Technology Acceptance and Digital Divide as Correlates of Performance Among Engineering Students and Teachers: Inputs to Educational Technology Acquisition and Adaptation Model.

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Abstract

Digital divide centers on access to various dimensions of information and communication technology (ICT) including physical access, motivation, skills, and actual usage of digital technologies. This divide tends to be even wider in the context of developing countries. Further, educational setting has been recognized as a domain with good potential for incorporation of new technologies. It involves a wide range of users of learning technology which should support the process of knowledge transfer and acquisition. Yet, there is a lack of literature on the digital divide and technology acceptance among the students and teachers in secondary education. As an initial step to fill the gap in the existing literature, developing a new model to capture the interplay between digital divide and technology acceptance, and how these affect performances among students and teachers using structural equation modelling and confirmatory factor analysis is of essence. This paper focuses on the development and validation of such a model. The purpose of the study is to build a model that examines relationships among variables associated with factors that influence technology acceptance and digital divide. Data was collected from 1000 participants using a survey questionnaire. Employing structural equation modelling, a hypothesized model was tested for model fit in the study. The resulting model is found to have a good fit.

Keywords
Technology Acceptance, Digital Divide, Performance, Structural Equation Modelling

1. Introduction

Information and communication technologies have become pervasive in the society having positive consequences on every walk of people's life including education. Researchers have also recognized the significance of technology in education particularly to enhance teaching-learning processes (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012; Youssef et al., 2013). These technologies can be very helpful to elevate the standards and quality of various dimensions of teaching-learning processes including content delivery, peer-learning, complementing the curriculum, and student assessment. Further, the significance of Learning management systems s is more vivid in institutions of basic education due to their acknowledged role in building the foundations for the next generation of professionals in a knowledge society.

Technology is ubiquitous in all areas in society. In education, at least two trends can be observed: First, educational systems are incorporating digital competences in curricula and assessments (Flórez et al., 2017).

Second, teachers and teacher educators are encouraged to include technology in their teaching—as a tool to facilitate learning (Shute & Rahimi, 2017). And for many years, researchers have been interested in identifying the conditions or factors that facilitated technology integration into education. Over time, models were developed and tested to predict technology acceptance. Among these models, the Technology Acceptance Model (TAM) is arguably the most popular (King, 2006).

The positive and dynamic role of emerging technologies in education. Researchers encourage teachers to utilize technology in order to improve their instruction whenever possible (Centeio, 2017). Since technology use in educational settings is considered to be helpful in increasing the access and quality of learning (Domingo & Garganté, 2016), teachers' access to Information Communication Technology is of utmost concern. The existing digital divide however prevents both teachers and learners to fully realize the benefits of technology integration in education (Centeio, 2017). The digital divide refers to the gap between people who have adequate access to ICT and those who have 'zero' or poor access to ICT. Rogers (2016) has referred to this issue as an important issue for social justice in the twenty-first century. Although swift advances in technology have occurred, the digital gap remains ever-present (Centeio, 2017).

Education has always lived in tension between two functions: education as a matter of assuring continuity and as a matter of fostering creativity and change. Within these, technology brings a new set of challenges and pressures for educational institutions (Romeo,Lloyd, & Downes, 2013). The speed with which the evolution of technology has taken place is phenomenal. Today, school teachers in many countries around the world are working with "digital natives" who are growing up with new technologies as a non-remarkable feature of their life. Technology allows us to (co-)create, collect, store and use knowledge and information; it enables us to connect with people and resources all over the world, to collaborate in the creation of knowledge and to distribute and benefit from knowledge products (Spector, 2008; von Davier, Hao, Liu, & Kyllonen, 2017).

The question remains as to what degree teachers integrate technology into teaching and learning activities. Research reveals that integrating technology is a complex process of educational change, and the extent of technological applications in schools is still extremely varied (Bishop & Spector, 2014; Fraillon et al., 2014). Clearly, emerging educational technology usage in (teacher) education has increased in recent years, but technology acceptance and usage continue to be problematic for educational institutions (Berrett, Murphy, & Sullivan, 2012; Straub, 2009). In the literature, the question is repeatedly put forward as to what variables determine technology integration in education. Measuring user acceptance of technology is a way of determining the teacher's intentions toward using new technologies in their educational practice

The importance of digital equity in education

Initiatives aimed to equip classrooms and build teacher capability in technology use encounter acceptance, sustainability and scalability challenges (Resta & Laferrière, 2015). Among all these issues, the most critical challenge is meeting digital equity among students, teachers, and administrations. For ICTs to empower education, there is a need to launch policies and initiatives that provide students and teachers with equitable access to digital technologies (Resta & Laferrière, 2015).

The first and foremost prerequisite for the exploitation of ICT in education is ensuring adequate ICT access by teachers as well as by students. While universities and other higher education institutes are considered as the key sources of skilled workforce upon which a knowledge society is built, the significance of ICT becomes more vivid in universities to help build a knowledge society, making faculty's ICT access an important area of investigation.

Such investigations carry even more significance in emerging countries such as the Philippines, given the higher prevalence of the digital divide problem in their contexts. There is not sufficient literature available which provides much evidence on technology practices in the secondary schools of the country.

As a first step, the present study focuses on examining the Philippines secondary school teachers ICT access at the four levels (van Dijk, 2005) – their motivations to adopt information and communication technology, their physical access to ICT, their capabilities to utilize digital technologies, and their actual usage of such devices and services. The four levels are the core of van Dijk (2005)'s theory of digital divide, which presented the model of successive kinds of access to ICT suggesting that there are four successive kinds of access to ICT i.e., motivational, physical, skills, and usage access. The model has classified digital skills into further three types: operational, informational, and strategic skills. The study also provides valuable information on the digital divide among the faculty in respect of their personal and positional categorical variables. Such information would illuminate whether the faculty is in a good position to benefit from the ICT based initiatives taken by the Department of Education and to support their teaching and research practices through utilizing emerging technologies.

1.1 Objectives

The study aims to develop a new model to capture the interplay between digital divide and technology acceptance, and how these affect performances among students and teachers in public schools.

Specifically, the study aims to answer the following questions

1. What are the demographic profiles of the secondary teachers in public and private schools in terms of age, gender, highest educational attainment, income level, and performance from the last year.
2. What is the teacher's access to digital technologies at the four levels (motivational, material, skills, and usage access)?
3. How does the teacher's digital access differ with respect to their personal (age, gender, income level) and positional categories (designation and academic achievement)?
4. What is the level of technology acceptance of public school teachers related to the use of Learning Management Systems in public schools in terms of:
    a. job relevance,
    b. perceived ease of use,
    c. perceived usefulness,
    d. behavioral intention, and
    e. actual system use?
5. What is the performance of students and teachers of the selected public schools in the past school year (SY 2020-2021)?
6. Is there a correlation between the Technology acceptance of teachers and student performance?
7. Is there a correlation between the digital access of teachers and student performance?
8. Can student performance be predicted based on the technology acceptance and digital access of teachers?
9. From these analyses, what common themes and factors can be adopted as inputs to educational technology acquisition and adaptation?

Hypotheses

The figure below shows the relationships of the variables as well as the hypotheses that the study wanted to test and consider:

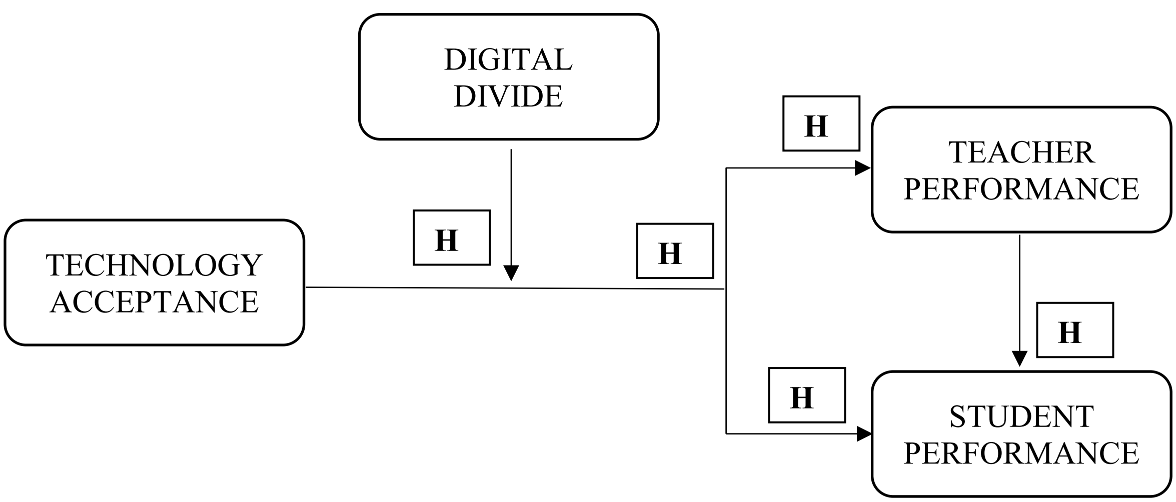


Figure 1.5 Initial Structural Equation Model

The five hypotheses are the following:

1. H1: Technology acceptance correlates positively with Student performance and teacher performance
2. H2: Digital divide inversely correlates with technology acceptance
3. H3: Digital Divide has a negative effect on Technology acceptance of students
4. H4: Digital Divide has a negative effect on Technology acceptance of teachers
5. H5: Teacher performance correlates with student performance.

2. Literature Review (12 font)

Digital Divide

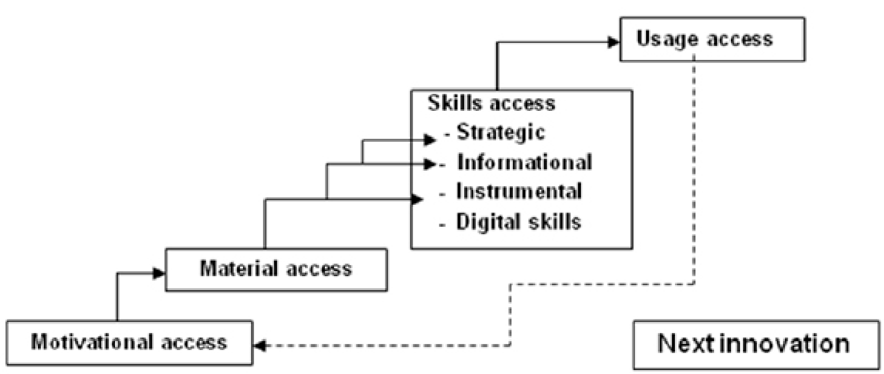
Information communications technology (ICT) has the power to raise the quality of people's lives. It has so much immersed in our life that the digital divide prevents people with no or inadequate ICT access from effective participation in society. The emerging digital technologies embrace the potential of incredible innovation and development prospects (Cruz-Jesus, Vicente, Bacao, & Oliveira, 2016).

The digital divide refers to the gap between people who have adequate access to ICT and those who have 'zero' or poor access to ICT. Rogers (2016) has referred to this issue as an important issue for social justice in the twenty-first century. Although swift advances in technology have occurred, the digital gap remains ever-present (Centeio, 2017). Such inequalities also exist in educational settings (Centeio, 2017). The existence of the digital gap in different groups related to education such as among teachers and students should be considered as a matter of concern.

ICTs can serve a vital function in the development of all countries and are even more significant for developing countries, for which technology is also being treated as a source to accomplish the United Nations' Sustainable Development Goals (SDGs) (United Nations, 2015) targets. Nevertheless, to get the most from these technologies, countries should integrate ICT education in their strategic plans

Figure 1.1 illustrates van Dijk's (2012) multifaceted model of access to ICT. He has argued that access problems of ICT progressively shift from the first two stages or kinds of access (physical and motivational access) to the last two (skills and usage access). This model suggests that the digital divide, between two groups or segments of the society, can occur at any one, two, three, or all four stages of access to digital technologies.

Figure 1.1: Digital Divide Model (van Dijk 2012)



Motivational access

Motivational access refers to an individual's wish or intent to "adopt, acquire, learn, and use" digital technologies (van Dijk 2005). In other words, it is about the mental readiness of an individual to have and use digital technologies. Lack of motivation in acceptance of emerging technologies has always been on top of the list of problems preventing technology adoption (van Dijk 2012).

Material or physical access

Material or physical access refers to the custody or authorization to use digital technologies. This is the type of access to ICT that has been heavily investigated in past studies. People consider that digital divide can be bridged by providing everyone with a computer and Internet connection (van Dijk 2005). Van Dijk (2005) has asserted that physical access should not be downplayed while emphasizing other kinds of access.

Skills access

Skills access denotes an individual's ability to learn, use, and manage digital hardware, software, and Internet connection. van Deursen and van Dijk (2008) have strongly emphasized the levels of digital skills to understand digital divide, focusing on individuals' "can's and cannots" with digital technologies. According to van Dijk (2005), digital skills do not mean only the ability to operate computers and other related digital technologies but it also includes the skills of searching, selecting, and applying information strategically to promote one's position in the community. He has suggested three successive levels of digital skills: operational skills, informational skills, and strategic skills.

Operational skills

Operational skills, one's ability to operate computer, network and software, is a necessary condition to higher levels of digital skills – informational and strategic skills. These skills involve handling computer files, skills to perform basic operations in word processing, spreadsheets, presentation, media player and utility software, surfing the Internet, and emailing.

Informational skills

Although operational skills have received much attention, having ability to work with information is indispensable in an information society (van Dijk 2005). van Dijk has defined informational skills as one's ability to search, select, process, and assess information in computer and network resources.

Strategic skills

According to van Dijk (2005), strategic skills reflect individuals' capabilities to use computer and network sources as the vehicle to reach specific goals as well as the general goal to promote one's position in the society. Strategic skills are not learned in a formal educational environment or on the work in categorical ways but are assimilated into the day-to-day practices of work, education, and leisure time (van Dijk 2005)

Usage access

An individual might have fulfilled the minimum requirements of the first three levels – he or she is motivated to possess and use a computer and Internet, has material access to them, and knows how to use them; but nevertheless he or she has "no need, occasion, obligation, time, or effort to actually use them" (van Dijk 2005)

Technology Acceptance

An area of great interest in incorporating new technologies is the field of learning and teaching. Educational settings involve a wide range of potential users of information and communication technology (ICT) which should support the process of knowledge transfer and acquisition. such context, we could question why users decide on the one hand to adopt and accept or, on the other hand, to reject particular technology. Recently, technology acceptance research in teaching and learning contexts has become an attractive trend (Al-Emran, Mezhuyev & Kamaludin, 2018) and necessity for meaningful inclusion of technology in educational settings has been emphasized (Scherer, Siddiq, & Tondeur, 2019). However, although the potential of ICT for enhancing the learning and teaching process is intuitively compelling the issue of learning technology acceptance or rejection could be essential.

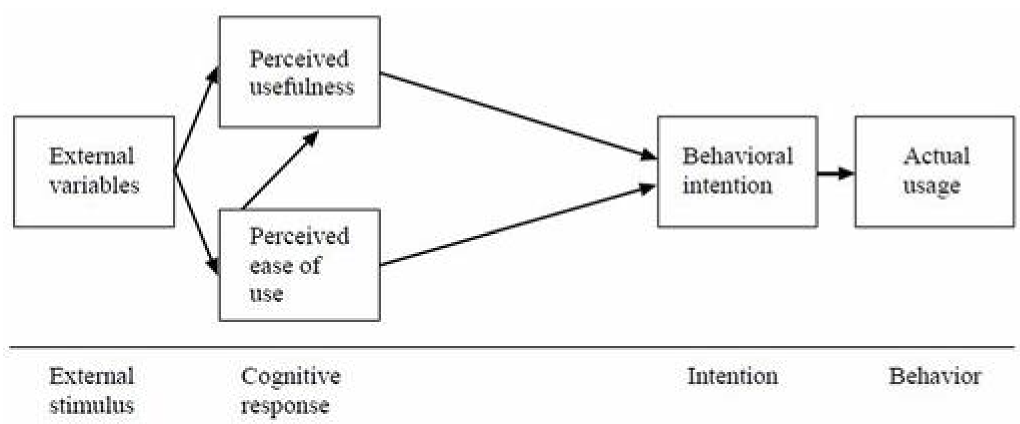
The Technology Acceptance Model (TAM) (Davis, 1989) has evolved to become the key model in understanding predictors of human behavior towards potential acceptance or rejection of the technology. Educational setting has been recognized as a domain with good potential for incorporation of new technologies. It involves a wide range of users of learning technology which should support the process of knowledge transfer and acquisition. Hence, technology acceptance research in the field of learning and teaching has become an attractive trend (Granić and Marangunić, 2019).

It has been shown that over the years, TAM has emerged as a leading scientific paradigm for investigating acceptance of learning technology by students, teachers and other stakeholders (Davis, 2011). TAM is the most common ground theory in e-learning acceptance literature. (Abdullah & Ward, 2016; Weerasinghe & Hindagolla, 2017). Different acceptance studies in the area have been exploring TAM's applicability for different learning technologies, like mobile learning (Sánchez Prieto, Olmos Migueláñez, & García-Peñalvo, 2016.), Personal Learning Environments (PLEs) (del Barrio-García, Arquero, & Romero-Frías, 2015), Learning Management Systems (LMSs) in general (Alharbi & Drew, 2014) as well as open-source LMS Moodle and commercial LMS Blackboard (Ibrahim et al., 2017) in particular

TAM suggested that the user's motivation can be explained by three factors: perceived ease of use, perceived usefulness and attitude towards using. Davis (1986) hypothesized that the attitude of a user towards the system was a major determinant of whether the user will actually use or reject the system. He defined perceived usefulness as the degree to which the person believes that using the particular system would enhance her/his job performance, whereas the perceived ease of use was defined as the degree to which the person believes that using the particular system would be free of effort (Davis, 1986). Finally, both beliefs were hypothesized to be directly influenced by the system external variables (see Figure 2).

For this study the external variables were defined as: Job Relevance, Output Quality and Platform Characeristics (features).

Figure 1.2: Technology acceptance model (Davis, 1986)



Perceived usefulness

is defined as "the extent to which a person believes that using a particular system will enhance his or her job performance" (Rauniar et al., 2014). Consequently, it is related to the belief that a technology enhances an individual's performance. It represents the degree to which an individual that uses new technology considers the technology to meet his/her goal of integrating it into the innovation process (Rauniar et al., 2014). Thus, the assumption is made that the perceived usefulness of technology and learning management system influences a teacher to use this technology in innovation processes. Nath et al. (2014) showed that perceived usefulness influences a person's attitude towards using their technology.

Perceived ease of use

The extent to which a person believes that using a particular system will be free of effort" (Sun et al., 2009). Studies validated that when individuals think employing a certain technology is easy to use, they will be inclined to work with it (Davis, 1986; Liu et al., 2010). Connecting this fact to learning management systems, it is assumed that if the learning management systems deployed are easy to handle, teachers will make use of it. As in the case of Perceived Usefulness, Perceived Ease of Use has an influence on a person's attitude towards using their technology system (Nath et al., 2014)

Behavioral Intention

The Behavioral intention influences a person's actions under the condition that the person assumes a relationship between the outcome and a definite behavior (Liu et al., 2005). Like the adoption of new technologies such as the use of learning management systems in education (Nath et al., 2014). Concepts that are summarized as behavioral intention are for instance attraction, liking, and general attitude towards a product (Fishbein and Ajzen, 1975). In other words, attitude is not a behavior in itself but it is a disposition that influences a particular behavior of people (Fishbein and Ajzen, 1975). In the context of TAM, several empirical studies have exposed the intention and the actual usage from a technical system is impacted by the user's attitude (Hassanein and Head, 2007).

Actual Usage

Actual usage or attitude towards use or actual system use as defined by Davis (1989) refers to a physical tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor. Davis hypothesized that the attitude of a user towards the system was a major determinant of whether the user will actually use or reject the system. It was found that teacher's attitudes were found to significantly influence their usage of web-based learning technologies. Research findings indicate promising prospects for introducing e-learning based courses (Shah, Iqbal, Janjua, & Amjad, 2013).

Synthesis of Related Literature

Although digital divide and the technology acceptance model has been separately investigated in educational settings, there are very limited research investigating the impact of the digital divide on the technology acceptance of both students and teachers. Further, the two models are developed years ago and there can be room for refinement.

As an initial step to fill the gap in the existing literature, developing a new model to capture the interplay between digital divide and how it affects technology among students and teachers using structural equation modelling and confirmatory factor analysis is of essence. This paper focuses on the development and validation of such a model.

Theoretical Framework of the Study

The theoretical framework of the study is anchored on the two theories. The first is van Dijk's (2012) multifaceted model of access to ICT, where access problems progressively shift from the first two stages or kinds of access (physical and motivational access) to the last two (skills and usage access). This model suggests that the digital divide, between two groups or segments of the society, can occur at any one, two, three, or all four stages of access to digital technologies. The second theory is the Technology Acceptance Model (TAM) by Davis (1989) which has evolved to become the key model in understanding predictors of human behavior towards potential acceptance or rejection of new technology. Since the educational setting has been recognized as a domain with good potential for incorporation of new technologies. It involves a wide range of users of learning technology which should support the process of knowledge transfer and acquisition.

3. Methods (12 font)

Research Design

In this study 1451 set of questionnaires was randomly distributed to teachers and students. Participants were predominantly public school teachers with different tenure and specialization courses. The instrument used in this study was designed based on the objectives of the study. It was piloted and the Cronbach's alpha of the reliability and validity of the instrument was put at (.855). This is acceptable and the instrument has met the reliability requirement for the study.

This study is based on the Technology Acceptance Model (TAM) and the Digital Divide Model, which consists of different factors and indicators that were presented in the first chapter. TAM inspects the influence of technology on a user's behavior and was developed by Davis (1986) with the aim of establishing a theory of a user's technology acceptance behavior (Rauniar et al., 2014). Digital Divide on the other hand looks at the several levels of access—motivational, material, skills, and usage. The digital divide model was developed in 2012 by Van Dijk where he suggested that the digital divide, between two groups or segments of the society, can occur at any one, two, three, or all four stages of access to digital technologies.

Research Design	Activities	Outcomes
Problem Definition and Research Design	Develop research Methodology	Research Design
Theoretical Foundation	Literature review	Digital Divide and Technology Acceptance Theories Constructs definitions
Model Construction and Instrument development	Develop Structural Models Survey Instrument Pilot Testing	Initial Structural Model Digital Divide Survey TAM survey
Data Collection	Survey Instrument Distribution Quality assessment of collected data	Raw data
Model Validation	Validate Structural Model	Acceptable values for all relevant validity measures
Interpretation	Analyze and interpret results	Final Model Directions for future research

This study employs a structural equation modelling (SEM) approach to develop a model that represents the relationships among the eight constructs on digital divide (Motivational access, material access, skills access – operational, strategic, informational, instructional, and usage access) and seven constructs on technology acceptance (Job relevance, Quality of output, Characteristics (features), perceived usefulness, perceived ease of use, behavioral intention, and actual system use). Data were collected through an online survey questionnaire deployed using google forms comprising questions on demographics and multiple items for each variable in the research model.

Participants and Sampling Technique

The participants of the study are students and teachers from public secondary schools. The study is delimited to fifteen public school in Region IV province Further, the breakdown of the schools involved in this study is shown in table 2.1.

To calculate the sample size, Cochran's formula is used. Cochran (1977) developed a formula to calculate a representative sample given by the formula:

$$n_0 = \frac{z^2 pq}{e^2}$$

where, n_0 is the sample size, z is the selected critical value of desired confidence level, p is the estimated proportion of an attribute that is present in the population, $q = 1 - p$, and e is the desired level of precision.

In this study, using the formula of Cochran to calculate the needed sample size of a large population whose degree of variability is not known, assuming maximum variability which is 50% (p = 0.5 and taking a 95% confidence level with ±5% precision, the sample size obtained is

$$n_0 = \frac{1.96^2(0.5)(1-.05)}{0.05^2}$$

$$n_0 = 384$$

Using the correction formula to know the final sample size

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

Here, n_0 is the sample size derived from the previous calculation and N is the population size. Given a population size 2,118 students

$$n = \frac{384}{1 + \frac{384 - 1}{2118}}$$

Hence we will need a student sample of n_s = 325 and a teacher sample of n_t = 52 (total population of teachers)

References

Abdullah, F., & Ward, R. (2016). Developing a general extended technology acceptance model for e-learning (GETAMEL) by analysing commonly used external factors. Computers in Human Behavior, 56, 238–256

Alharbi, S., & Drew, S. (2014). Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. International Journal of Advanced Computer Science and Applications, 5(1), 143–155.

Ali, W. (2020). Online and remote learning in higher education institutes: a necessity in light of COVID-19 Pandemic. High. Educ. Stud. 10:16. doi: 10.5539/hes.v10n3p16

Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2018). Technology acceptance model in m-learning context: A systematic review. Computers & Education, 125, 1–41.

Berrett, B., Murphy, J., & Sullivan, J. (2012). Administrator insights and reflections: Technology integration in schools. The Qualitative Report, 17(1), 200-221.

Cruz-Jesus, F., Vicente, M. R., Bacao, F., & Oliveira, T. (2016). The education-related digital divide: an analysis for the EU-28. Computers in Human Behavior, 56, 72–82. https://doi.org/10.1016/j.chb.2015.11.027.

Centeio, E. E. (2017). The have and have nots: an ever-present digital divide. Journal of Physical Education, Recreation & Dance, 88(6), 11–12. https://doi.org/10.1080/07303084.2017.1331643.

Cochran, W.G. (1977) Sampling Techniques. 3rd Edition, John Wiley & Sons, New York.

Commission on Higher Education (2020). COVID-19 Updates - Advisory 6. Quezon City, PH: CHED.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–339.

Davis, F.D., 1986. A technology acceptance model for empirically testing new end-user information systems: theory and results. Doctoral dissertation. Massachusetts Institute of Technology

del Barrio-García, S., Arquero, J. L., & Romero-Frías, E. (2015). Personal learning environments acceptance model: The role of need for cognition, e-learning satisfaction and students' perceptions. Educational Technology & Society, 18(3), 129–141.

Domingo, M. G., & Garganté, A. B. (2016). Exploring the use of educational technology in primary education: teachers' perception of mobile technology learning impacts and applications' use in the classroom. Computers in Human Behavior, 56, 21–28. https://doi.org/10.1016/j.chb.2015.11.023.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. Computers & Education, 59(2), 423-435. doi:10.1016/j.compedu.2012.02.001

Flórez, F. B., Casallas, R., Hernández, M., Reyes, A., Restrepo, S., & Danies, G. (2017). Changing a Generation's Way of Thinking: Teaching Computational Thinking Through Programming. Review of Educational Research, 87(4), 834-860. doi:10.3102/0034654317710096

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). Preparing for Life in a Digital Age - The IEA International Computer and Information Literacy Study International Report. Heidelberg, New York, Dordrecht, London: Springer International Publishing. doi:10.1007/978-3-319-14222-7

Granić, A. and Marangunić, N., (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*, 50(5), pp.2572-2593. https://doi.org/10.1111/bjet.12864

Hassanein, K. and Head, M., 2007. Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping. Int. J. Human-Computer Studies, 65(8), pp.689-708

Huber, S. G., and C. Helm. 2020. "COVID-19 and Schooling: Evaluation, Assessment and Accountability in Times of Crises—reacting Quickly to Explore Key Issues for Policy, Practice and Research with the School Barometer." Educational Assessment, Evaluation and Accountability 1–34. doi:10.1007/s11092-020-09322-y.

Ibrahim, R., Leng, N. S., Yusoff, R. C. M., Samy, G. N., Masrom, S., & Rizman, Z. I. (2017). E-learning acceptance based on technology acceptance model (TAM). Journal of Fundamental & Applied Sciences, 9, 871–889

Kang, C. (2016, February 23). Bridging a digital divide that leaves schoolchildren behind. New York Times. Retrieved from https://www. nytimes.com/2016/02/23/technology/fccinternet-access-school.html

King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. Information & Management, 43(6), 740-755. doi:10.1016/j.im.2006.05.003

König, J; Jäger-Biela, D; & Glutsch, N. (2020) Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany, European Journal of Teacher Education, 43:4, 608-622, DOI: 10.1080/02619768.2020.1809650

Lapada, A., Miguel, F., Robledo, D., & Alam, Z. (2020). Teachers' Covid-19 awareness, distance learning education experiences and perceptions towards institutional readiness and challenges. International Journal of Learning, Teaching And Educational Research, 19(6), 127–144. doi: 10.26803/ijlter.19.6

Liu, C., Marchewkab, J. T., Luc, J. and Yud, C.-S., 2005. Beyond concern—a privacy-trust1behavioral intention model of electronic commerce. Information & Management, 42(1), pp.289- 304

Lumagbas, J., Smith, W., Care, E., & Scoular, C. (2019). Tablet computers in Philippine public schools: school-level factors that influence technology management and use. Technology, Pedagogy And Education, 28(1), 73-89. doi: 10.1080/1475939x.2019.1572535

McFarlane, A. E. 2019. "Devices and Desires: Competing Visions of a Good Education in the Digital Age." British Journal of Educational Technology 50 (3): 1125–1136. doi:10.1111/bjet.12764.

Nath, R., Bhal, K. T., and Kapoor, G. T., 2014. Factors influencing IT Adoption by Bank Employees: An Extended TAM Approach. Vikalpa: The Journal for Decision Makers, 38(4), pp.83-96

Rauniar, R., Rawski, G., Yang, J. and Johnson, B., 2014. Technology acceptance model (TAM) and social media usage: an empirical study on Facebook. Journal of Enterprise Information Management, 27(1), pp.6-30

Resta, P., & Laferrière, T. (2015). Digital equity and intercultural education. Education and Information Technologies, 20(4), 743– 756. https://doi.org/10.1007/s10639-015-9419-z

Romeo, G., Lloyd, M., & Downes, T. (2013). Teaching teachers for the future: How, what,why, and what next? . Australian Educational Computing, 27(3), 3-12.

Rogers, S. E. (2016). Bridging the 21st century digital divide. TechTrends, 60(3), 197–199. https://doi.org/10.1007/s11528-016-0057-0.

Sánchez Prieto, J. C., Olmos Migueláñez, S., & García-Peñalvo, F. J. (2016). Informal tools in formal contexts: Development of a model to assess the acceptance of mobile technologies among teachers. Computers in Human Behavior, 55A, 519–528

Shah, S. A. M., Iqbal, N., Janjua, S. Y., & Amjad, S. (2013). Employee behavior towards adoption of e-learn1ing courses: Validating technology acceptance model. Mediterranean Journal of Social Sciences, 4(14), 765–774

Biography

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