EFFECTS OF ICT ON TVET EDUCATION DURING THE COVID-19 PANDEMIC

MUSTAPHA Aliyu, ABDULKADIR Mohammed, HASSAN Abdullahi Mohammed
Industrial and Technology Education Department,
Federal University of Technology Minna

RAJI, Abdullahi Egigogo
Department of Software Engineering and Cyber Security,
Al-Qalam University Katsina

MUSA Abdurrahaman Ewugi
Automobile Technology Department,
Niger State College of Education Minna

Abstract
Every aspect of modern life has been impacted by technology, including education. Today, technology can offer various formal and non-formal online learning opportunities globally. Technology breakthroughs have made learning to go beyond the traditional classroom and now occur in various virtual classrooms where the teacher and students are physically apart. This has made the scope of learning opportunities unprecedented. Today, technology breakthroughs and access to learning opportunities are unprecedented in scope. In light of the Coronavirus (COVID-19) pandemic, the primary goal of this research is to elaborate on the crucial role that ICT plays in Technical Vocational Education and Training (TVET) education. This is because TVET is one of the critical sectors where Information Communication Technology (ICT) integration can boost productivity. This paper outlines the benefits of ICT adoption for school administration, teachers, and students. A conceptual analysis of the factors influencing ICT usage from the perspectives of teachers, students, schools, and society is also included in this study. The findings of this study include, among others, that ICT played a critical role in teaching and learning during the outbreak. However, several issues in the implementation process, such as teacher mindset and economic level, remain unsatisfactory.

Keywords: COVID-19 Pandemic**,** ICT**,** Learning**,** Teaching & TVET

Introduction

With the advancement of technology, information and communication technology (ICT) is becoming increasingly crucial in our daily lives. ICT is a broad term that refers to a collection of resources and technology used for communication. ICT integration, particularly in education, significantly increases students' academic performance

(Iglesias-Pradas et al., 2021). The integration of ICT has impacted the globe in various ways during the last few decades. As ICT technology advances, people progressively incorporate ICT into different disciplines, such as industries, public and private sectors, economic growth, and education (Yang & Gu, 2021).

When ICT is integrated into advanced tools in factories and industries, workers can use advanced machines to help them increase production efficiency and effectiveness (Kelley et al., 2020); when ICT is applied to management systems, digital library management systems are beneficial to improving library management efficiency (Ho & Kuvaas, 2020); As a result, the proper use of ICT may assist all industries in enhancing their production and management, consequently boosting their worldwide competitiveness. A country's total ICT level grows swiftly, which benefits the country's overall long-term economic growth. With the growth and popularity of online education in recent years, more and more academics have begun to recognize the relevance of ICT integration in education. When ICT is integrated into classrooms, interesting online education applications can be practical (Nartiningrum & Nugroho, 2020). One of the primary areas in education where ICT integration might improve productivity is Technical, Vocational Education and Training (TVET).

TVET is an essential avenue for college students' skill development. Furthermore, TVET has grown in importance to ensure students' lifelong learning. One of the most essential aspects of ICT integration that has a beneficial influence on TVET education is the availability and utilization of Open Educational Resources (OER). This is because OER considerably assists teachers' growth by allowing them to apply innovative, flexible learning methods to improve TVET students' skills, education and training

(Yeap et al., 2021). Furthermore, incorporating ICT into TVET education can provide instructors access to infinite outside resources. To provide an education system that fulfils all of the labour and industry objectives, vocational education reform that began in 2013 focuses on industrial or technical abilities and increases work chances for students' professional growth (Okolie et al., 2020). Education institutions, particularly those involved in training, produce qualified workers and excellent human capital for the future using the TVET education system.

ICT integration in the classroom has a long history of the study. Incorporating ICT into the classroom can significantly improve classroom structure and administration (Hayes et al., 2020). ICT is one of the most potent weapons of educational reform and revolution (Yang & Gu, 2021). It is being used more and more successfully in teaching, learning, and evaluation. According to Bera (2015), combining ICT with the teaching process may help education evolve better, promote equity in education, enhance teaching quality, and encourage professional development.

Furthermore, integrating ICT into TVET is critical for improving the outcomes of TVET students. Courses in TVET assist students in learning 21st-century skills like problem-solving and critical thinking (Mutohhari et al., 2021). These hands-on classes can help students get the skills needed for their future careers while also increasing their employability. The sudden emergence of COVID-19 has made the importance of ICT in education more obvious. ICT was essential in supporting teaching and learning throughout the outbreak.

Even though the integration of ICT and education has a long history of constant innovation, COVID-19 has been wreaking havoc on countries throughout the world's

economic and educational progress since its abrupt emergence in December 2019 (Song & Zhou, 2020). To avert the virus's continued and fast spread, nations worldwide have launched school closures worldwide. The federal, state and local government has also established related laws, urging people to minimize gatherings and travel to prevent the virus from spreading from person to person. During the epidemic, activities such as attending class, working, and shopping were suspended (Jiang et al., 2021). The global suspension of courses, on the other hand, has had a significant impact on the development of education in countries all over the world.

2. Problem Statement

Since the first case was identified in 2019 and the global outbreak started in 2020, one of the world's most pressing health issues now is COVID-19 (Yezli & Khan, 2020). Many actions have been implemented in order to effectively stop the development of COVID-19, including social withdrawal, border control, and closing of schools (Karasmanaki & Tsantopoulos, 2021). Vaccinations have undoubtedly significantly altered our lives and behaviors in many ways, including our involvement in physical activity, our interactions with friends, and the teaching and learning processes at educational institutions, despite the fact that they were introduced to combat the COVID-19 pandemic (Dutta & Smita, 2020).

As a result of COVID-19's sudden emergence, the importance of ICT in education has become increasingly visible. ICT played a crucial role in supporting teaching and learning during the pandemic. However, obstacles and roadblocks in the implementation process, such as teacher mentality and financial status, remain unsatisfactory. At the same time, TVET education must be handled seriously as one of

the most essential fields of education (Ghavifekr & Yulin, 2021). Many poor or disadvantaged children lost access to school and training during COVID-19 because of the abrupt stoppage of education.

Furthermore, during COVID-19, the abrupt stoppage of TVET education had severe consequences for society (Shyamal Majumdar & Iñigo Araiztegui, 2020). Due to the unexpected blockage, many individuals have lost their jobs and even gone hungry. To solve the food and clothing dilemma, these artisans cannot balance revenue and spending and commit unlawful and criminal activities such as robbery and kidnapping, increasing worldwide crime rates. The aim of this study is to determine the effects of ict on tvet education during the covid-19 pandemic. The following are the precise goals that this study aspires to achieve:

1. Elaborate on the critical role of ICT in education
2. Offer an overview of the advantages of incorporating ICT into TVET education.
3. provide a conceptual overview of the factors that influence ICT usage from various perspectives, such as instructors, students, schools, and society,

2. Methods

The findings of relevant resources on ICT use in education were summarized using a conceptual review approach in this study. Through a complete, critical, and objective investigation, this approach assisted in gaining valuable knowledge about the issue. The narrative review, an essential aspect of this research, assisted in developing a theoretical and conceptual framework for the use of technology in TVET education. The narrative review assisted the researchers in achieving the study's goals, which included expanding on the critical significance of ICT in TVET education. It also emphasized a

conceptual assessment of the elements influencing ICT usage from multiple perspectives, including instructors, students, schools, and society.

3. Results and Discussion

3.1 Benefits of Using ICT in Education

In recent years, there has been a growth in the amount of literature on the use of ICT in education. There are three categories of ICT beneficiaries: teachers, students, and school administration. (Li et al., 2020). This study also provides an outline of these three factors:

3.1.1 Uses of ICT by Teachers during COVID-19 pandemic

i. **Support teaching:** Using ICT resources in the educational process can aid instructors in providing high-quality instruction (Mishra et al., 2020). Using a virtual teaching environment (VLE) may give instructors effective and easy virtual classrooms, which can assist teachers in better conducting teaching and classroom management, especially during epidemic periods (Ghavifekr & Yulin, 2021). Furthermore, according to Niem et al. (2020), using ICT in education makes lesson preparation easier for instructors. Teachers can utilize ICT tools like PowerPoint, Google Classroom, and interactive whiteboards to help them prepare for exams.

ii. **Promote relationship:** According to Jiang et al. (2021), integrating ICT into education is conducive to enhancing students' interest in studying, mainly by deploying high-quality applications that may significantly increase students' academic performance. When student performance improves, teacher evaluations and teacher evaluations will improve dramatically (Gonzalez et al., 2020). Meanwhile, (Hew et al., 2021) conducted research in South Korea and

found that students are enthusiastic about flipped classrooms. This level of passion can motivate learners to become more engaged in their studies and promote cooperative relationships between instructors and students.

iii. **Enhance the quality of instruction**: The growth of ICT in education contributes to the enrichment of educational resources available to students and instructors (Wen et al., 2021). Most teaching resources, particularly during the pandemic, are available online (Umar & Ko, 2022). The disparity in teaching resources between urban and rural areas has narrowed significantly due to this policy because all schools have equitable access to high-quality educational materials like open ICT resources. Hence, the continued growth of ICT is beneficial in closing the gap in education resource allocation between urban and rural areas. At the same time, it provides a terrific opportunity for rural instructors to get more educational materials.

3.1.2 Uses of ICT by Students during COVID-19 Pandemic

i. **Student-centered:** ICT in the classroom necessitates a shift in mindset from teacher-centred to student-centred (Díaz, 2020). Using ICT to learn is a self-directed activity. Because all pupils have computer access, the instructor cannot monitor everyone's dynamic engagement. Students must be able to study alone and maintain tight self-control to avoid distractions from the online world, such as pornographic websites and games when using ICT (Abusalim et al., 2020). ICT can assist pupils in improving their ability to learn on their own.

ii. **Conducive to the growth of a student's abilities:** Long-distance synchronous learning can inspire timid students to share their thoughts and answer questions.

Teachers can also engage in online connections through various fun, interactive tools (Jiang et al., 2021). Active engagement in class can help pupils enhance their learning and thinking skills. According to Hatmanto and Purwanti (2021), optimal ICT integration in the teaching and learning process stimulates students' interest in ICT while also guiding them to master ICT skills independently. Therefore, incorporating ICT into the classroom can aid students in developing their ICT leadership skills. ICT skills are vital not just for study but also for future jobs.

iii. **Create a more conducive learning environment:** The integration of ICT has allowed tens of millions of children who had been driven out of school to return to school (Fontenelle-Tereshchuk, 2021). The use of ICT technology provides a secure learning environment for children unable to attend school due to the outbreak (Lorente et al., 2020). The virtual teaching environment provides a safe and effective atmosphere for students who were forced to miss school due to the outbreak. Furthermore, even when there is no epidemic, online asynchronous learning options (Huang et al., 2020).

3.1.3 Uses of ICT by School Management during COVID-19 Pandemic

According to Caliskan and Zhu (2020), ICT has been more successfully employed in teaching, learning, and evaluation as a potent instrument for educational innovations and reforms. According to Ermenc et al. (2021), combining ICT with education benefits teachers' professional growth. ICT is beneficial to teacher team development for school leaders. Furthermore, according to the Ministry of Education of China's notice on informatization education, government departments at all levels have completed informatization construction work, which will assist managers in better managing the

entire department (Song & Zhou, 2020). At the same time, ICT can help with technological issues.

4. Factors Affecting ICT Use in the classroom

The primary factors influencing the usage of ICT in education may be broken down into four groups:

4.1 Teacher Aspect: According to Guillén-Gámez and Mayorga-Fernández (2020), teachers' attitudes regarding ICT significantly impact the ICT use's success. ICT integration is only regarded as successful when instructors are willing to accept change (Hakim, 2020). As a result, the teacher's perspective is critical for ICT integration. According to a study by Anderson and Putman (2020), the attitude of teachers is a critical component impacting the effectiveness of ICT integration and the role of teachers' mindset in teachers' technology usage. Integration outcomes will be significantly harmed if teachers have a nasty attitude toward using ICT. Much research has been conducted on the efficacy of instructors with ICT. Goh and Sigala (2020) stressed the link between the capacity of the teacher and the impact of ICT integration. Park and Son (2020) agree that instructors have a critical and complex role in using ICT in teaching and learning. Teachers serve as learners and instructors in the information transfer process (Carless, 2020). As a result, instructors must ensure that they assist students in creating a positive learning atmosphere while ensuring that the teaching content and curriculum are successful.

4.2 Student Aspect: Students are major benefactors of ICT integration in education. Students' attitudes have a significant role in the success of ICT use in education. According to research by Tian and Xiong (2020), low-performing students in online classrooms were only 48.9% happy amid the current pandemic crisis. This demonstrates

that a student's mindset directly impacts their academic success. Learning ICT is more challenging for kids who lack self-discipline (Babinčáková & Bernard, 2020).

4.3 School Aspect: The school is undoubtedly one of the significant determinants of ICT integration in education. According to Goh and Sigala (2020), the successful integration of ICT necessitates a suitable learning environment. Although all classes during the epidemic will be online, schools should monitor and govern the virtual teaching and learning environment and the online platforms utilized by instructors. Furthermore, at the school level, staff collaboration and satisfaction are also criteria for ICT integration eligibility (Karasmanaki & Tsantopoulos, 2021). School leaders have to be good at what they do and also have to be good at what they say.

4.4 Social Aspect: The quality of online education has always been influenced by network speed, accessibility, security, and dependability, especially during the epidemic. According to World Bank data, because everyone needs to study offline to online during the pandemic, even the best education system and economic level will not be able to accomplish such a large-scale transition (Abusalim et al., 2020).

5. Conclusion

To cap it all, ICT is critical for education stakeholders such as students, instructors, and administrators. However, due to the COVID-19 pandemic, the importance of ICT in education has grown even more. With the quick advancement of ICT, many issues have emerged to obstruct it. As a result, this paper examines the problem from various perspectives and firmly believes that our society will improve with the continued advancement of ICT.

References

Abusalim, N., Rayyan, M., Jarrah, M., & Sharab, M. (2020). Institutional adoption of blended learning on a budget. *International Journal of Educational Management*, *34*(7), 1203–1220. https://doi.org/10.1108/IJEM-08-2019-0326

Anderson, S. E., & Putman, R. S. (2020). Special Education Teachers' Experience, Confidence, Beliefs, and Knowledge About Integrating Technology. *Journal of Special Education Technology*, *35*(1), 37–50. https://doi.org/10.1177/0162643419836409

Babinčáková, M., & Bernard, P. (2020). Online experimentation during covid-19 secondary school closures: Teaching methods and student perceptions. *Journal of Chemical Education*, *97*(9), 3295–3300. https://doi.org/10.1021/acs.jchemed.0c00748

Bera, S. (2015). Enhancing Quality of Teaching Learning By Using Information and Communication Technology (Ict). *Researchgate.Net*, *3*, 100–101. www.srjis.com

Caliskan, A., & Zhu, C. (2020). Organizational culture and educational innovations in Turkish higher education: Perceptions and reactions of students. *Educational Sciences: Theory and Practice*, *20*(1), 20–39. https://doi.org/10.12738/jestp.2020.1.003

Carless, D. (2020). From teacher transmission of information to student feedback literacy: Activating the learner role in feedback processes. *Active Learning in Higher Education*. https://doi.org/10.1177/1469787420945845

Díaz, J. P. (2020). *Student-Centred Learning in CLIL Physical Education*. http://tauja.ujaen.es/handle/10953.1/13063

Dutta, S., & Smita, M. K. (2020). The Impact of COVID-19 Pandemic on Tertiary Education in Bangladesh: Students' Perspectives. *Open Journal of Social Sciences*, *08*(09), 53–68. https://doi.org/10.4236/jss.2020.89004

Ermenc, K. S., Kalin, J., & Mažgon, J. (2021). How to Run an Empty School: The Experience of Slovenian School Heads During the COVID-19 Pandemic. *SAGE Open*, *11*(3). https://doi.org/10.1177/21582440211032154

Fontenelle-Tereshchuk, D. (2021). 'Homeschooling' and the COVID-19 Crisis: The Insights of Parents on Curriculum and Remote Learning. *Interchange*, *52*(2), 167–191. https://doi.org/10.1007/s10780-021-09420-w

Ghavifekr, S., & Yulin, S. (2021). Role of ICT in TVET Education: Teaching & Learning amid COVID-19 Pandemic. *International Journal of Advanced Research in Education and Society*, *3*(1), 119–131. http://myjms.mohe.gov.my/index.php/ijares

Goh, E., & Sigala, M. (2020). Integrating Information & Communication Technologies

(ICT) into classroom instruction: teaching tips for hospitality educators from a diffusion of innovation approach. *Journal of Teaching in Travel and Tourism*, *20*(2), 156–165. https://doi.org/10.1080/15313220.2020.1740636

Gonzalez, T., De la Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PLoS ONE*, *15*(10 October). https://doi.org/10.1371/journal.pone.0239490

Guillén-Gámez, F. D., & Mayorga-Fernández, M. J. (2020). Identification of variables that predict teachers' attitudes toward ict in higher education for teaching and research: A study with regression. *Sustainability (Switzerland)*, *12*(4). https://doi.org/10.3390/su12041312

Hakim, B. (2020). Technology Integrated Online Classrooms and the Challenges Faced by the EFL Teachers in Saudi Arabia during the COVID-19 Pandemic. *International Journal of Applied Linguistics and English Literature*, *9*(5), 33. https://doi.org/10.7575/aiac.ijalel.v.9n.5p.33

Hatmanto, E. D., & Purwanti, E. (2021). Teacher education: relevance of ICT in transforming teaching and learning. *Journal.Ump.Edu.My*. https://doi.org/10.15282/ijleal.v10.3945

Hayes, D., Mills, M., Christie, P., & Lingard, B. (2020). Teachers and schooling making a difference: Productive pedagogies, assessment and performance. *Teachers and Schooling Making A Difference: Productive Pedagogies, Assessment and Performance*, 1–256. https://doi.org/10.4324/9781003117643

Hew, K. F., Bai, S., Dawson, P., & Lo, C. K. (2021). Meta-analyses of flipped classroom studies: A review of methodology. *Educational Research Review*, *33*. https://doi.org/10.1016/j.edurev.2021.100393

Ho, H., & Kuvaas, B. (2020). Human resource management systems, employee well-being, and firm performance from the mutual gains and critical perspectives: The well-being paradox. *Human Resource Management*, *59*(3), 235–253. https://doi.org/10.1002/hrm.21990

Huang, R., Yang, J., & Chang, T. (2020). Guidance on Flexible Learning during Campus Closures : Ensuring course quality of higher education in COVID-19 outbreak Rights and Permissions Please cite the work as follows. *Smart Learning Institute of Beijing Normal University*, *May*. https://www.researchgate.net/profile/Tingwen-Chang/publication/341266514_Guidance_on_Flexible_Learning_during_Campus_Closures_Ensuring_course_quality_of_higher_education_in_COVID-19_outbreak_Rights_and_Permissions_Please_cite_the_work_as_follows/links/5eb

Iglesias-Pradas, S., Hernández-García, Á., Chaparro-Peláez, J., & Prieto, J. L. (2021). Emergency remote teaching and students' academic performance in higher

education during the COVID-19 pandemic: A case study. *Computers in Human Behavior*, *119*. https://doi.org/10.1016/j.chb.2021.106713

Jiang, B., He, J., Chen, J., Larsen, L., & Wang, H. (2021). Perceived Green at Speed: A Simulated Driving Experiment Raises New Questions for Attention Restoration Theory and Stress Reduction Theory. *Environment and Behavior*, *53*(3), 296–335. https://doi.org/10.1177/0013916520947111

Jiang, Z., Wu, H., Cheng, H., Wang, W., Xie, A., & Fitzgerald, S. R. (2021). Twelve tips for teaching medical students online under COVID-19. *Medical Education Online*, *26*(1). https://doi.org/10.1080/10872981.2020.1854066

Karasmanaki, E., & Tsantopoulos, G. (2021). Impacts of social distancing during COVID-19 pandemic on the daily life of forestry students. *Children and Youth Services Review*, *120*. https://doi.org/10.1016/j.childyouth.2020.105781

Kelley, T. R., Knowles, J. G., Holland, J. D., & Han, J. (2020). Increasing high school teachers self-efficacy for integrated STEM instruction through a collaborative community of practice. *International Journal of STEM Education*, *7*(1). https://doi.org/10.1186/s40594-020-00211-w

Lorente, L. M. L., Arrabal, A. A., & Pulido-Montes, C. (2020). The right to education and ict during covid-19: An international perspective. *Sustainability (Switzerland)*, *12*(21), 1–17. https://doi.org/10.3390/su12219091

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, *1*, 100012. https://doi.org/10.1016/j.ijedro.2020.100012

Mutohhari, F., Sutiman, S., Nurtanto, M., Kholifah, N., & Samsudin, A. (2021). Difficulties in implementing 21st century skills competence in vocational education learning. *International Journal of Evaluation and Research in Education*, *10*(4), 1229–1236. https://doi.org/10.11591/ijere.v10i4.22028

Nartiningrum, N., & Nugroho, A. (2020). Online Learning amidst Global Pandemic: EFL Students' Challenges, Suggestions, and Needed Materials. *ENGLISH FRANCA : Academic Journal of English Language and Education*, *4*(2), 115. https://doi.org/10.29240/ef.v4i2.1494

Niem, M. M., Veriña Veriña Veriñ, R. U., & Alcantara, E. C. (2020). Teaching and Learning with Technology: Ramification of ICT Integration in Mathematics Education. *Southeast Asian Mathematics Education Journal*, *10*(1), 27–40. https://doi.org/10.46517/seamej.v10i1.83

Okolie, U. C., Nwajiuba, C. A., Binuomote, M. O., Ehiobuche, C., Igu, N. C. N., & Ajoke, O. S. (2020). Career training with mentoring programs in higher education: Facilitating career development and employability of graduates. *Education and Training*, *62*(3), 214–234. https://doi.org/10.1108/ET-04-2019-0071

Park, M., & Son, J. B. (2020). Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*. https://doi.org/10.1080/02188791.2020.1815649

Shyamal Majumdar & Iñigo Araiztegui, T. (2020). *Technical Vocational Education & Training – reflections on the issues facing TVET and its potential in the time of COVID-19*. *2019*, 1–27. www.linkedIn.com/in/shyamalmajumdar

Song, L., & Zhou, Y. (2020). The COVID-19 Pandemic and Its Impact on the Global Economy: What Does It Take to Turn Crisis into Opportunity? *China and World Economy*, *28*(4), 1–25. https://doi.org/10.1111/cwe.12349

Umar, M., & Ko, I. (2022). E-Learning: Direct Effect of Student Learning Effectiveness and Engagement through Project-Based Learning, Team Cohesion, and Flipped Learning during the COVID-19 Pandemic. *Sustainability (Switzerland)*, *14*(3). https://doi.org/10.3390/su14031724

Wen, Y., Gwendoline, C. L. Q., & Lau, S. Y. (2021). ICT-Supported Home-Based Learning in K-12: a Systematic Review of Research and Implementation. *TechTrends*, *65*(3), 371–378. https://doi.org/10.1007/s11528-020-00570-9

Yang, F., & Gu, S. (2021). Industry 4.0, a revolution that requires technology and national strategies. *Complex & Intelligent Systems*, *7*(3), 1311–1325. https://doi.org/10.1007/s40747-020-00267-9

Yeap, C. F., Suhaimi, N., & Nasir, M. K. M. (2021). Issues, Challenges, and Suggestions for Empowering Technical Vocational Education and Training Education during the COVID-19 Pandemic in Malaysia. *Creative Education*, *12*(08), 1818–1839. https://doi.org/10.4236/ce.2021.128138

Yezli, S., & Khan, A. (2020). COVID-19 social distancing in the Kingdom of Saudi Arabia: Bold measures in the face of political, economic, social and religious challenges. *Travel Medicine and Infectious Disease*, *37*. https://doi.org/10.1016/j.tmaid.2020.101692

Zhou, L., Li, F., Wu, S., & Zhou, M. (2020). "School's Out, But Class's On", The Largest Online Education in the World Today: Taking China's Practical Exploration During The COVID-19 Epidemic Prevention and Control as an Example. *Best Evidence of Chinese Education*, *4*(2), 501–519. https://doi.org/10.15354/bece.20.ar023