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Challenges of e-learning adoption in South African public schools: Learners' perspectives

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Abstract

Educational technology (EdTech) plays a vital role in teaching and learning with e-learning ensuring equal access to education and continuity even when contact classes are impossible. The South African departments of education are making efforts to realize the use of technology in schools. The COVID-19 pandemic has an adverse impact on the education sector and accelerated the adoption of technology by many institutions with some shifting to distant learning to ensure academic continuity. There are various educational technologies. The aim of the study is to explore public high school learners' perspectives on e-learning and the challenges in its adoption. Secondary data is used to draw conclusion. An interpretivism paradigm with an exploratory sequential mixed-method approach is used. The findings show that e-learning implementation needs careful consideration and planning. The results of this study indicate that lack of access to devices, the high cost of internet access, a perceived lack of interest among teachers and perceived ineffectiveness are the key challenges to e-learning adoption in South African public schools within poor communities. Addressing key challenges will ensure a successful implementation of e-learning.

Keywords: Educational technology, E-learning, Learner perspectives, Online learning, Poor communities, Remote learning.

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Contents

Contribution of this paper to the literature

E-learning adoption has been widely studied. However, no studies have focused on learner perspectives in poor communities. This study therefore contributes to the body of knowledge in the form of literature, on e-learning adoption in poor communities. It further contributes to practice by exposing the challenges that need to be addressed to improve e-learning adoption.

1. Introduction

The emergence of the coronavirus affected every industry, forcing organizations to consider the role of technology in their operations. Various countries have taken significant steps to stop the virus's spread. In alignment with the World Health Organization precautions, gatherings were prohibited, physical contact minimized by maintaining social distancing and hygiene measures (World Health Organization, 2020). As a precaution, schools, churches and industries were closed as the economy was placed on lockdown save for essential services (Jordan, David, Phillips, & Pellini, 2021). These measures managed to flatten the curve by slowing down infections and giving the health system more time to prepare for the pandemic's peak. However, this move affected other sectors of the economy negatively.

In South Africa, the education system has been severely affected while the government has worked tirelessly to complete the academic year (Parliamentary Monitoring Group, 2020a). Attention was given to provide alternative teaching and learning modes focusing on the learner. Distant teaching and learning became the most realistic option with e-learning as the best alternative.

E- learning ensures equitable and fair access to digital and innovative learning resources (Jantjies, 2020). There is a significant digital difference that derives from apartheid's historical inequalities. The move to distant teaching and learning is inevitable due to its benefits (Tong, Wang, McBride, Kelly, & Cui, 2020) but learners from disadvantaged communities (Jantjies, 2020) may not adopt e-learning as expected. The aim of this paper is to explore the learners' perceived challenges to e-learning adoption in South African public schools.

2. Purpose of the Study

This paper investigates the challenges faced by South African public schools in disadvantaged communities in the adoption of technology specifically e-learning. The discussion is based on the learners' perspectives. It makes the following contributions to literature: By discussing the challenges, it brings insight into the realities of poor schools and learners' assistance in finding solutions. Furthermore, using lessons learned from a case study provides a different understanding and perspective on the responses of learners to technology. Since the academic process is meant to benefit the learners. It is important to consider their views on problems that affect the teaching and learning process.

3. Review of Literature

Educational technology has been introduced to enhance teaching and learning. However, even after three decades since its introduction, technology adoption in schools has faced different challenges (Mirzajani, Mahmud, Ayub, & Wong, 2016). Academic researchers have tried to establish factors that affect the acceptance and adoption of technology. Issues of adoption, acceptance and integration of Information and Communication Technology (ICT) have been discussed at different levels and platforms within the South African education context (Ostrowick, 2018; Parliamentary Monitoring Group, 2016; South African Government, 2016).Several research findings show that successful technology adoption, acceptance and integration should be required for employee engagement and proper change management (Macharia & Pelser, 2014; Tabuni & Kusuma, 2019). Literature reflects that the success or failure of any innovation is based on users' adoption and acceptance which depends on several key issues and perceptions. These issues are best understood using theories and models of adoption and acceptance including design (Kildea et al., 2019). To better understand user acceptance of new technologies, several theories and models have evolved over the years (Taherdoost, 2018) with the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) being the most widely used.

The process of teaching and learning has been affected by the introduction of technology within the educational landscape (Martin et al., 2011) as well as changes in evolving skills and knowledge needs (Ottenbreit-Leftwich, Liao, Sadik, & Ertmer, 2018). There is a further need to understand the new generation Z (Gen Z) of technologically active learners. As digital natives, Kim and Jensen (2020) postulate that they make use of technology to learn, study and develop skills necessary for the completion of their everyday social, academic and professional lives. An increasing number of learning institutions make use of e-learning (Manny-Ikan, Dagan, Tikochinski, & Zorman, 2011) with many new innovations introduced to enhance the process of teaching and learning (Kim & Jensen, 2020). The advent of COVID -19 has accelerated the adoption of e-learning by many schools worldwide. Studies have further reflected that the use of technology in education has encouraged and enhanced learner engagement. According to Martin et al. (2011), new mobile technology devices significantly improve learner engagement and participation in both indoor and outdoor activities.

In recent years, the South African government has rolled out several technology projects and programs aimed at equipping schools and preparing teachers and learners for a technology-enabled learning context (South African Government, 2016). These efforts aim to equip learners with the skills required for the digital world of work. Various interventions have sought to avail technology infrastructure, content and related skills to support teaching and learning in schools as well as decision- making processes (Ostrowick, 2018). According to reports, there have been further provincial and district projects focusing on an e-portal for their educators and learners (Parliamentary Monitoring Group, 2020b) while others have adopted data-driven decision-support systems to enhance decision-making processes (National Department of Basic Education, 2020). However, educators and learners have not fully adopted these developments due to various factors ranging from socio-economic to user related challenges. Several studies reflect the need to ensure comprehensive co-design technology approaches (Chemisto, Rivett, & Jacobs, 2016) and related adoption processes while offering proper training before rolling out

new technologies (Suárez-Rodríguez, Almerich, Orellana, & Díaz-García, 2018). This is not effectively followed when introducing new technologies in public schools.

Empirical evidence further reflects that change is not easily accepted when any form of technology is introduced in schools. The acceptance and adoption of technologies in education are often met with resistance and challenges (Edmunds, Thorpe, & Conole, 2012; Mirzajani et al., 2016). Technology has a direct impact on teaching and learning. Studies on technology adoption by teachers found that not all teachers are fully prepared to use technology, citing reasons from a lack of training particularly in underprivileged and rural schools (Christensen & Knezek, 2017; Jääskelä, Häkkinen, & Rasku-Puttonen, 2017; Jantjies & Joy, 2017; Schildkamp, Poortman, Luyten, & Ebbeler, 2017). Public schools in poor communities of South Africa are often under-equipped. Furthermore, there are cases of burglaries and robberies targeting devices, thereby disadvantaging learners' access. Thus, challenges related to technology in schools need to be explored and evaluated. An understanding of challenges can be used to improve adoption by addressing the challenges.

Jantjies and Joy (2016) discovered that the lack of technology training for teachers has prevented teachers from realizing the full potential of the use of technology to achieve learning objectives. This further affects their perception of the use of technology in education. In most schools in South Africa, Chigona, Chigona, Kausa, and Kayongo (2010), Cantrell and Visser (2011) it is challenging to integrate technology due to a lack of expertise among teachers. However, it is believed that this challenge may be overcome through proper training (Bladergroen et al., 2012; Cantrell & Visser, 2011; Chigona et al., 2010).

Studies have shown that the effect of perceptions on technology adoption cannot be overlooked (Ko, Pei, & Tsai, 2016; Lai, 2017; Scherer & Teo, 2019). Models and theories of technology adoption exist with constructs involving expectations and perceptions among others (Lai, 2017; Marangunić & Granić, 2015; Sohn & Kwon, 2020). Joo, Kim, and Kim (2016) compared students' actual use of technology to their perceived usefulness and expectations. The study found that perceived usefulness will improve the continuous use (adoption) of mobile learning (Joo et al., 2016). To improve the adoption of technology, it is therefore significant to explore and understand the expectations and perceptions of users on various aspects of the technology.

4. Methodology and Data Collection Description

To understand the perceived challenges experienced by township schools with the adoption of technology, the interpretivism paradigm was adopted. Interpretivism aims to understand how social actors participate in social processes to enact their realities give them meaning and link these meanings, beliefs and intentions to their social action (Klein & Myers, 1999). A sequential mixed-method approach to data collection and analysis was taken to fully explore the challenges. Semi-structured interviews were conducted with some participants as part of an experimental study on gamification. A thematic approach was used to analyze the data. Themes from the interviews were used to develop a questionnaire that was administered to all participants. This study was undertaken in one township within the Cape metropolitan area of South Africa. In the South African context a densely populated community is termed a "township".

4.1. Context of the Study: South African Public Schools

South African public schools are categorized according to the resources and level of financial support they need. They are classified into five groups called quintiles. Quintiles 1-3 are schools in the poorest communities and therefore are paying with 4 and 5 being fee-paying public schools. This study was done in a quintile 3 school.

4.2. Participants

This paper makes use of data collected as part of an experimental study on gamification. The sample was selected from 11th grade students using both random and non-random probability sampling. Subjects for interviews were purposively selected and the whole sample for the experimental study responded to the questionnaire. The gender distribution is shown in Table 1.

Table 1. Gender distribution of participants.

Gender	No of learners	Percentage
Male	50	49.5
Female	38	37.6
Unspecified	13	12.9
Total	101	100

5. Results and Discussion

Participants were asked whether or not they would want to engage in e-learning. The responses unanimously indicated their interest. However, they added reasons why they think e-learning is not being used. An analysis of the responses by learners on the issues they perceived as challenges to e-learning pointed out a number of key factors. Access to internet-capable devices stood out as a huge threat. Learners concur that while access is not a problem among educators, most households do not have such devices. The perceived challenges are reflected in Table 2.

Table 2. Perceived challenges to e-learning.

Factor	Male	Female	Unspecified	Percentage of total
Lack of access to devices	50	38	13	100%
The cost of data is too high	50	38	13	100%
E-learning is not effective	29	22	7	57%
Educators are not interested	27	21	6	53%

5.1. Access to Devices

All respondents indicated that access to devices is a big challenge. This is attributed to poverty as the school is in a poor community. One learner said, "Sir, there is no one working at home, we survive on grants (social services support) and sometimes there is no food". "We cannot afford a computer". A teacher's objective is to make teaching and learning easy and motivate learners. Keeping this in mind, it is therefore meaningless to teach using a platform that is inaccessible to the learners. This reason is further supported by the findings on learners' access to computers and other digital learning devices. For effective e-learning to take place, one of the requirements is the availability of devices that are compatible with online-learning applications. This study considers the basic devices that may be used to access the internet and digital learning devices. Table 3 presents the types of access to devices and their proportions.

Table 3. Learner access to devices.

*Access	No. of learners	Percentage
Full access	7	7%
Shared (Domestic)	13	13%
Shared (Public)	22	22%
None	59	58%
Total	101	100

Note: *Full access refers to owning a device that one uses without having to share. Shared domestic means having at least one device within a household that a learner has access to, and shared public means access is only through a public facility or at school.

According to interviews, learners are enthusiastic and willing to engage in e-learning. However, they raised key issues that need to be addressed first. In their view, if these issues are addressed, they should be exposed to such technologies. The most prevalent challenge among learners is access to digital learning devices. Among the 101 learners who participated, 58% have no access to any digital devices and only 7% own a smartphone, tablet, laptop or desktop computer. Further prompting revealed that 7% have full access, only 2% own laptops and the rest have smartphones. These findings are in line with other research findings. Antee (2021) states that in developing countries, learners are exposed to fewer digital literacies at home including basic skills such as accessing email causing significant challenges in education equality (Antee, 2021) . It is worrying to find out that of the 35% that have access to shared devices, 22% can only access digital learning devices either from a public school library, an internet café or a friend while the other 13% use a family member's device. In most cases, siblings use a parent's device which limits the time each one has access. With the current COVID -19 pandemic and South Africa being under lockdown, it becomes difficult for learners to access shared public devices. Without addressing the issue of access will lead to its failure. This is supported by Erdogdu and Erdogdu's study (2015) who looked at the impact of access to ICT on student success. Furthermore, access to an ICT device has a positive impact on learner performance (Erdogdu & Erdogdu, 2015).

5.2. The Data Cost is too High

All learners who participated in the study concur that it is hard for them to afford enough broadband data for e-learning. This is further supported by the fact that 93% of people do not have full access to devices. With the high cost of prepaid data, e-learning would add an extra burden to already struggling households. Due to the COVID-19 pandemic, some households have lost income especially in the informal sector. Internet access has long been considered a luxury due to prohibitive data pricing despite calls to make it a basic need (Masimbe, 2019).This supports the findings of this study which revealed that in underprivileged communities, internet access is inaccessible. In such communities, e-learning cannot be effective without proper internet access.

5.3. Effectiveness: E -Learning is not Effective

57% of the learners do not have faith in the effectiveness of e-learning. They indicated their enthusiasm and willingness to try it. They have reservations about whether or not it will be as effective as contact classes. According to Comi, Argentin, Gui, Origo, and Pagani (2017), the effectiveness of ICT in teaching and learning depends on how it is used. In this regard, the learners' argument on the effectiveness of the method can be justified since it is in line with other research findings (Comi et al., 2017). In their reasoning, they claim that they do not have conducive learning environments at home. Of the 101 learners who took part in the study, 67 live in informal settlements and 87 admitted to being overcrowded at home. All of them alluded to experience an unfavorable, disruptive environment that made it difficult to focus on their schoolwork while at home. They further state that if they get resources, they may be sold to buy food and other necessities. Evidence from previous studies points out that some learners stay in unconducive households and can only concentrate on their studies when they are away from that environment. Taking this into consideration and learners' perspectives on e-learning, one may argue that it is challenging to implement e-learning effectively under such conditions.

5.4. Lack of Interest

Educators are expected to be lifelong learners and learner-centred in their pedagogy. While this was out of the scope of this study, the majority of the learners claim that educators are not addressing their learning needs. 52% responded positively to educators not showing interest in using educational technology. In their arguments, these learners pointed out the possibility of a lack of technological skills among their educators leading to a lack of interest in using technology. These findings are in line with other studies (Christensen & Knezek, 2017; Kafyulilo, Fisser, & Voogt, 2016) advocating for teacher professional development for ICT use in the classroom. Studies have shown that professionals need to continuously develop themselves to remain relevant. It is therefore recommended for educators to empower themselves with the ICT skills necessary for teaching and learning including e-learning. This can be done through continuous professional development.

6. Limitations

This research makes use of secondary data. While the relevance to the current need for e-learning due to the COVID-19 pandemic is apparent, the data is limited and not exhaustive of the learner perspectives and challenges to e-learning since it was collected for a different study. Furthermore, it is not possible to go back and collect supplementary data from the same subject since their circumstances have changed which may influence their perspectives.

7. Summary

E-learning has not been adopted in most township high schools within the Cape Metro despite the challenges brought by the COVID-19 pandemic to the education sector. Data collected by means of semi-structured interviews and questionnaires was used to draw conclusion. There are mixed views on e-learning but it is worth noting that there is a reality that resources are a challenge for most previously disadvantaged communities. E-learning should provide fair and equitable access to learning resources. However, this is not the case due to lack of access to devices and data among the poor, the perceived lack of effectiveness of e-learning and low interest among educators.

8. Recommendations

From the findings of this study, the provision of resources to poor communities and proper educator training before implementing e-learning are recommended. It may be worth considering developing custom-made devices with zero-rated access to online learning platforms so as to address the issue of access to devices and data simultaneously. Such devices may be of no value other than accessing learning and hence the resale of such will be minimal.

References

Antee, A. (2021). Student perceptions and mobile technology adoption: Implications for lower-income students shifting to digital. *Educational Technology Research and Development*, *69*(1), 191-194. https://doi.org/10.1007/s11423-020-09855-5

Bladergroen, M., Chigona, W., Bytheway, A., Cox, S., Dumas, C., & Van Zyl, I. (2012). Educator discourses on ICT in education: A critical analysis. *International Journal of Education and Development Using Information and Communication Technology*, *8*(2).

Cantrell, S., & Visser, L. (2011). Factors influencing the integration of technology to facilitate transfer of learning processes in South African, Western Cape Province schools. *Quarterly Review of Distance Education*, *12*(4), 275-286.

Chemisto, M., Rivett, U., & Jacobs, C. (2016). *Impact of co-design and design science on adoption of an ICT solution in rural South Africa*. Paper presented at the AMCIS 2016 Proceedings.

Chigona, A., Chigona, W., Kausa, M., & Kayongo, P. (2010). An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. *International Journal of Education and Development using Information and Communication Technology*, *6*(2), 21-32.

Christensen, R., & Knezek, G. (2017). Readiness for integrating mobile learning in the classroom: Challenges, preferences and possibilities. *Computers in Human Behavior*, *76*, 112-121. https://doi.org/10.1016/j.chb.2017.07.014

Comi, S. L., Argentin, G., Gui, M., Origo, F., & Pagani, L. (2017). Is it the way they use it? Teachers, ICT and student achievement. *Economics of Education Review*, *56*, 24-39. https://doi.org/10.1016/j.econedurev.2016.11.007

Edmunds, R., Thorpe, M., & Conole, G. (2012). Student attitudes towards and use of ICT in course study, work and social activity: A technology acceptance model approach. *British Journal of Educational Technology*, *43*(1), 71-84. https://doi.org/10.1111/j.1467-8535.2010.01142.x

Erdogdu, F., & Erdogdu, E. (2015). The impact of access to ICT, student background and school/home environment on academic success of students in Turkey: An international comparative analysis. *Computers & Education*, *82*, 26-49.

Jääskelä, P., Häkkinen, P., & Rasku-Puttonen, H. (2017). Teacher beliefs regarding learning, pedagogy, and the use of technology in higher education. *Journal of Research on Technology in Education*, *49*(3-4), 198-211. https://doi.org/10.1080/15391523.2017.1343691

Jantjies, M. (2020). How South Africa can address digital inequalities in e-learning, The conversation. Retrieved from: https://theconversation.com/how-south-africa-can-address-digital-inequalities-in-e-learning-137086. [Accessed 20 May 2020].

Jantjies, M., & Joy, M. (2016). Lessons learnt from teachers' perspectives on mobile learning in South Africa with cultural and linguistic constraints. *South African Journal of Education*, *36*(3), 1–10. https://doi.org/10.15700/saje.v36n3a1274

Jantjies, M., & Joy, M. (2017). Teaching through mobile technology: A reflection from high school studies in South Africa. In Handbook of Research on Instructional Systems and Educational Technology. In (pp. 299–312): IGI Global.

Joo, Y. J., Kim, N., & Kim, N. H. (2016). Factors predicting online university students' use of a mobile learning management system (m-LMS). *Educational Technology Research and Development*, *64*(4), 611-630. https://doi.org/10.1007/s11423-016-9436-7

Jordan, K., David, R., Phillips, T., & Pellini, A. (2021). Education during the COVID-19: Crisis Opportunities and constraints of using EdTech in low-income countries. *Distance Education Magazine*, *21*(65), 1-15. https://doi.org/10.6018/red.453621

Kafyulilo, A., Fisser, P., & Voogt, J. (2016). Factors affecting teachers' continuation of technology use in teaching. *Education and Information Technologies*, *21*(6), 1535-1554. https://doi.org/10.1007/s10639-015-9398-0

Kildea, J., Battista, J., Cabral, B., Hendren, L., Herrera, D., Hijal, T., & Joseph, A. (2019). Design and development of a person-centered patient portal using participatory stakeholder co-design. *Journal of Medical Internet Research*, *21*(2), e11371. https://doi.org/10.2196/11371

Kim, J. H., & Jensen, L. J. (2020). Pedagogical cases in integrating technology into instruction: What can we do to celebrate failure? In *Handbook of Research on Innovative Pedagogies and Best Practices in Teacher Education* (pp. 140-162): IGI Global.

Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, *23*(1), 67-93. https://doi.org/10.2307/249410

Ko, C.-H., Pei, L., & Tsai, Y.-H. (2016). A study of employees' perception of information technology adoption in hotels. *International Journal of Organizational Innovation*, *8*(3), 231-238.

Lai, P. (2017). The literature review of technology adoption models and theories for the novelty technology. *JISTEM-Journal of Information Systems and Technology Management*, *14*(1), 21-38. https://doi.org/10.4301/s1807-17752017000100002

Macharia, J. K., & Pelser, T. G. (2014). Key factors that influence the diffusion and infusion of information and communication technologies in Kenyan higher education. *Studies in Higher Education*, *39*(4), 695-709. https://doi.org/10.1080/03075079.2012.729033

Manny-Ikan, E., Dagan, O., Tikochinski, T., & Zorman, R. (2011). [Chais] ysing the interactive white board in teaching and learning–an evaluation of the smart classroom pilot project. *Interdisciplinary Journal of E-Learning and Learning Objects*, *7*(1), 249-273. https://doi.org/10.28945/1523

Marangunić, N., & Granić, A. (2015). Technology acceptance model: A literature review from 1986 to 2013. *Universal Access in the Information Society*, *14*(1), 81-95. https://doi.org/10.1007/s10209-014-0348-1

Martin, S., Diaz, G., Sancristobal, E., Gil, R., Castro, M., & Peire, J. (2011). New technology trends in education: Seven years of forecasts and convergence. *Computers & Education*, *57*(3), 1893-1906. https://doi.org/10.1016/j.compedu.2011.04.003

Masimbe, C. (2019). *Mobile internet access and affordability among youth in South Africa: Rethinking universal service and access in the age of "digital mobility"*. South Africa: University of Limpopo.

Mirzajani, H., Mahmud, R., Ayub, A. F. M., & Wong, S. L. (2016). Teachers' acceptance of ICT and its integration in the classroom. *Quality Assurance in Education, 24*(1), 26-40. https://doi.org/10.1108/qae-06-2014-0025

National Department of Basic Education. (2020). The data driven dashboard– providing instant online access to education-related data. Retrieved from: https://www.education.gov.za/ArchivedDocuments/ArchivedArticles/TheDataDrivenDashboard.aspx. [Accessed 18 June 2020].

Ostrowick, J. (2018). *Empowering teachers to use ICTS in South Africa.* Moscow, Russia: Global Dialogue On Ict And Education Innovation.

Ottenbreit-Leftwich, A., Liao, J. Y.-C., Sadik, O., & Ertmer, P. (2018). Evolution of teachers' technology integration knowledge, beliefs, and practices: How can we support beginning teachers use of technology? *Journal of Research on Technology in Education, 50*(4), 282-304. https://doi.org/10.1080/15391523.2018.1487350

Parliamentary Monitoring Group. (2016). Provision of ICT in schools: Department of basic education & department of telecommunications and postal services briefing. Retrieved from: https://pmg.org.za/committee-meeting/22096/. [Accessed 18 June 2020].

Parliamentary Monitoring Group. (2020a). COVID-19 update & DBE 2020/21 annual performance plan; With ministry | PMG. Retrieved from: https://pmg.org.za/committee-meeting/30135/. [Accessed 22 May 2020].

Parliamentary Monitoring Group. (2020b). ICT roll-Out: Department of basic education briefing; Coronavirus measures | PMG. Retrieved from: https://pmg.org.za/committee-meeting/30052/. [Accessed 18 June 2020].

Scherer, R., & Teo, T. (2019). Unpacking teachers' intentions to integrate technology: A meta-analysis. *Educational Research Review, 27*(1), 90-109. https://doi.org/10.1016/j.edurev.2019.03.001

Schildkamp, K., Poortman, C., Luyten, H., & Ebbeler, J. (2017). Factors promoting and hindering data-based decision making in schools. *School Effectiveness and School Improvement, 28*(2), 242-258. https://doi.org/10.1080/09243453.2016.1256901

Sohn, K., & Kwon, O. (2020). Technology acceptance theories and factors influencing artificial intelligence-based intelligent products. *Telematics and Informatics, 47*(101324), 1–14. https://doi.org/10.1016/j.tele.2019.101324

South African Government. (2016). Parliament welcomes progress in ICT schools-connect project | South African government, South african Government. Retrieved from: https://www.gov.za/speeches/progress-ict-schools-connect-project-1-mar-2016-0000. [Accessed: 18 June 2020].

Suárez-Rodríguez, J., Almerich, G., Orellana, N., & Díaz-García, I. (2018). A basic model of integration of ICT by teachers: Competence and use. *Educational Technology Research and Development, 66*(5), 1165-1187. https://doi.org/10.1007/s11423-018-9591-0

Tabuni, Y., & Kusuma, P. G. (2019). Evaluation of e-government use among civil servants using unified theory of acceptance and use of technology model-a case of central mamberamo regency. *International Journal of Scientific & Technology Research, 8*(09), 1624–1631.

Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing, 22,* 960-967. https://doi.org/10.1016/j.promfg.2018.03.137

Tong, R., Wang, S., McBride, E., Kelly, H., & Cui, W. (2020). Data, mark of a new era. In radical solutions and learning analytics. In (pp. 17-35). Singapore: Springer.

World Health Organization. (2020). Considerations for mass gatherings in the context of COVID-19: Annex: Considerations in adjusting public health and social measures in the context of COVID-19. Retrieved from: https://www.who.int/publications/i/item/considerations-for-mass-gatherings-in-the-context-of-covid-19-annex-considerations-in-adjusting-public-health-and-social-measures-in-the-context-of-covid-19. [Accessed 18 June 2020].