology than they did [30].There is adequate research evidence that for teachers technology competence could lead lead to its relative ease of use.

Relationship between teacher Technology Competence and use behavior

Results of a previous research [32] show that teachers only focus on a traditional - centered approach when developing ICT skills in the classroom. While teachers are having high confidence and competency in using ICT in classroom their usage pattern does not represent a large variety of ICT tools. This is because they believe that ICT is a tool could help in learning

UDK 37.091.33-028.26:339.138(540); DOI 10.2507/IJVA.4.2.1.51

process especially to relate with real life practices. The research shows that the relationship between competency and confidence could reflect the balances between training and pedagogically focused approaches in ICT professional development. With this, the school management could make sure that there are sufficient supports for the teachers to integrate ICT in the classroom. Earlier studies have predicted teacher technology competence by their openness to change and technology integration was predicted by teacher openness to change and percentage of technology use[33].

Methodology

This study was conducted in the Indian state of Kerala. A sample of 387 teachers from government high schools and higher secondary schools from across 14 districts in the state were selected using random proportionate sampling method. An exploratory research was carried out in the first phase of the study to identify the premise for technology adoption by teachers in schools in the state. Technology integration and barriers to its adoption served as the initial keywords for the literature review. A questionnaire was formed after the exploratory phase which was used to collect the data for the study. The questionnaire comprised of two parts. The first part of the questionnaire comprised of questions inquiring about the demographic information of the respondents and their general technology usage pattern while the second part of the questionnaire consisted of 5 point Likert type questions where '1' represented the least agreement with the statement and '5' represented the highest agreement. To study teacher technology competence the construct related to teacher technology skill from the TPACK framework[34]. While ease of use and use behavior constructs were adopted from the TAM framework[35]. A descriptive design was adopted in the next stage of the study which falls into a conclusive design. The 14 districts which were divided into three zones and a zone wise proportion of teachers was considered while apportioning the sample to each of the respective three zones. An exploratory factor analysis was followed by confirmatory factor analysis was done to ascertain the variables viz., teacher technology competence, ease of use and use behavior.

Establishing the existence of interactive mediation effect-Sobel, Aroian and Goodman test models

The researcher attempted to study the mediation effect of ease of use of technology impacting the relationship between teacher technology competence and use behavior of technology. A basic causal relationship requires only independent and dependent variable. A third type of variable, the intervening variable, appears in more complex causal relationships. It comes between the independent and dependent variables and shows the link or mechanism between them. Advances in knowledge depend not only on documenting cause and effect relationship but also on specifying the mechanisms that account for the causal relation. In a sense, the intervening variable acts as a dependent variable with respect to independent variable and acts as an independent variable toward the dependent.

Consider a model that proposes that some independent variable (X) is correlated with some

339.565; DOI 10.2507/IJVA.4.1.1.43

dependent variable (Y) not because it exerts some direct effect upon the dependent variable, but because it causes changes in an intervening or mediating variable (M), and then the mediating variable causes a changes in the dependent variable. Management scientists tend to refer to the X → M → Y relationship as "mediation." [36] reviewed fourteen different methods that have been proposed for testing models that include intervening variables as Causal Steps. This is the approach that has most directly descended from the work of Judd, Baron, and Kenny and which has most often been employed by psychologists. Using this approach, the criteria for establishing mediation, which is nicely summarized by [37]. One method for testing the mediation effect or intervening effect is to deploy the Sobel test. The Sobel test statistic is computed by dividing the indirect effect coefficient by its standard error. This test statistic is usually evaluated by comparing it to the standard normal distribution. The most commonly employed standard error is [38] first-order approximation, which is computed as $\sqrt{\alpha^2\sigma_\beta^2 + \beta^2\sigma_\alpha^2}$, where α is the zero-order correlation or unstandardized regression coefficient for predicting M from X, σ^2_β is the standard error for that coefficient, β is the standardized or unstandardized partial regression coefficient for predicting Y from M controlling for X, and σ^2_α is the standard error for that coefficient. Details can be found in [39]; [38].

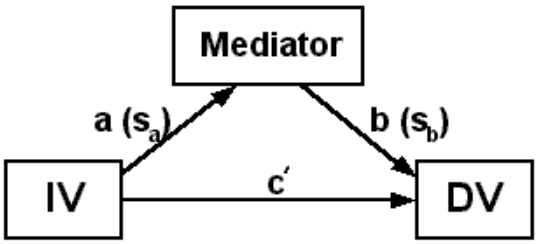

Figure 1.1 Diagram of Mediation effect

In figure 1.1, a, b, and c' are path coefficients. a = raw (unstandardized) regression coefficient for the association between independent variable (IV) and mediator. sa = standard error of a. b = raw coefficient for the association between the mediator and the dependent variable (DV) (when the IV is also a predictor of the DV). sb = standard error of b.

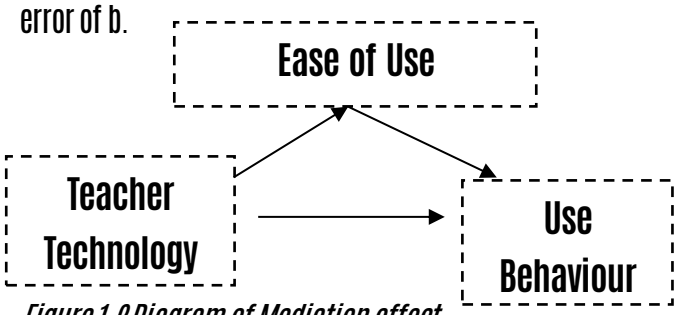

Figure 1.2 Diagram of Mediation effect

In the shadow of above references, the mediation effect of ease of use on the relationship between teacher technology competence and use behavior was proposed and tested. Teacher technology competence and ease of use were considered as the independent variables and use behavior was considered as the dependent variable. The hypothesis framed to test the mediator effect was as follows:

H1: Ease of Use interaction mediates the relationship between Teacher Technology Competence and Use Behaviour

The correlation between the independent variables to that of Use Behaviour was checked. Table 1 shows

UDK 37.091.33-028.26:339.138(540); DOI 10.2507/IJVA.4.2.1.51

that Use Behaviour is strongly correlated toTeacher Technology Competence (r = 0.521) when compared with Ease of Use Interaction (r = 0.401). To trace the mediation effect, Ease of Use Interaction was taken as the control variable and partial correlation was attempted.

		Teacher Technology Competence	Ease of Use
Use Behaviour	Pearson Correlation	.521**	.401**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2. Correlations

In order to find out the effect of the mediating variable,Sobel test, Arorian test and Goodman test was performed. A variable may be considered a mediator to the extent to which it carries the influence of a given independent variable to a given dependent. Ease of Use of technology can be considered as the facilitating premise that enhances teacher technology competence which leads to increased use of technology.

Input		Model	Test Statistic	Std. Error	p-Value
A	0.236	Sobel	4.1161	0.0209	P < 0.05
B	0.365	Aroian	4.0862	0.02108	P < 0.05
S_a	0.039	Godman	4.1466	0.02077	P < 0.05
S_b	0.065				

Table 3 Results of study

All the models to prove the mediation effect of Ease of Use interaction were found to be significant (Sobel = 4.623, Aroian = 4.608, Godman = 4.638 p<0.05) which implied that along with teacher technology competence , there should be Ease of Use of technology to enhance Use behaviour of technology among teachers.

Discussion

The study found a positive correlation between teacher technology competence and their technology use as supported by several other research results. One such study refers to the use of technology by teachers in the schools as 'institutionalized use'[40] and has confirmed the positive association. Factors like computer attributes, cultural perception along with computer competence according to [41] were significant predictors of teachers' attitude towards technology. The current study investigated how ICT use behavior of teachers was related to the teacher technology competence and also tested the mediation effect of ease of use between these two variables. The results confirmed a positive and significant relation between teacher competence and technology use behavior among teachers and it was also found that ease of use mediated the relationship between these two variables. While many researchers have investigated the barriers to technology integration in schools among the teaching community, it is imperative to understand whether these teachers really possess required competencies to make technology integration a reality. The results implied that greater teacher technology competence would indicate greater ICT use and hence greater ICT integration, these findings are unlike those studies[42]that have emphasized teachers' self-

339.565; DOI 10.2507/IJVA.4.1.1.43

efficacy and perceived usefulness of technology as the solepredictors of use behavior. The study resulted in findings that were congruent with those [43];[44];[45]who have utilized usage and not ability, to indicate teachers' proficiency in technology integration.

It must be noted at this juncture that mere usage of computers does not guarantee technology integration; teachers need to understand how to use technology in their respective disciplines and content areas. Only an in depth understanding of how to embed technology in a specific domain of study would ensure true technology enabled and embedded teaching. Therefore the quality of training programs do matter as suggested by past studies[46].Professional training of teachers has been emphasized as the most important factor that could improve technology integration[47].As hypothesized by the current study Ease of use was also found to have a positive correlation with use of technology which supported the findings of several other studies like[48]. While some other researchers have suggested an indirect but significant relation between ease of use and use of technology[49].It must be noted that teachers may consider a rich set of factors to initially accept technology means in the classroom environment, but for its continued acceptance, ease of use is an essential element[50]. The current study found that ease of use had a strong mediation effect on the relationship between teacher technology competence and use of technology. The results only strengthen the argument that ease of use plays a critical role in ascertaining teachers' decision to use ICTs. As the teachers who are the potential users of these educational ICTs, gain greater experience in using these system tools they perceive them as easy to use andbecome more confident with technology [51]. Therefore role of ease of use of ICTs, in mediating the relationship between teacher technology competence and use behavior can be viewed as crucial for successful technology integration.

Conclusion

This paper presents a set of results that are empirically tested on a sample of 387 high school and higher secondary school teachers from across 14 districts of Kerala a southern state in India. A majority of these respondentshad a teaching experience of more than eleven years and had been using computers for more than five years.The results reveal that technology competence among these teachers was moderately but positively correlated to their actual use of technology and this relationship was found to be mediated by ease of use. This finding suggests that greater investments in teacher training programmes would yield high returns in terms of improved technology competence and in turn result in greater technology usage among them. Improved technology competence in teachers would ensure better technology integration in classrooms which would not only be facilitating technology enabled learning among students but also streamline technology embedded learning.Ease of use of technology has emerged as a powerful mediating variable in strengthening the relationship between teacher technology competence and use behavior signaling that not only its acceptance but the continued usage of technology by teachers can be pledged if they perceive it to be easy to use. The school leadership could ensure greater ease of use

UDK 37.091.33-028.26:339.138(540); DOI 10.2507/IJVA.4.2.1.51

of technology by providing necessary assistance to teachers by way of technical and operational help through user friendly manuals, hands-on trainings and proficient technicians who could process teacher requests on time and clarify their technology related queries.

References

[1] Haaksma-Oostijen,T.G.& Pauper J.(2000) ICT and the new role of the teacher in Dutch secondary education. In A. McDougall, J.S. Murnane, C. Stacey &CDowling(Eds.), Proceedings of the 3.1& 3.3 working groups conference on International federation for Information Processing : ICT & the teacher of the future- vol.23(p.51-53)

[2] Riel, M(2000) The future of technology & Education: Where are we heading?In D.M Watson &T. Downes(Eds.), Communication & Networking in Education (pp9-24).Boston, MA: Kluewer Academic press

[3] Semenov, A.L. (2000) Technology in Transforming Education. In D.M Watson & T. Downes (Eds.), Communication & Networking in Education (pp9-24).Boston, MA:Kluewer Academic press

[4] Weinberger, Fischer, &Mandl (2002). Fostering computer supported collaborative learning with cooperation scripts and scaffolds, published in proceeding of conference on Computer support for collaborative Learning: Foundations for a CSCL Community, pp(573-574)

[5] Sollied Madsen, Siri& Thorvaldsen, Steinar&Archard, Sara. (2018), Teacher Educators' Perceptions of Working with Digital Technologies. Nordic Journal of Digital Literacy. 13. 177-196. 10.18261/issn.1891-943x-2018-03-04.

[6] Paul Jen Hwa Hu, Theodore H.K.Clark, Will W.Mab, (2003),Examining technology acceptance by school teachers: a longitudinal study,Information & management- Elsevier ,Vol. 41, Issue 2, December 2003,Pp227-241

[7] Zepp R.A.(2005),Teachers' perceptions on the roles on educational technology, Journal of Educational Technology & Society, JSTOR

[8] Drent, Marjolein&Meelissen, Martina(2008) Which factors obstruct or stimulate teacher educators to use ICT innovatively? Computers & Education. 51. 187-199. 10.1016/j.compedu.2007.05.001

[9] Sollied Madsen,Siri& Thorvaldsen, Steinar&Archard, Sara. (2018)Teachereducators' perceptionsof working with digital technologies.Nordic- Journal of Digital Literacy, pg(177-196

[10] Ertmer, Peggy. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? Educational Technology Research & Development. 53. 25-39. 10.1007/BF02504683.

[11] Chan Min Kim,Min Kyu Kim, Chiajung Lee,J.Michael Spector, Karen DeMeester(2013), Teacher beliefs and technology integration , Teaching and Teacher Education, Volume 29, January 2013, Pages 76-85

[12] Factors influencing technology integration in teaching: a Taiwanese perspective Lih-Juan ChanLin ,Jon-Chao Hong,Jeou-ShyanHorng,Shih-Hui Chang &Hui-Chuan Chu Pages 57-68 | Published online: 17 Feb 2007 ,Journal Innovations in Education and Teaching InternationalJournalVolume 43, 2006 - Issue 1

[13] ClaudiaSmarkola(2008), Efficacy of a planned behavior model: Beliefs that contribute to

computer usage intentions of student teachers and experienced Teachers,Computers in Human Behavior, Volume 24, Issue 3, May 2008, Pages 1196-1215

[14] Plomp, T., &Voogt, J. (2009). Pedagogical practices and ICT use around the world: Findings from the IEA international comparative study SITES 2006. Education and information technologies, 14(4),285-296. https://doi.org/10.1007/s10639-009-9090-3

[15] He, T., Zhu, C. &Questier, F. Asia Pacific Educ. Rev. (2018). https://doi.org/10.1007/s12564-018-9517-Pp1-12.

[16] Atsoglou, Kanella&Jimoyiannis, Athanassios. (2012). Teachers' Decisions to Use ICT in Classroom Practice: An Investigation Based on Decomposed Theory of Planned Behavior. International Journal of Digital Literacy and Digital competence.
20-37.10.4018/jdldc.2012040102. https://www.researchgate.net/publication/236961250

[17] Drent, M., & Martina Meelissen. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? Computers and Education,Volume 51, Issue 1, August , Pages 187-199.

[18] Douglas D. Agyei,Joke M.Voogt, (2011), Exploring the potential of the will, skill, tool model in Ghana: Predicting prospective and practicing teachers' use of technology, Computers and Education, Volume 56, Issue 1, Pages 91-100]

[19] Turner (2005), 20 Technology Skills Every Educator Should Have,(2005),The journal

[20] Ward, D. L., Bronwyn Weston ,& Tracy Bowker. (2007). School ICT Network Infrastructure Upgrade Project: Evaluation of Early Impacts. Report prepared for the Ministry of Education.: Cognition Consulting.

[21] Watson, D. (1993). The Impact report:An evaluation of the impact of Information technology on childrens achievements in primary and secondary schools. London.

[22] BhattacherjeeAnol and Premkumar G. (2004), Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test, MIS Quarterly, Vol. 28, No. 2, pp. 229-254.

[23] Thompson, R., Compeau, D., & Higgins, C. (2006). Intentions to use information technologies: An integrative model. Journal of Organizational and End User Computing, 18(3),, 25-46

[24] Gorder, L. M. (2008). A Study of Teacher Perceptions of Instructional Technology Integration in the Classroom. The Delta Pi Epsilon Journa, Volume L, No. 2, Spring/Summer,.

[25] JoTondeur, Ruben Hermans, Johan van Braak and Martin Valcke,(2008), Exploring the link between teachers' educational belief profiles and different types of computer use in the classroom, Computers in Human Behavior, VOL.24,ISSUE. 6, (2541),

[26] Gorder, L. M. (2008). A Study of Teacher Perceptions of InstructionalTechnology Integration in the Classroom. The Delta Pi Epsilon Journa, Volume L, No. 2, Spring

[27] Monique Volman a, E. v. (2005). New technologies, new differences Gender and ethnic differences in pupils' use of ICT in primary and secondary education.ELSIVIER,Computers & Education 45,35-55.

[28] Divaharan, S., & Ping, L.C. (2010). Secondary school socio-cultural context influencing ICT

UDK 37.091.33-028.26:339.138(540); DOI 10.2507/IJVA.4.2.1.51

integration: A case study approach. Australasian Journal of Educational Technology 26(6), 741-763.
[29] Ozden, M. (2007). Problems with Science and Technology Education in Turkey. Eurasia Journal of Mathematics, Science & Technology Education, 3(2),157-161.
[30] Hennessy Sara, Ruthven Kenneth, Brindle Sue, (2005), Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change, Journal of Curriculum Studies , Volume 37, 2005 - Issue 2,Pp. Pages 155-192
[31] Winzenried, A.,Dalgarno, B., & Tinkler, J. (2010). The Interactive Whiteboard: A transitional technology supporting diverse teaching practices. Australasian Journal of Educational Technology, 26(Special Issue 4), 534-552.
[32] Cox & Marshall, (2007) Effects of ICT: Do we know what we should know? Educ Inf Technol, 12, 59-70.
[33] Amy L BayloraDonn Ritchie,(2002),What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? Computers & EducationVolume 39, Issue 4, December 2002, Pages 395-414
[34] Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A new framework for teacher knowledge. Teachers College Record 108 (6), 1017-1054.
[35] Davis, F.D. (1986). A technology acceptance model for empirically testing new end-user information systems: Theory and results. Massachusetts, United States: Sloan School of Management, Massachusetts Institute of Technology
[36] MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. Psychological Methods, 83-104
[37] Howell, D. (2009). Statistical Methods for Psychology. Cengage Learning.
[38] Sobel, M. E. (1982). Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models. Sociological Methodology, 290-312.
[39] Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. . Journal of Personality and Social Psychology, 1173-1182
[40] Vanderlinde, R., Aesaert, K. and Van Braak, J. (2014) 'Institutionalised ICT use in primary education: a multilevel analysis', Computers and Education, Vol. 72, No. 2014, pp.1-10
[41] Albirini, A. (2006) 'Teachers' attitudes towards information and communication technologies: the case of Syrian EFL teachers', Computers and Education, Vol. 47, No. 4, pp.373-398.
[42] Shiue, Y. M. (2007). Investigating the sources of teachers' instructional technology use through the decomposed theory of planned behavior. Journal of Educational Computing Research, 36(4), 425-453
[43] Becker, H. J. (1999). Internet use by teachers: Conditions of professional use and teacher-directed student use–Teaching, learning, and computing: 1998 national survey Report #1. Retrieved September 9, 2010, from http://sandbox.ea.ecu.edu.au/staffuse/cnewhous/resources/Becker%20Report.pdf
[44] Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent

paradox. American Educational Research Journal, 38, 813-834

[45] Moersch, C. (1999). Assessing current technology use in the classroom: A key to efficient staff development and technology planning. Learning and Leading with Technology, 26(8), 40-49.

[46] Bichelmeyer, B., &Molenda, M. (2006). Issues and trends in instructional technology: Gradual growth atop tectonic shifts. In M. Orey, V. J. McClendon, & R. M. Branch (Eds.), Educational media and technology yearbook, 31 (pp. 3-32). Westport, CT: Libraries Unlimited.

[47] Culp, K. M., Honey, M., &Mandinach, E. (2003). A retrospective on twenty years of education technology policy. Office of Educational Technology. Retrieved September 9, 2010, from http://www.ed.gov/rschstat/eval/tech/20years.pdf

[48] Kumar, Naresh, Che Rose, Raduan, Lawrence, Jeffrey(2008) Teachers' Readiness to Use Technology in the Classroom: An Empirical Study ,VoL - 21, European Journal of Scientific Research

[49] Will Wai kit Ma, Robert Andersson, Karl Oskar Streith, (2005), Examining user acceptance of computer technology: an empirical study of student teachers, Journal of computer assisted learning ,https://doi.org/10.1111/j.1365-2729.2005.00145.x

[50] Paul Jen HwaHua, Theodore H.K.Clark, Will W. Ma, Examining technology acceptance by school teachers: a longitudinal study, Information &Management,Volume 41, Issue 2, December 2003, Pages 227-241

[51] Gary Hackbarth,Varun Grover, MunY.Yi, Computer playfulness and anxiety: positive and negative mediators of the system experience effect on perceived ease of use , Information & Management, Volume 40, Issue 3, January 2003, Pages 221-232.

UDK 37.091.33-028.26:339.138(540); DOI 10.2507/IJVA.4.2.1.51