International Journal of Learning, Teaching and Educational Research
Vol. 22, No. 10, pp. 271-289, October 2023
https://doi.org/10.26803/ijlter.22.10.15
Received Sep 3, 2023; Revised Oct 13, 2023; Accepted Nov 1, 2023

Factors Contributing to Resistance in the use of Information and Communications Technology: A Snapshot on Engineering Graphics and Design Teachers

Philani Brian Mlambo* **and Mogale Simon Albert Maeko**
Faculty of Arts and Design, Durban University of Technology, Pietermaritzburg, South Africa

Samuel Dumazi Khoza
Faculty of Humanities, Tshwane University of Technology, Soshanguve, South Africa

Abstract. The prevalent adoption of ICT in education has compelled even EGD teachers to integrate ICT in teaching and learning of EGD. However, not every teacher understands the importance of using technology in EGD lessons, even though it offers a lot of benefits for both teachers and learners. Many scholars have attributed this resistance of teachers to many factors, such as gender, age, and attitudes as well as the fact that teachers do not perceive technology as important as they believe that traditional methods are still bearing fruit. In an attempt to understand the actual reasons behind teachers' resistance to ICT integration in EGD lessons, this study followed a qualitative approach, and semi-structured interviews were used to gather data. Purposive sampling was used to identify 11 EGD teachers to take part in this study. Furthermore, the study employed the Technology Acceptance Model (TAM) framework, which puts emphasis on the acceptance and adoption of technology. This framework assisted in pinpointing factors contributing to ICT resistance and how teachers can accept technology for the purpose of teaching and learning. The findings show that factors such as age, lack of proper skills to use technology, lack of exposure to technology at the tertiary level, attitude, and shortage of resources in schools are contributing to teachers' resistance to using technology. The study recommends that the department of education should train teachers and provide schools with relevant ICT resources.

Keywords: Resistance; technology; ICT training; Engineering Graphics and Design; Information and Communication Technology; AutoCAD

*Corresponding author: Philani Brian Mlambo; brianmdineka@gmail.com

©Authors
This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (CC BY-NC-ND 4.0).

1. Introduction

The adoption and usage of ICT in teaching and learning is increasing at a very high rate, and this calls for all the stakeholders in education to embrace technology for the benefit of learners. To further emphasise the rise in the adoption of ICT across the globe, scholars articulate that ICT has brought about changes in the style of teaching and learning. Current technologies have achieved a level of maturity that qualifies them to be considered enablers of teaching and learning excellence. These technologies include, but are not limited to, the Internet, AutoCAD, overhead projectors and even WhatsApp, which was mentioned by Mlambo (2023) as one of the technologies that EGD teachers relied on during the COVID-19 lockdown. In the uMgungundlovu District where this study was conducted, it was observed that most schools have technologies, but they do not use them, which compelled the need to investigate factors that contribute to not using technologies. These technologies do not only assist learners but teachers as well to deliver content in an easy manner that is of benefit to learners, as Mlambo (2023) contends that using ICT in EGD lessons assists learners to grasp some concepts better, resulting in higher performance in sections that learners are finding difficult to understand. However, in spite of the benefit associated with the integration of ICT in teaching, the literature shows that teachers are often reluctant to adopt technologies for the enhancement of teaching and learning (Cullen, 2018; Johnson et al., 2016), and this is not unique to the South African context where this study was conducted. The resistance to ICT adoption among high school teachers has been on the rise in recent years, and it was brought to light during the COVID-19 pandemic. During the COVID-19 lockdown, most teachers in many South African schools and the world over could not conduct online classes, and this was attributed to many reasons. A study by Hyndman (2018) alludes to the scarcity of teachers who are aware of the benefits associated with the use of technology in EGD lessons as one of the reasons. Pure resistance to using ICT has also been observed to be one of the reasons teachers are not aware of the benefits of ICT in teaching and learning. This level of resistance to the adoption by ICT in EGD teachers can be further attributed to many factors, such as gender, age, and attitude among others. To meet the objectives of this study, it aimed at investigating factors contributing to teachers' resistance to the adoption of ICT in EGD classrooms. This was necessitated by the current experience on the ground where the study was conducted (uMgungundlovu District), where most schools do have access to technologies but are not using them in EGD lessons. Therefore, the researchers embarked on this journey of investigating factors contributing to teachers not using these technologies.

2. Research Questions

This study was guided by the following research questions:

1. What are factors that contribute to teachers' resistance to the use of ICT in EGD lessons?
2. What strategies can be put in place to curb EGD teacher resistance to ICT adoption?

3. Literature Review

3.1 Information and Communications Technology

To understand the concept of ICT that has become integral all over the world, a definition must be attached to it. According to Education (2004), ICT is the processing, management, and sharing of data, information, and knowledge that are made possible through networks, technology, software, and methods of communication, cooperation, and engagement. The above definition was given by the DoE more than 18 years ago, which is an indication that ICT has always been there and has slowly gained momentum. In recent years, ICT has gained prominence; hence, Bornman (2016) postulates that ICT includes all technological tools such as computers and tablets that enable individuals to access, create, and modify information, which many South African schools possess. In the same vein, Cardullo et al. (2018) describe ICT as network devices, computers, and all other wide ranges of telecommunication technologies that can assist in interactive communication and are also capable of performing data communication. Another definition of ICT is given by Linden (2013) as devices used for communication, such as cell phones, computers, and other applications used to pass information. In EGD, such could be used to draw on a computer using an AutoCAD programme and save them for later usage. In EGD, AutoCAD is a useful ICT tool for design and technical documentation that replaces manual drafting with an automated process. The concept of ICT simply means that all the means used by teachers with the purpose of infusing technology are said to be ICT. The concept of ICT revolves around the usage of technological tools such as computers, among other things. This means that educators need to be fully equipped with ICT skills so that they can infuse ICT effectively. Such could be beneficial for teaching concepts such as solid geometry and isometric drawing, to name a few, in which EGD can be effectively taught through ICT. In South Africa, many schools have ICT tools and some teachers have been gotten training in many ICTs. This can be accompanied by the fact that many learners do own a device or two, and that means ICT is not foreign to us in the teaching and learning situation. Regardless of the above, some EGD teachers are still resisting using technology in their EGD lessons.

3.2 Factors influencing teachers' ICT resistance

In spite of the transformation brought about in all aspects of society, the infusion of ICT into education is still in the early stages of development (Mashile, 2017). This shows that the integration of ICT into education by teachers is happening more slowly than expected. The slow integration of ICT might be owing to many factors, such as the lack of training of teachers and the unwillingness of teachers, which can be associated with attitude and a lack of confidence in using ICT tools. Mashile (2017) indicated that the slow integration of ICT is because South Africa has only 26% of teachers who are equipped with ICT skills, which is a shocking statistic as technology keeps evolving. However, a lot has happened six years down the line since Mashile's study in 2017. Many schools have wi-fi, smartboards, and laptops, and they often use a platform called the D6 Communicator, which teachers, learners, and parents engage in. Mahdi and Al-Dera (2013) contest that age is one of the factors that influence teachers' ICT capabilities and willingness to infuse ICT in education. In support of Mahdi and Al-Dera's findings, Msila (2015) posits that older teachers tend to avoid using

computers in their lessons. One of the people interviewed by Msila said, *"I feel less professional when I do not know what seems to be the basic computer knowledge,"* and another teacher said, *"I have been teaching for years without these computers."* Based on Msila's (2015) findings, it can be seen that older teachers are resistant to using technology, which is one of the factors that this section is trying to look at. But also, it does not mean that younger teachers are willing to infuse ICT. There is a wide range of factors that contribute to teachers' resistance to infusing ICT. Another is teachers' shortage of skills to use technology. Raman and Yamat (2014) further revealed that there are many factors that hinder teachers from integrating ICT, and one of those factors is the age and experience of the teachers. In support of this notion, a participant in a study conducted in Malaysia by Raman and Yamat (2014) said, *"I have 10 years of teaching experience. So, I am very convenient using my manual ways, and I did not grow up in a technological environment. I prefer reality experiences rather than looking at monitors."* Another participant said, *"My age is 53, and I have been teaching for more than 25 years." Also, "I believe in the traditional method, which lets the learners touch, feel, and learn. I could make interactive lessons without using the ICT tools."* and *"I think this is not the time for ICT integration in my teaching."* This resistance to using ICT may be due to many reasons, like not being trained or a lack of facilities at schools. These forms of resistance from teachers were also evident in Zimbabwe, as a study done by Matongo (2022) revealed that teachers are not infusing ICT into teaching because they lack ICT skills, which can be acquired through training. Matongo (2022) further states that not being trained results in teachers not being confident in using technology in classes full of ICT-capable learners and often suffering from technology phobia. Another factor that influences the resistance of teachers is that they were not trained or taught how to use ICT while they were at university. To validate the above, Matongo (2022) and Quaye et al. (2015) assert that teachers are not infusing ICT in their lessons because they were not trained in the colleges where they obtained their teaching qualifications, which influences their attitudes when turning professional.

In addition, literature has also shown that teachers' insufficient skills in using the internet discourage them from integrating ICT in their lessons (Yunus & Wekke, 2009). On the other hand, Jegede (2009) argues that age is not the contributing factor, but attitude is. This notion by Jegede (2014) shows that age doesn't influence the usage of ICT, which is in contrast to claims made by Mahdi and Al-Dera (2013) and Msila (2015). Scholars such as Badri et al. (2013) and Copriady (2014) concur, as they claim that a teacher's decision to use or not use ICT is merely associated with their attitude. Copriady (2014) also mentioned that teachers have a nonchalant attitude towards the implementation of ICT; hence, their level of willingness and readiness is extremely low. In support of the above, the literature has shown that teachers do not want to integrate ICT into their EGD lessons, as they feel that the traditional way is still bearing fruit and EGD might not be an exception. Interestingly, Radović-Marković (2010) indicates that traditional teaching allows teachers to have more personal interaction with the learners, which is in contrast to what online learning can offer. Because EGD needs lots of practice, the teaching of the subject has always been synonymous with personal interaction with learners through showing of teaching methods.

Another factor that can contribute to teachers' resistance to infusing ICT is a lack of confidence. Rastogi and Malhotra (2013) reported that some teachers had the basic knowledge of using computers but lacked the confidence to use them in the teaching and learning process. Rastogi and Malhotra (2013) further mentioned that they knew the basics of many software programmes but were too sceptical to use them for teaching and learning purposes. For example, in EGD, a teacher might feel confident when using AutoCAD without the presence of learners, but it becomes a challenge for them to operate it in front of them. This comes down to a question of teachers' attitudes towards ICT, as Rastogi and Malhotra cite in the study they conducted. In a study, they also reported that the success of implementing the new curriculum with ICT in education depends greatly upon the attitudes of the teachers and their willingness to embrace such technology and ICT knowledge and skills (Rastogi & Malhotra, 2013). Rastogi and Malhotra (2013) further explained that teachers should not only have ICT skills but also the right attitude toward ICT use. In a study by Mustafina (2016), findings show that teachers display a positive attitude toward ICT integration. The study further revealed that gender, age, knowledge, and confidence play a crucial role in shaping teachers' attitudes toward ICT. On the contrary, Raman and Yamat (2014) postulate that age, gender, and attitude are some factors influencing teachers' resistance to infusing ICT. Raman and Yamat (2014) further revealed that one of the interviewed teachers said: "*My age is 53 and I have been teaching for more than 25 years. I believe in traditional method which let the learners touch, feel, and learn. I could make interactive lesson without using the ICT tools. This is not the time for ICT integration in my teaching.*" Another teacher said: "*I prefer reality experiences rather than looking at monitors. So, applying ICT tools in my classrooms is not effective. However, traditional forms are more effective.*" The issue of attitude towards the integration of technology seems to be a frequent problem among teachers, translating to a poor attitude towards the usage of technology in teaching and learning. This assertion is further expressed by Erişti et al. (2012), who cited that one of the barriers that affects teachers' ability to infuse ICT is their attitude. Attitude is one of the factors that influences teachers' resistance to infusing ICT into EGD classes. Mustafina (2016) produced factors other than attitude that contribute to teachers' resistance to the integration of ICT into teaching and learning. Figure 1 below shows some other factors that influence teachers' attitudes toward technology integration.

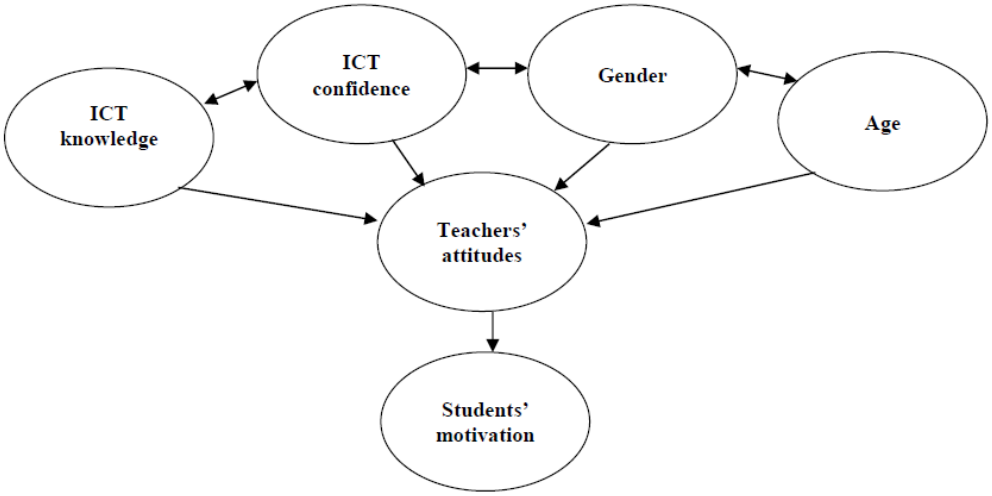

Figure 1: Factors that influence teachers' attitudes toward technology integration (Mustafina, 2016)

Figure 1 above shows distinct factors that contribute to teachers' attitudes towards the infusion of ICT in teaching and learning. In addition, Al-Zaidiyeen et al. (2010) state that a teacher who possesses a positive attitude toward ICT is more inclined to infuse it into his teaching and learning. This is also evident in a study done by Raman and Yamat (2014), "which found that teachers' attitudes toward the use of technology in teaching and learning is one of the key factors" in the meaningful use of computer technology in education. If this attitude continues unabated in practical subjects like EGD, learners will be put at a disadvantage when getting into institutions of higher education and also when competing for jobs.

Figure 1 above shows that gender was mentioned as one of the factors that contributes to teachers' resistance to infusing ICT. Gebhardt et al. (2019) posit that female teachers are seen as being less likely to use technology as opposed to male teachers. In the same vein, as reported by the International Computer and Information Literacy Study (ICILS) 2013, a study done by Fraillon et al. (2019) revealed that when asked about using technology in the classroom, female teachers responded negatively. This is an indication that female teachers are mostly shy or not inclined to infuse technology into teaching and learning as compared to male teachers. In support of a study done by Mukhari (2016), one of the interviewed people's responses was, *"Women made excuses when asked to go for computer training, and if they did, they left the course early." And "In comparison, their male counterparts were keen to be trained on various computer programmes."* It was further revealed that female teachers exhibit low levels of ICT usage, and this is due to a lack of ICT skills (Du Toit, 2015). Du Toit (2015) further mentions that females do not want to use technology despite having all technologies available to them in schools. In contrast to Du Toit's (2015) assertion, Aslan and Zhu (2016) found that gender is not a contributing factor, as both male and female teachers were infusing ICT into their lessons. Aslan and Zhu (2016) further mentioned that "*teachers are integrating technology into their practises regardless of their gender.*" In the uMgungundlovu District, there is a balance in terms of gender that was evident in the EGD workshops attended, and EGD teachers included both old and young,

but the majority are younger teachers. Even though EGD is dominated by younger educators, the level of ICT integration is extremely low in comparison to the preference given to the traditional method of teaching. EGD is a subject that deals with abstract concepts, and the usage of ICT tools can help teachers deliver content to the learners in a better way. It is presumed that this could also help learners make sense of the abstract concepts that are being taught in EGD. This assertion was echoed by Khoza (2013) and Makgato (2016) who found that learners are usually poor at spatial visualisation. Integrating technology into the classroom can be seen as the main reason for improving spatial skills (Akkuş & Arslan, 2022). It is contended that ICT integration in the teaching and learning of EGD is essential, and for that to be possible, teachers must be ready to infuse ICT. Consequently, this study is looking at the factors contributing to ICT resistance and how they can be addressed.

3.3 Remedies for teachers who are ICT resistant

The above section has shown that most teachers are resistant to using ICT in teaching and learning, citing age, gender, and a lack of experience as other reasons for their resistance. Not integrating ICT as part of their pedagogical strategies somehow puts learners at a disadvantage, as technology in EGD, among other subjects, has been proven to be an integral part. It is no secret that we are living in a fast-paced world in terms of technology, thus it is vital that teachers use technology when teaching so that learners can benefit immensely. The importance of ICT integration in EGD lessons is noted by Mlambo (2023), who notes that AutoCAD is one of the ICT tools EGD teachers could use to integrate ICT into teaching and learning. Mlambo (2023) further argues that AutoCAD has the ability to increase learners' spatial awareness, which in turn improves their performance in chapters such as isometric drawing and assembly drawing. As much as ICT has all these kinds of benefits attached to it, the above sections have shown that teachers are still resistant to using technology. In an attempt to assist teachers who are resistant to the use of technology, scholars have indicated the importance of subjecting teachers to ICT training. According to Adams (2020), teachers without ICT are doomed. Furthermore, Barbour (2014) cited that teachers should be subjected to development programmes and workshops where they will be equipped with ICT skills. The aforementioned advances are an indication that training is particularly important in ensuring that teachers are using technology when teaching. To further emphasise the importance of ICT skills, Alazam et al. (2013) postulate that ICT can prove to be a very crucial component in a classroom if used wisely by a well-trained teacher. This simply means that teachers need to be thoroughly trained so that they can infuse ICT into teaching and learning effectively. Alazam et al. (2013) discovered that the level of teachers' ICT skills and use was moderate in a study that examined the levels of ICT skills and ICT use in classrooms. In addition, teachers who possess ICT skills are found to be more useful than those who do not (Rastogi & Malhotra, 2013). This shows how important it is for teachers to be thoroughly trained so that they can have relevant skills for infusing ICT. The importance of training teachers is seen as a particularly crucial step in ensuring that teachers are in a better position to infuse ICT. Matongo (2022) further mentioned that without training, teachers develop a phobia of technology as they are less motivated to use it due to a lack of ICT skills.

This simply means that ICT training plays a significant role in ensuring that teachers integrate ICT into teaching and learning.

4. Theoretical Framework

This study revolves around the adoption and usage of technology, and there are many frameworks that revolve around the adoption and usage of technology. According to Pultoo (2020), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), and the Technology Acceptance Model (TAM) are some of the eight frameworks that revolve around the adoption and usage of technology. In the context of this study, TAM, developed by Davis (1989), speaks about the acceptance of using technology, and as this study investigates the factors contributing to technophobia, the acceptance and usefulness of using technology cannot be overlooked. It has been established that one way teachers can adopt technology is through technology acceptance (Davis, 1989). The aforementioned statement alludes to the fact that in order to manage teachers who resist using technology, they must accept the adoption of technology into teaching and learning. Consequently, this study also adopted the TAM framework as shown in Figure 2 below.

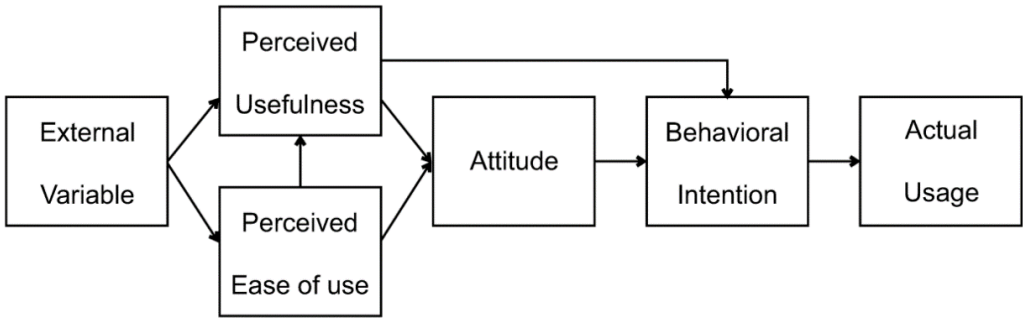

Figure 2: Technology Acceptance Model (Davis, 1989)

TAM has six interrelated constructs made up of internal and external variables, but for the purpose of this study, only three constructs were deemed relevant, which are: perceived usefulness, perceived ease of use, and attitude. According to Davis (1989), below are the definitions of these constructs:

Perceived ease of use: This is defined as one's belief that using a certain system will require a little effort, and this construct was used to investigate whether teachers perceive the use of technologies in enhancing teaching and learning to be easy.

Perceived usefulness: This is defined as the degree to which a person believes that using a particular technology will enhance the job, and this construct was used to investigate if teachers feel that infusing ICT in teaching and learning will bring about improvements in learners' ability to understand the subject matter.

Attitude: This is defined as a certain feeling towards technology usage. It is further mentioned that showing a positive attitude towards technology will motivate a user to use it.. This construct was used to measure attitudes in teachers towards technology, as some authors perceive attitude as one of the factors that contributes to technophobia.

5. Research Methodology

5.1 Research approach

In research studies, there are three commonly used research approaches: qualitative, quantitative, and mixed-method approaches, and they are all unique in terms of the qualities they bring. Consequently, this study deemed it fit to employ a qualitative research approach. Roberts (2010) defines qualitative research as a form of study that is used to gather rich descriptive data from the participants. Put simply, it means you get the information from the horse's mouth, which can be referred to as a primary source of data. The researcher opted for this approach because of its ability to gather an in-depth understanding of the phenomena under investigation, which is the investigation of factors that contribute to EGD teachers' resistance to using ICT.

5.2 Population and Sampling

The study used 11 EGD teachers from uMgungundlovu District. These teachers were selected because of their common characteristics that the researcher deemed necessary to assist with the objectives of the study. The participants were chosen because they are teaching EGD, which is the phenomenon that is being investigated in this study. Consequently, the researcher employed a purposive sampling technique, which is also termed judgmental sampling. According to Etikan et al. (2016), purposive sampling is a non-probability sampling technique that is normally used in qualitative studies. Taherdoost (2016) argues that purposive sampling is used because it is less time-consuming and low- cost, among other advantages. The aforementioned advantages are some of the reasons the researcher employed purposive sampling. Another reason is that the researcher wanted to understand why some EGD teachers are resistant to using ICT in the teaching and learning of EGD; hence, the answers could only be provided by the EGD teachers. Therefore, the participants of this study included 11 teachers who are teaching EGD, which consisted of 4 female and 7 male teachers.

5.3 Data Collection Instruments

To gather the viewpoints of the participants as advanced by Roberts (2012), data was collected through semi-structured interviews. Interviews are one of the data collection techniques that are normally used in qualitative studies. Collecting data through interviews allows a researcher to engage with the participants verbally. Cresswell (2007), cited by Raman and Yamat (2014), posits that interviews are used because of their ability to elicit insights from the participants. The researcher used semi-structured interviews to get an in-depth understanding of the factors contributing to resistance to the adoption of ICT by EGD teachers.

5.4 Data analysis

Interviews can be conducted telephonically or face-to-face; in the context of this study, the participants were interviewed face-to-face. The interviews were conducted in EGD teachers' labs, and they were tape recorded. The resulting data was subjected to thematic analysis, which followed six steps developed by Braun and Clarke (2006): which are (1) data familiarisation; (2) coding; (3) generating themes; (4) reviewing themes; (5) defining and naming themes; and (6) writing up.

5.5 Ethical considerations

Pseudonyms were used as a way of concealing the participants' actual names. Hence, they were referred to as teacher 1, teacher 2, etc. Using pseudonyms in research is a common occurrence that plays a significant role in research ethics and protecting the true identity of the participants. To ensure that the ethics were upheld, a gatekeeper's letter was sought from the DoE to conduct the study in KwaZulu Natal schools that offer EGD. Upon receiving the letter, permission was further sought from the principals of the selected. Once permission was granted, informed consent forms were issued to teachers to consent to their participation in the study.

6. Results

Below are the findings from the semi-structured interviews conducted with 11 EGD teachers. The interviews were done in EGD teachers' classrooms during their free time, and English was used as the medium of instruction. Each interview lasted for about 15 minutes. The interview schedule consisted of two sets of questions, one speaking to the teacher's biography. Below are the responses of the participants based on the questions asked.

The first question asked was about the software they used at the university for the purpose of teaching EGD. This question was asked to ascertain whether or not resistance stems from no previous exposure during training. From the teachers' responses below, only one theme emerged.

Theme 1: Adequate ICT exposure

Based on responses from the interviewed teachers, it appears that they were exposed to AutoCAD as an EGD technology that assisted them in teaching EGD with ease. This is the case in teachers from the uMgungundlovu district, as the findings above show that they were exposed to technology at the university, and the chances of using technology in EGD lessons are high. When the teachers were interviewed, below is how they responded:

"Yes I did. AutoCAD was the software we were exposed to while I was still at the university"

"Yes, the software we used was AutoCAD" ***(teacher 6)***

"Yes we did AutoCAD" ***(teacher 11)***

"Yes. It was AutoCAD" ***(teacher 2)***

"Yes. We were taught on how to use AutoCAD, the was also another module where we were taught basic computer skills" ***(teacher 5)***

"Yes we did AutoCAD during my time at the university" ***(teacher 1)***

"Yes, while I was at the university I did AutoCAD" ***(teacher 10)***

*"At the university I did AutoCAD and a module which was called computer technology"****(teacher 8)***

The second question asked was whether or not age does contribute to resistance to the use of ICT in EGD lessons. From the responses, only one theme emerged, which is discussed below:

Theme 2: Age Related

Based on the above responses, it is clear that resistance to using technology is prevalent among female teachers. They highlighted that EGD teachers who have plenty of experience do not want to engage in the use of technology, as they claim that they have been using the traditional approach for a very long time without encountering problems. They went as far as saying, "*Why change when it is not broken?"* Teachers' views about age are articulated below:

"Yes, it is a contributing factor. I have observed that older teachers are still using the traditional approach of teaching" ***(teacher 9)***

" es aging could be a contributing factor for teachers resisting to Interact with ICT or digital lessons" ***(teacher 3)***

"Yes is a contributing factor, old teachers who are over 40 years are not interesting in using technology compared to their younger counterparts who are very excited about using technology" ***(teacher 11)***

"Yes, in my opinion old teachers prefer the use of traditional methods of chalkboard and set squares" ***(teacher 5)***

"Yes, teachers who are over the age of 35 don't want to use technology as they are firm believers of using traditional teaching" ***(teacher 3)***

"Yes age is the contributing factor more especially for those teachers who have over 20 years of experience they feel too old to try something new" ***(teacher 2)***

Another question asked was whether gender does contribute to teachers' resistance to using technology in EGD lessons. From the responses below, only one theme emerged**.**

Theme 3: Gender

Teachers were asked to ascertain whether gender is a contributing factor to teachers' resistance to using technology in the teaching and learning of EGD. A number of teachers were of the opinion that gender has no relationship with resisting using technology. The following questions asked were about factors they think contribute to EGD teachers not using technology in their lessons. The teacher's views are articulated below:

"No. I don't think so. I know females who are using technology as much as males" ***(teacher 1)***

"No, I believe every teacher want to use technology regardless of gender" ***(teacher 3)***

"No gender has nothing to do with the use of ICT, both males and females can actively engage in the use of ICT, in my school every teacher uses technology regardless of gender" ***(teacher 10)***

"No gender is not a contributing factor; teachers use technology regardless of gender" ***(teacher 11)***

"I don't think gender is the contributing factor, teachers decide to use technology regardless of gender" ***(teacher 9)***

*"Gender as well is not a factor because I know most female teachers who are using technology in teaching and learning of EGD" (**teacher 8)***

Another question asked was about factors they think contribute to EGD teachers not using technology in their lessons. And from their responses, only one theme emerged:

Theme 4: Factors associated with ICT resistance

Apart from age, that has already been identified as a factor in resisting the integration of ICT. EGD teachers also attributed the resistance to using technology to many factors, such as a lack of proper skills to use technology, a lack of exposure to technology at the tertiary level, an attitude, and a shortage of resources in schools. These factors were mentioned by teachers below:

*"Lack of ICT skills. Teachers need to be trained so that they use technology" **(teacher 2)***

*"Some factors are that technology is confusing, it is difficult to use hence teachers are not using it for that reason" **(teacher 9)***

*"Some of the factors are lack of support system at school, shortage of technologies, lack of software's and electricity outages (load-shedding)" **(teacher 10)***

*"Shortage of information/knowledge to use technology" **(teacher 3)***

*"No resources or Inadequate resources provided, some teachers are incapacitated with the use of ICT therefore they lack knowledge, they are not motivated to engage with, in my case I'm capacitated with the use of these online platforms but I don't have access to it since I'm not assisted with regards to teacher profiling for ICT" **(teacher 8)***

*"Lack of resources and ICT skills are some of the factors contributing to resistance of using technology" **(teacher 11)***

*"Lack of information about the usefulness of technology, background as well as does contribute. As most teachers from disadvantaged schools are not using technology. Another reason is the bad attitude of teachers towards using technology" **(teacher 1)***

*"Not being exposed to technology at the university dictates whether they are going to use technology or not" **(teacher 5)***

*"Another is th teachers' attitude towards technology" **(teacher 7)***

*"Lack of proper development, lack of resources such as whiteboard, projectors and computers, and training are some of the factors" **(teacher 6)***

The last question asked was about what could be done to ensure that EGD teachers are not shying away from the idea of using technology in their EGD lessons. Based on the findings below, only one theme emerged:

Theme 5: Teacher Training

The above responses from EGD teachers indicate that those teachers who are not using technology in lessons due to a number of factors can be assisted through the department of education subjecting those teachers to ICT training so that they can be equipped with relevant ICT skills. It has been noted that mostly EGD teachers understand the importance of using technology in EGD lessons but are not using it because they do not know how to. As a result, the need for ICT training was

deemed necessary. Below are the views of the teachers captured when asked about what can be done to assist teachers who are not using technology.

"I think there must be programmes set by the Department of Education to capacitate those teachers who are resistant to technology" ***(teacher 1)***

"We need to get workshops where it can accommodate every EGD teacher to familiarise themselves with such, in that way teachers will change their perspective about technology" ***(teacher 5)***

"Those teachers should be trained and also be taught the importance of using technology in EGD lessons" ***(teacher 10)***

"Training is the best way to assist those teachers who are showing signs of resistance" ***(teacher 11)***

"I think the Department of Education should conduct workshops to capacitate those teachers on how to use technology in their lessons and also the department should the schools as well that offer EGD with relevant resources to aid in the infusion of technology" ***(teacher 9)***

"The Department of Education should make it mandatory for all teachers to use technology and they should also conduct developmental programmes so that they can be capacitated on the importance of using technology" ***(teacher 6)***

"Equip schools with necessary resources and the Department of Education should train them so that they can be able to use these technologies in their classrooms" ***(teacher 2)***

7. Discussions

From the responses above, it was evident that most EGD teachers had exposure to technology while they were in university, which has been seen as an influencing factor in using technology when they get to school. The above is echoed by Matongo (2022) and Quaye et al. (2015) who found that teachers' exposure to technology during university time plays a major role when they turn professional.

Furthermore, the participants indicated that age does contribute to resistance to using technologies. In line with the participant views, studies (Msila, 2015; Raman & Yamat, 2014) indicate that age is associated with resistance to using technology. The same assertion is echoed in a study by Mahdi and Al-Dera (2013), which found that age is one of the reasons teachers are not using technology. Furthermore, findings of a study done in Kenya by Langat (2020) revealed that the age of teachers influences ICT adoption, as 84.7% of teachers strongly agreed that age does contribute to ICT usage. Consequently, it is clear that older teachers tend to resist using technology in their EGD lessons. However, when teachers were asked about gender being a contributing factor, they responded negatively. They went as far as saying teachers use technology regardless of their gender. The above findings were collaborated by other authors (Aslan & Zhu, 2016; Yusop et al., 2021). *"Teachers are Integrating technology in their practises regardless of their gender"* (Aslan & Zhu, 2016). In the same vein, a study conducted by Gebhardt et al. (2019) revealed that there is no gender difference in using technology. Furthermore, findings in a study done in Kenya by Mwei (2020) show that gender has a marginal or no significant influence on teachers' perceptions of factors

affecting the integration of ICT for instructional purposes. This is an indication that gender is not a contributing factor in using technology in EGD lessons. However, this is in direct contrast to other claims (Du Toit, 2015; Mukhari, 2016) that females were less inclined to use technology in teaching and learning as compared to their male counterparts.

The findings further revealed a host of factors that contribute to teachers' resistance. All of the above-mentioned factors are in line with what many scholars have discovered. It was outlined that factors are categorised into internal and external factors (Alharbi, 2021; Xuan et al., 2023). According to Ismaili (2022), external factors are infrastructure, facilities, support resources, and training programmes and internal factors consist of factors such as perception, proficiency, desire, and readiness of teachers. All of the above factors contribute one way or another to teachers' resistance in using technology. For example, both Matongo (2022) and Quaye et al. (2015) argue that a lack of ICT skills plays a major role in teachers not using technology in their lessons. Furthermore, a South African study done in the Eastern Cape has revealed that insufficient ICT skills hinder teachers from using technology (Chisango et al., 2020). In other studies, (Badri et al., 2013; Copriady, 2014; Jegede, 2009), attitudes have been cited as the contributing factor in using technology. In the same vein, a study by Chisango et al. (2020) held that s technology is disruptive in class. To support this, one interviewed teacher said, "*I think using computers is a waste of my time, I have been teaching for the past 20 years and getting good matric results without the aid of a computer so I can just as well continue like that.*" The above signals that teachers have a negative attitude towards using technology. A negative attitude by teachers was also expressed in a study by Manjawira (2022), which revealed that teachers in Malawi have a negative perception of the integration of ICT in teaching and learning.

In support of the lack of availability of resources in schools as a reason teachers are not using technology, Mathevula and Uwizeyimana (2014) posit that there is a shortage of resources in schools that prevents the successful integration of technology, which is further echoed by Addandani (2011) and (Alharbi (2021). The lack of ICT resources is echoed by Xuan et al. (2023), who argue that a lack of ICT infrastructure has been observed to be an issue in Vietnamese schools, which shows that not only schools in South Africa are experiencing a lack of infrastructure. In the same vein, schools in Morocco are experiencing a shortage of ICT equipment, as only 10% of teachers responded 'yes' when asked if their school has enough ICT equipment. (Ismaili, 2022).

Teachers outlined that developmental programmes such as workshops must be conducted by the DoE to assist those teachers who are not using technology in their EGD lessons. They also mentioned training as very important. The necessity of training is outlined in the literature above by many authors, such as Langat (2020), who posits that teachers should be subjected to developmental programmes such as training workshops so that they are equipped to use technology. In the same vein, it has been noted that ICT integration in teaching is very easy when teachers are well-trained (Alazam et al., 2013; Ramnarain et al., 2023). Furthermore, Matongo (2022) asserts that teachers without proper training develop a phobia of using technology in class. The above assertion is an indication that training is a very important part of ensuring that teachers are integrating ICT

into teaching and learning. The importance of training is further alluded to by Chisango et al. (2020), who assert that teachers in the Eastern Cape province can benefit from being subjected to ICT training as they showed a lack of ICT skills. In support of the aforementioned, one participant said, "*No, I do not use computers in teaching and learning because they are few and I do not know how to use them to teach.*" This necessitates the need for ICT training workshops.

8. Conclusion

In response to the above objectives of the study, the study discovered that age, lack of proper skills to use technology, lack of exposure to technology at the tertiary level, attitude, and shortage of resources are factors that contribute to teachers' resistance to using technology in EGD lessons. The aforementioned factors have been outlined by other scholars as well as shown in the literature review of the study. This means that the resistance to using ICT can be curbed if, during in service training at universities, teachers are taught how to use technology so that when they turn professional, they are well equipped.

Attitude has been observed to be a contributing factor based on the findings above, which means that teachers should work on their attitude, as a positive attitude translates to willingness to use technology in EGD lessons as opposed to a negative attitude, which translates to resistance. The findings above indicated that the shortage of resources in schools was voiced by teachers, which can be curbed by the Department of Education by providing schools with the relevant ICT resources so that they can use technology.

The findings outlined the importance of ICT training as a tool that can be used to assist those teachers. Teachers mentioned that developmental workshops should be conducted by the Department of Education to train teachers on how to use technology. This is because teachers said most teachers are not using technology because they do not know how to use it. It is worth noting that addressing these factors contributing to resistance to ICT integration by EGD teachers will improve the results obtained in EGD, and teachers will finish the syllabus early to have enough time for revision.

9. Recommendations

Based on the findings above, the study recommends that the department of education conduct developmental workshops where they will train teachers on how to use ICT in teaching and learning. The study discovered that there is a shortage of ICT resources in schools, which hinders the integration of ICT. The study further recommends that the department of education should also provide schools with ICT resources, as most teachers indicated that they are able and willing to use technology as they understand that the nature of EGD does require ICT integration.

These resources can be in the form of an overhead projector, a white board, or laptops, as these are considered basic ICT tools needed to kickstart the process. The department of education can arrange for workshops to be held at least once a month so that teachers can be consistently subjected to training.

10. Limitations of the study

The qualitative nature of the study means that the results cannot be generalised to a wider population, and they are contextually bound. The study had 11 EGD teachers as participants, which is a small sample, which may affect the generalisation of the findings. It is worth noting that the researcher intended to use 15 EGD teachers, but only 11 responded positively; hence, the sample had 11 teachers. Another limitation of this study was that only one method (semi structured interviews) was used to gather data, which raised concerns about the duplication of the results if the study were to be repeated.

11. Future research

This study focused on EGD teachers only. For future research, studies must be conducted on learners to gather their perspective on integrating ICT into the teaching and learning of EGD. One of the factors was the lack of training for teachers; therefore, future research must be conducted on specific training programmes EGD teachers should be subject to.

Acknowledgement

No specific grant or funding was provided for this study from any institution.

Declaration of interests

The researchers declare no conflict of interests.

12. References

Adams, C. (2020). *Teachers need lots of training to do online learning well. Coronavirus closures gave many just days*. Retrieved 25 April from https://hechingerreport.org/teachers-need-lots-of-training-to-do-online-learning-well-coronavirus-closures-gave-many-just-days/

Addandani, K. (2011). *The lack of the ability of Saudi teachers* PhD thesis, University of King Saud, Saudi Arabia].

Akkuş, İ., & Arslan, P. Y. (2022). The Effects of Augmented Reality in the Technical Drawing Course on Engineering Students' Spatial Ability and Academic Achievement. *Journal of Learning and Teaching in Digital Age*, *7*(2), 160-174. https://doi.org/10.53850/joltida.1020075

Al-Zaidiyeen, N. J., Mei, L. L., & Fook, F. S. (2010). Teachers' Attitudes and Levels of Technology Use in Classrooms: The Case of Jordan Schools. *International education studies*, *3*(2), 211-218. https://doi.org/10.5539/ies.v3n2p211

Alazam, A.-O., Bakar, A. R., Hamzah, R., & Asmiran, S. (2013). Teachers' ICT skills and ICT integration in the classroom: The case of vocational and technical teachers in Malaysia. *Creative Education*, *3*(08), 70. https://doi.org/10.4236/ce.2012.38B016

Alharbi, A. (2021). A review of the internal and external factors affecting teachers' ICT use in Classroom. *International Journal of Education and Research*, *9*(12), 105-116.

Aslan, A., & Zhu, C. (2016). Influencing Factors and Integration of ICT into Teaching Practices of Pre-Service and Starting Teachers. *International Journal of Research in Education and Science*, *2*(2), 359-370. https://doi.org/10.21890/ijres.81048

Badri, M., Al Rashedi, A., & Mohaidat, J. (2013). School teachers' technology readiness–An empirical study applying readiness factors and teacher type categorization. Proceedings of the 2013 International Conference on Information, Business and Education Technology (ICIBET 2013). https://doi.org/10.2991/icibet.2013.124

Barbour, M. K. (2014). Training teachers for a virtual school system: A call to action. In *K-12 Education: Concepts, Methodologies, Tools, and Applications* (pp. 1398-1415). IGI Global. https://doi.org/10.4018/978-1-4666-4502-8.ch081

Bornman, E. (2016). Information society and digital divide in South Africa: results of longitudinal surveys. *Information, Communication & Society*, *19*(2), 264-278. https://doi.org/10.1080/1369118X.2015.1065285

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Cardullo, V. M., Wilson, N. S., & Zygouris-Coe, V. I. (2018). Enhanced student engagement through active learning and emerging technologies. In *Student engagement and participation: Concepts, methodologies, tools, and applications* (pp. 399-417). IGI Global. https://doi.org/10.4018/978-1-5225-2584-4.ch019

Chisango, G., Marongwe, N., Mtsi, N., & Matyedi, T. E. (2020). Teachers' perceptions of adopting information and communication technologies in teaching and learning at rural secondary schools in eastern cape, South Africa. *Africa Education Review*, *17*(2), 1-19. https://doi.org/10.1080/18146627.2018.1491317

Copriady, J. (2014). Self-Motivation as a Mediator for Teachers' Readiness in Applying ICT in Teaching and Learning. *Turkish Online Journal of Educational Technology-TOJET*, *13*(4), 115-123. https://doi.org/10.1016/j.sbspro.2015.01.529

Cullen, E. (2018). What is Technology Enhanced Learning, and why is it important. *Mentimeter, Mentimeter*. https://www.mentimeter.com/blog/interactive-classrooms/what-is-technology-enhanced-learning-and-why-is-it-important

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340. https://doi.org/10.2307/249008

Du Toit, J. (2015). Teacher training and usage of ICT in education. New directions for the UIS global data collection in the post-2015 context. *UNESCO Institute for Statistics, Retrieved*, *16*.

Education, D. O. (2004). *White Paper on E-education: Transforming Learning and Teaching Through Information and Communication Technologies (ICTs)*. DoE. https://www.gov.za/documents/white-paper-e-education-transforming-learning-and-teaching-through-information-and

Erişti, S. D. B., Kurt, A. A., & Dindar, M. (2012). Teachers' views about effective use of technology in classrooms. *Turkish online journal of qualitative inquiry*, *3*(2), 30-41. https://dergipark.org.tr/en/pub/tojqi/issue/21395/229369?publisher=tojqi

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), 1-4. https://doi.org/10.11648/j.ajtas.20160501.11

Fraillon, J., Ainley, J., Schulz, W., Duckworth, D., & Friedman, T. (2019). *IEA international computer and information literacy study 2018 assessment framework*. Springer Nature. https://doi.org/10.1007/978-3-030-19389-8

Gebhardt, E., Thomson, S., Ainley, J., & Hillman, K. (2019). Teacher gender and ICT. In *Gender differences in computer and information literacy* (pp. 53-68). Springer. https://doi.org/10.1007/978-3-030-26203-7_1

Hyndman, B. (2018). Ten reasons why teachers can struggle to use technology in the classroom. *Science Education News*, *67*(4), 41-42.

Ismaili, A. A. (2022). ICT Use in the EFL Classroom in Morocco: EFL Teachers' Personal and Technology-Related Variables. *International Journal of Information and Communication Technology Education (IJICTE)*, *18*(1), 1-13. https://doi.org/10.4018/ijicte.286759

Jegede, P. O. (2009). Age and ICT-related behaviours of higher education teachers in Nigeria. *Issues in Informing Science & Information Technology*, *6*. https://doi.org/10.28945/3384

Johnson, A. M., Jacovina, M. E., Russell, D. G., & Soto, C. M. (2016). *Challenges and solutions when using technologies in the classroom*. Routledge. https://doi.org/10.4324/9781315647500-2

Khoza, S. D. (2013). Difficulties in sectional drawing: a case of student teachers at a university based in the Eastern Cape. https://doi.org/10.12973/eurasia.2016.1220a

Langat, W. K. (2020). *Teacher Related Factors Influencing Integration of Information and Communication Technology in Public Secondary Schools in Narok North Sub-county, Kenya,* University of Nairobi.

Linden, A. (2013). The importance of technology management in the ICT requirements definition process. In *2013 Proceedings of PICMET'13: Technology Management in the IT-Driven Services (PICMET)* (pp. 2283-2295). IEEE.

Mahdi, H. S., & Al-Dera, A. S. A. (2013). The Impact of Teachers' Age, Gender and Experience on the Use of Information and Communication Technology in EFL Teaching. *English Language Teaching*, *6*(6), 57-67. https://doi.org/10.5539/elt.v6n6p57

Makgato, M. (2016). Difficulties of student teachers in the engineering graphics and design course at a South African university: Snapshot on sectional drawing. *EURASIA Journal of Mathematics, Science and Technology Education*, *12*(4), 703-715. https://doi.org/10.12973/eurasia.2016.1220a

Manjawira, M. T. (2022). Integrating Information and Communications Technology in Teaching: Perceptions fromTeachers in Malawi. *Journal of Education & Social Sciences,*, *2*(10), 10-22. https://doi.org/10.20547/jess1022210202

Mashile, T. (2017). *Technology integration and the digital divide: understanding factors that impact on educators' ability to integrate technology in South African classrooms* University of Pretoria].

Mathevula, M. D., & Uwizeyimana, D. E. (2014). The challenges facing the integration of ICT in teaching and learning activities in South African rural secondary schools. *Mediterranean Journal of Social Sciences*, *5*(20), 1087. https://doi.org/10.5901/mjss.2014.v5n20p1087

Matongo, M. (2022). Teacher readiness to teach using ICT in classroom pedagogy in Zimbabwean primary schools. *Journal of African Education*, *3*(2), 45-66. https://doi.org/10.31920/2633-2930/2022/v3n2a2

Mlambo, P. B. (2023). Information and Communications Technology in Engineering Graphics and Design classrooms: A post COVID-19 era. *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: e-Saintika*, *7*(2). https://doi.org/10.36312/esaintika.v7i2.1321

Msila, V. (2015). Teacher Readiness and Information and Communications Technology (ICT) Use in Classrooms: A South African Case Study. *Creative Education*, *06*(18), 1973-1981. https://doi.org/10.4236/ce.2015.618202

Mukhari, S. (2016). Teachers' experience of information and communication technology use for teaching and learning in urban schools (DEd thesis). *Pretoria: University of South Africa*.

Mustafina, A. (2016). Teachers' Attitudes toward Technology Integration in a Kazakhstani Secondary School. *International Journal of Research in Education and Science*, *2*(2), 322-332. https://doi.org/10.21890/ijres.67928

Mwei, P. K. (2020). Teachers' Perception of Factors Affecting Integration of Information and Communication Technology for Instructional Purposes in Secondary Schools

in Kenya. *International Journal of Educational Technology and Learning*, *8*(1), 25-37. https://doi.org/10.20448/2003.81.25.37

Pultoo, A. B., Anoop & Meunier, Jean & Sheoraj, Kaviraj & Panchoo, Shabneez & Naseeven, Parveen & Ujoodha, Mohun & Roocha, Vikramsing & Rajcoomar, Hrishant & Oojorah, Avinash. (2020). Classe21. Educators' Acceptance of Technology-Enhanced Classroom Using the UTAUT Model. (14), 39-48

Quaye, F., Ametepe, W., & Annan, N. K. (2015). The Impact of ICT on Teaching and Learning in Tertiary Institutions: A Case Study of Wisconsin International University College, Ghana. *Journal of Information Engineering and Applications*, *5*(5), 8-14.

Radović-Marković, M. (2010). Advantages and disadvantages of e-learning in comparison to traditional forms of learning. *Annals of the University of Petroşani, Economics*, *10*(2), 289-298.

Raman, K., & Yamat, H. (2014). Barriers teachers face in integrating ICT during English lessons: A case study. *Malaysian Online journal of educational technology*, *2*(3), 11-19.

Ramnarain, U., Ncube, R., & Teo, T. (2023). South African Life Sciences Teachers' Pedagogical Beliefs and their Influence on Information Communication and Technology Integration. Frontiers in Education. https://doi.org/10.3389/feduc.2023.1217826

Rastogi, A., & Malhotra, S. (2013). ICT skills and attitude as determinants of ICT pedagogy integration. *European Academic Research*, *1*(3), 301-318.

Roberts, C. M. (2010). *The dissertation journey: A practical and comprehensive guide to planning, writing, and defending your dissertation*. Corwin Press. https://doi.org/10.4135/9781452219219

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research (April 10, 2016)*. https://doi.org/10.2139/ssrn.3205035

Xuan, T. T. H., Thanh, N. B. H., & Nhi, N. T. (2023). Factors affecting the flipped classroom in the educational context of Vietnam. *Journal of Education and e-Learning Research*, *10*(2), 99-110. https://doi.org/10.20448/jeelr.v10i2.4441

Yunus, M. M., & Wekke, I. S. (2009). The application of multicultural education and applying ICT on Pesantren in South Sulawesi, Indonesia.

Yusop, F. D., Habibi, A., & Razak, R. A. (2021). Factors affecting Indonesian preservice teachers' use of ICT during teaching practices through theory of planned behavior. *SAGE Open*, *11*(2), 21582440211027572. https://doi.org/10.1177/21582440211027572