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Blended Learning Approach in TVET Colleges: Lecturers and Students Perceptions of Teaching and Learning Practical Subjects Online

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ABSTRACT

With the advent of artificial intelligence, institutions are now adopting the Blended learning approach, which infuses face-to-face strategies and online teaching methodologies. A blended learning approach is a way to enhance the quality of teaching and learning in higher education institutions, but how feasible is that in TVET Colleges? This study thus investigated the global perceptions of lecturers and students in Technical Vocational Education (TVET) colleges regarding Blended learning for teaching practical subjects online. It examined the challenges and opportunities of moving practical learning online, considering the unique requirements of first-hand subjects like Electrical Engineering, Tourism, Hospitality, Art, and Design. The study utilised articles from Google Scholar and Science Direct databases to comprehensively understand the effectiveness of Blended learning in the TVET context. Using Blended learning as a theoretical framework, a new methodological approach, and a promising blueprint for transforming higher education, the study adopted an integrative literature review methodology to synthesise identified cases and draw themes from the survey. The study brings new knowledge regarding the significant shift in online learning usage during and after the COVID-19 pandemic, particularly in vocational education, providing valuable insights for designing effective online learning strategies.

Keywords: *Artificial Intelligence, Blended Learning, Integrative Literature Review, Technical Vocational Education (TVET) Colleges*

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INTRODUCTION

Technical and Vocational Education and Training (TVET) colleges emphasise practical and lab-based teaching and learning.[1] These colleges aim to provide students with the knowledge and skills necessary for employment and self-employment.[2] The United Nations Educational, Scientific and Cultural

[1] Heila Lotz-Sisitka et al., "TVET SI: Evaluating Boundary Crossing Social Learning in Vocational Education and Training: A Value Creation Approach," *Southern African Journal of Environmental Education* 39 (2023); Tanya Smit and Suzanne Bester, "TVET Leaders' Experiences of an Enquiry-Based Blended-Learning Programme," *Journal of Vocational, Adult and Continuing Education and Training* 5, no. 1 (2022): 136–55.
[2] Simon McGrath and Jo-Anna Russon, "TVET SI: Towards Sustainable Vocational Education and Training: Thinking beyond the Formal," *Southern African Journal of Environmental Education* 39 (2023).

Organization advocates that TVET colleges develop individuals and societies, promote understanding of human rights, foster inclusion, promote cultural diversity, support social and economic participation, and contribute to sustainable development and peace.[3] Thus, UNESCO calls for TVET colleges to achieve Sustainable Development Goal (SDG) 4 (Quality Education) and emphasises the vital role of TVET colleges in achieving the SDGs, particularly in areas of quality education, which will promote decent work, economic growth, and no poverty.

With efforts to promote sustainability and environmental awareness in TVET, there has been a shift to focus on skills for sustainable production and green skills.[4] TVET Colleges are practically oriented learning centres, yet during and after COVID-19, there was a need to migrate to online learning. Moreover, the proliferation of technology has forced the education sector to adopt technology for its learning and teaching, giving rise to the sudden rise of blended learning in TVET colleges. Blended learning is not a new phenomenon but has long been in operation, only that TVET Colleges would not exactly venture into that pedagogy because of the practical component of most of the programs offered. Most TVET colleges focus on the hindrances of blended learning, not the possibilities.

There are challenges in implementing TVET education, such as limited resources, equipment, and infrastructure, which can hinder the development of practical knowledge and skills.[5] These challenges and the exponential growth of digital technologies for education and our daily lives are how TVET colleges and students handle the new blended learning approach. In addition, Covid-19 forced institutions to migrate to online learning, forcing educationists to ponder the question of how feasible it is to teach practical subjects online. Hence, this study attempts to understand TVET Colleges' use of Blended learning from students' and lecturers' perceptions.

LITERATURE REVIEW

Technical Vocational Education and Training (TVET) landscape

The TVET program has long been rooted in the medieval European apprenticeship system, offering theoretical and educational training that empowers individuals with the skills and knowledge needed for specific occupations or trades and has evolved with industrialisation and formalisation.[6] Indonesia has made considerable progress in developing a TVET system, with the government implementing policies to improve the quality and applicability of TVET educational programmes. UNESCO holds that Technical and Vocational Education and Training (TVET) is an all-inclusive education system that aspires to equip individuals with the essential skills and know-how to secure and maintain employment.[7] It combines formal, informal, and non-formal learning, integrating technology, sciences, practical skills, attitudes, and information about jobs in various sectors. TVET organisations are seen as workplace suppliers addressing sustainable issues. It has catalysed national development in industrialised countries, enhancing economic growth, industrial expansion, and competitiveness. As a result, TVET colleges are considered essential to the country's higher education system.

In Africa, TVET education plays a crucial role in empowering individuals with the skills needed for the workforce and promoting sustainable development. South Africa categorises TVET colleges as higher education providers alongside universities. TVET Colleges have been functional in

[3] UNESCO, " General Conference, 38th Session. "Recommendation Concerning Technical and Vocational Education and Training. " (Paris, November 13, 2015).
[4] Oluwaseyi OPESEMOWO et al., "Differential Bundle Functioning of National Examinations Council Mathematics Test Items: An Exploratory Structural Equation Modelling Approach," *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi* 14, no. 1 (March 25, 2023): 1–18, https://doi.org/10.21031/epod.1142713.
[5] Lotz-Sisitka et al., "TVET SI: Evaluating Boundary Crossing Social Learning in Vocational Education and Training: A Value Creation Approach."
[6] Muhammad Ali, Bruri Triyono, and Thomas Koehler, "Evaluation of Indonesian Technical and Vocational Education in Addressing the Gap in Job Skills Required by Industry," in *2020 Third International Conference on Vocational Education and Electrical Engineering (ICVEE)* (IEEE, 2020), 1–6.
[7] UNESCO, "Sub Education Policy Review Report. Technical Vocational and Education Training (TVET).," 2021.

South Africa since the 1800s.[8] The need for technical education rose in the late 1800s due to industry expansion. This policy statement supplied the guiding ideas and vision for creating the new education and training system. The 2002 development of the TVET college sector was made possible by the legal framework provided by the Further Education and Training (FET) Act 98 of 1998. One hundred fifty-two previous technical colleges were replaced with 50 multi-site TVET colleges dispersed throughout South Africa's nine provinces through a merger procedure. The Department of Education announced that the curriculum was to reflect contemporary events.

The primary goal of TVET colleges in South Africa is to prepare youth for the workforce by imparting skills, information, and attitudes. They provide practical training and skills development in engineering, information technology, business studies, agriculture, hospitality, and tourism.[9] These colleges offer shorter, specialised courses, apprenticeships, and vocational qualifications, preparing students for specific careers and allowing them to gain practical experience and make connections that can help them. They are crucial for lifelong learning and offer various learning opportunities, including full-time, part-time, Blended, and short learning programs.

Blended Learning

Blended learning as a theoretical framework is defined as a method which integrates classroom and online education, applying theories like Complex Adaptive Blended Learning System CABLES framework, behaviourism, and constructivism to create a well-planned and practical learning approach.[10] The broad use of the term is sometimes equated to learning, which mixes in-person classes with online study and lets students have some say in their learning while also needing good planning and tools to work well. This theory anchors on face-to-face instruction/learning, digital or online instruction/learning, control over learning, and integrating learning environments.[11]

Raban and Mayisela define *blended learning as combining online educational materials and opportunities for online interaction* with traditional place-based classroom methods.[12] Despite common understandings, Blended learning used in different contexts implies different perceptions. According to Hashim and Hamidon, a Blended learning approach integrates classroom learning with online materials. This definition considers technology and classroom content, making it relevant.[13] This is through technology usage, on-the-job training, and live, flexible learning activities. This definition considers practical subjects by mentioning on-the-job training. Graham and Halverson assert that Blended learning, popularised in the early 2000s, is an innovative educational approach that combines online and in-person learning.[14] A study by Graham and Halverson cautions that the definition of Blended learning is contextually based, although it is universally recognised as combining online and in-person education.[15] Definitions vary by institution and researcher needs. This makes it a flexible concept that adapts to different educational environments. Hrastinski described Blended learning as an umbrella term for technology-based and physical learning.[16] On the other hand, Dziuban

[8] S. Mphatsoe, "A Different Approach: Technical-Vocational Education and Training," *Mail and Guardian*, February 16, 2023, https://mg.co.za/special-reports/2023-02-16-a-different-approach-technical-vocational-education-and-training/; Siphelo Ngcwangu, "Skills Development and TVET Policies in South Africa: The Human Capabilities Approach," in *Handbook of Vocational Education and Training* (Cham: Springer International Publishing, 2019), 259–72, https://doi.org/10.1007/978-3-319-94532-3_4.

[9] S Field, P Musset, and J L Álvarez-Galván, "OECD Reviews of Vocational Education and Training: A Skills beyond School Review of South Africa" (Paris, France: OECD Publishing. https://doi. org/10.1787/9789264223776-en, 2014).

[10] Meifeng Liu et al., "Theoretical Foundations for Blended Learning," in *Handbook of Educational Reform Through Blended Learning* (Singapore: Springer Nature Singapore, 2024), 1–44, https://doi.org/10.1007/978-981-99-6269-3_1.

[11] Mukhtar Raban and Tabisa Mayisela, "Blended Learning as a Means of Opening up Learning at Northlink TVET College in South Africa," *Open Learning as a Means of Advancing Social Justice*, 2024, 86.

[12] Raban and Mayisela, "Blended Learning as a Means of Opening up Learning at Northlink TVET College in South Africa."

[13] Norliza Hashim and Zahari Hamidon, "Blended Learning in Technical and Vocational Education and Training (Tvet) Training Institute," *International Journal of Academic Research in Progressive Education and Development* 11, no. 1 (2022): 837–60.

[14] Charles R. Graham and Lisa R. Halverson, *Blended Learning Research and Practice* (EdTech Books, 2023).

[15] Graham and Halverson, *Blended Learning Research and Practice*.

[16] Stefan Hrastinski, "Asynchronous and Synchronous E-Learning," *Educause Quarterly* 31, no. 4 (2008): 51–55.

et al. assert that though Blended learning is regarded as a boundary object, it is a flexible, common identity across sites that adapts to various parties' local needs and constraints.[17]

The Rise of Blended Learning in TVET

The issue of Blended Learning has gained much importance and consideration, especially post-COVID-19. The paper Open LMS outlined how the COVID-19 pandemic impacted education in South Africa, for example, at Tshwane North TVET College.[18] The study outlines how the College adopted the Open LMS EDU in 2020, a Blended approach offered through eLearning. Although Tshwane College migrated to LMS to salvage the academic year, the pandemic posed a challenge for the institution. There was a mismatch between users and resources.[19] In terms of Blended learning experiences during COVID-19, Masina and Mawonedzo investigated Blended learning during COVID-19.[20] Their study concluded that there was heightened stress and anxiety among teachers and learners, particularly among TVET programmers, due to barriers like social distancing and travel restrictions, necessitating an exploration of its impact on students' learning processes. However, one must note the need for more research on TVET Colleges and Blended learning. Although a large and growing body of literature has investigated blended learning in education, the studies do not specifically address the perspectives of lecturers and students. This view is supported by Hashim and Hamidon, who assert that the literature review on Blended learning in Public Technical Training Institutes like the Institute Latihan Perindustrian (ILP) is limited, thereby indicating a research gap regarding TVET and Blended learning.[21] Therefore, this study uses Blended learning as the supporting theoretical framework to understand the topic further.

Advantages of Blended learning

Blended learning combines online and face-to-face instruction, offering students an interactive, engaging experience. It enhances understanding and retention of subject material, allowing personalised access to resources and materials at their own pace.[22] Blended learning allows students to access course materials online and study at their own pace, providing a more flexible and customised educational experience than face-to-face instruction.[23] As a result, blended learning addresses education challenges by making it more accessible, personalised, and cost-effective. This study argues that we can make Blended learning cost-effective because it involves a lot of financial needs in terms of adapting systems to match students' needs. It also requires trained staff, and that requires much funding. However, contests may adjust accordingly and avoid being too ambitious.

The flexibility of Blended learning enables students to review and revisit content as needed, reinforcing their understanding and mastery of the subject matter.[24] As flexibility allows for further content revision, this study cautions that not all learners will understand from that extra time. Perhaps

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[17] Charles Dziuban et al., "Student Satisfaction with Online Learning: Is It a Psychological Contract?.," *Online Learning* 19, no. 2 (2015): n2.

[18] Open LMS EDU, "Tshwane North TVET College Transitions to Blended Learning With Open LMS EDU" (Pretoria, South Africa, 2021).

[19] Open LMS EDU, "Tshwane North TVET College Transitions to Blended Learning With Open LMS EDU."

[20] R Masina and A Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare," *South African Journal of Higher Education* 36, no. 4 (2022): 101–16.

[21] Hashim and Hamidon, "Blended Learning in Technical and Vocational Education and Training (Tvet) Training Institute."

[22] P. T. Manditereza and B. Manditereza, "Increased Student Intake, Reduced Funding: How Should Engineering Departments React? A Case Study on the Implementation of a Remote Lab Platform. South Africa International Conference on Educational Technologies," *Beyond Familiar Territories*, 2018; Hashim and Hamidon, "Blended Learning in Technical and Vocational Education and Training (Tvet) Training Institute."

[23] S. Raja Kumar and C Shirley Moral, "Blended Learning: Incorporating Digital Technology into the Classroom Instruction," *Thiagarajar College of Preceptors Edu Spectra* 5, no. S1 (May 2023): 57–61, https://doi.org/10.34293/eduspectra.v5is1-may23.010;Mavis Chamboko-Mpotaringa and Blandina Manditereza, "Innovative Language Learning Approaches," in *Transforming the Language Teaching Experience in the Age of AI*, ed. G. Kartal (IGI-Global., 2023), 189–214, https://doi.org/10.4018/978-1-6684-9893-4.ch011.

[24] Colin Latchem, "Using ICTs and Blended Learning in Transforming TVET. Perspectives on Open and Distance Learning.," *Commonwealth of Learning*, 2017; Raja Kumar and Shirley Moral, "Blended Learning: Incorporating Digital Technology into the Classroom Instruction."

lecturers need to follow up and water content for the benefit of the weaker learners. Latchem further asserts that Blended learning offers flexible learning options for students with unique needs; this current study disagrees with that assertion because it is not automatic that all students with unique needs can benefit as intended.[25] The interactive nature of Blended learning, including online discussions, collaborative projects, and multimedia resources, promotes active learning and student engagement, leading to improved learning outcomes. This view corroborates Latchem, who commended the advantage of technology in Blended learning as being able to help students solve problems in creative ways. Therefore, this study views creativity as leading students to become critical thinkers.[26]

Blended learning also fosters the development of critical thinking skills as students are encouraged to analyse, evaluate, and apply knowledge in real-world contexts. Blended learning provides a dynamic and adaptable learning environment that can positively impact student learning outcomes. Despite arguments against it, Blended learning offers advantages in TVET College education. Raban and Mayisela pointed out that the approach offers flexible schedules that can be customised to suit individual learning preferences.[27] Hashim and Hamidom came up with a slightly divergent view.[28] Blended learning enhances TVET education by combining various technologies, providing flexibility by reducing student presence, and increasing participation from people with disabilities. It is commendable that they regard the method as a tool for inclusive education. Yeap pointed out critical elements of Blended learning: combining online and offline materials for flexible learning.[29] Combines online and hands-on training for a complete learning experience. It allows learning through Internet access and uses modules, textbooks, and printed materials.

Kumar and Moral cautioned that Blended learning requires adequate technical infrastructure, such as fast internet and gadgets, and enjoyable time management to ensure effective learning.[30] This can make Blended learning challenging for both students and teachers. Therefore, there are further disadvantages to taking note of, like drawbacks cited in challenges in the network, and assessment challenges confirm that the absence of face-to-face interaction may be challenging for those not self-motivated.[31]

METHODOLOGY

The study aimed to understand TVET Colleges' use of Blended learning from students' and lecturers' perceptions. It pursued answering the following research questions: 1) What are the advantages and challenges of blended learning in TVET institutions from the lecturers' perspective? 2) What are TVET course participants' perceptions of Blended learning, including their preferences for online and face-to-face learning? 3) Which strategies are effective for teaching practical courses online in TVET programmes? The study used the integrative literature review approach on Blended learning in TVET colleges to achieve this.[32] An integrative literature review is a research methodology that offers fresh perspectives and knowledge by synthesising and summarising previous empirical or theoretical literature to understand a subject thoroughly.[33] The research used Google Scholar and Science Direct, using the keywords TVET+ Blended+ Lecturers+ Students and Online and included all open-access English-language review articles, books, and Chapters published from 2014 to 2024 based on article

[25] Latchem, "Using ICTs and Blended Learning in Transforming TVET. Perspectives on Open and Distance Learning."
[26] Latchem, "Using ICTs and Blended Learning in Transforming TVET. Perspectives on Open and Distance Learning."
[27] Raban and Mayisela, "Blended Learning as a Means of Opening up Learning at Northlink TVET College in South Africa."
[28] Hashim and Hamidon, "Blended Learning in Technical and Vocational Education and Training (Tvet) Training Institute."
[29] Chye Fhern Yeap, Najibah Suhaimi, and M. Khalid M. Nasir, "Issues, Challenges, and Suggestions for Empowering Technical Vocational Education and Training Education during the COVID-19 Pandemic in Malaysia," *Creative Education* 12, no. 08 (2021): 1818–39, https://doi.org/10.4236/ce.2021.128138.
[30] Raja Kumar and Shirley Moral, "Blended Learning: Incorporating Digital Technology into the Classroom Instruction."
[31] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare"; Raban and Mayisela, "Blended Learning as a Means of Opening up Learning at Northlink TVET College in South Africa."
[32] Anna M Kutcher and Virginia T LeBaron, "A Simple Guide for Completing an Integrative Review Using an Example Article," *Journal of Professional Nursing* 40 (2022): 13–19.
[33] C. E. Toronto and R. Remington, *A Step-by-Step Guide to Conducting an Integrative Review* (Springer, 2020).

and abstract exclusion. The literature was checked for quality and relevance, and the selection process involved screening articles to explore the experiences of TVET lecturers and student participants in implementing Blended learning approaches. The study also examined the impact of Blended learning implementation in TVET colleges. As a result, case reports were drawn from five countries, focusing on students' and lecturers' perspectives.

PRESENTATION OF FINDINGS AND DISCUSSION

Findings of Previous Case Studies in TVET BLENDED Education

Author and Year	Context and Methodology	Purpose	Students Views	Lecturers Views
Raban & Mayisela (2022).[34]	**SOUTH AFRICA** a case study using qualitative methods. Interviews and focus groups.	Exploring TVET Colleges in South Africa Improved access and quality of learning opportunities.in Blended learning	Divergent views Most preferred face-to-face. Need additional assistance. .	Need for assistance in delivering online lessons. Staff in the study help positive views.
Masina & Mawonedzo (2022)[35]	**ZIMBABWE** TVET students at a Polytechnic Mixed methods research. Surveys and interviews were the main tools	To share a study on TVET lecturers' and Students' views on digital learning. To discuss the benefits and readiness for digital learning in education (Zimbabwe's TVET is presented as Polytechnics.	The learning environment for direct practical activities was a hindrance. Clothing and Textile Technology (CTT) and Building Technology (B.T.) students felt affected and failed to adapt to online learning,	Digital learning is beneficial, user-friendly, Enhances teaching and Learning flexibility. College lacks adequate infrastructure.
Puspitasari & Soeharto (2019)[36]	**INDONESIA** Quantitative research with a descriptive approach and questionnaires. TVET Students from various majors	The study focuses on vocational education students' perceptions of Blended learning.	The student showed Interest in Blended.	Increases student interest and relevance. Enhances access to learning materials and technology literacy. Needs to boost student confidence in Blended learning models.

[34] Raban and Mayisela, "Blended Learning as a Means of Opening up Learning at Northlink TVET College in South Africa."
[35] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."
[36] E D T Puspitasari, "Perception of Vocational Education Students on the Utilization of Blended Learning Models," in *Journal of Physics: Conference Series*, vol. 1273 (IOP Publishing, 2019), 012046.

Hondonga , et al. (2021)[37]	**BOTSWANA** Quantitative research design. Online questionnaire One hundred nineteen participants from four colleges.	Discusses the impact of online learning on education accessibility and enrolment. Highlights challenges and strategies for integrating online learning.	Lack of training Lack of network Poor resources are a hindrance.	Lecturers NOT trained. They believe students need more training on Lecturers see potential in online teaching for TVET.
Adewale, Omodan & Awodiji / (2022)[38]	**NIGERIA** A systematic literature Review. The paper used a systematic review of the PRISMA protocol. It included searching electronic databases for	Overview of TVET teaching and learning during COVID-19 in Nigeria	Lack of computer and internet access. Unsatisfied trainees with lecture methods. Disappointment affects competency.	Challenges in Virtual Practical Training, Poor internet, device availability and the need for online learning Need Digital to-use training.

Table 1.1: Summary of study findings: Authors are based on literature.Reviewed

From the analysed cases, students' and lecturers' perspectives indicated superficial similarities between students' and lecturers' views and between lecturers to lecturers or students to students. This highlights that variations are contextually based, as presented in the following sections.

For example, the students gave varying responses depending on the subject and context.[39] Their student respondents cited the advantages of Blended learning as providing them with flexibility and independence in their learning and the ability to access materials anytime, anywhere, making it challenging yet rewarding. One of the students' views was that they feel motivated when engaging with Blended learning. [40] The study revealed that 46.66% of students agree with the ease of understanding instructional material, while 43.39% disagree. These statistics look keenly contested, indicating mixed views between students and lecturers and sometimes between lecturers.

Lecturer Views

From the literature reviewed, the Lecturer's views cited seem to vary. During the pandemic, Zwezwe found that TVET colleges confirmed utilising Blended learning strategies.[41] However, they cited challenges like the need for more training, resulting in their need to be aware of specific strategies. In the Mbanga and Mtembu (2020) study, TVET lecturer respondents cited digital learning as beneficial for interaction, discussions, and convenience. However, they acknowledged that their college

[37] Jerald Hondonga, Tawanda Chinengundu, and Phyllis Kudzai Maphosa, "Online Teaching of TVET Courses: An Analysis of Botswana Private Tertiary Education Providers' Responsiveness to the COVID-19 Pandemic Learning Disruptions," *The On-LineJournal of Technical and Vocational Education and Training in Asia*, no. 16 (2021): 1–16.

[38] Sulaimon Adewale, Bunmi I. Omodan, and Omotayo A. Awodiji, "A Systematic Review of Post-COVID-19 Pandemic Strategies to Improve Instruction of Technical and Vocational Education and Training in Nigeria," *E-Journal of Humanities, Arts and Social Sciences*, October 28, 2022, 19–35, https://doi.org/10.38159/ehass.2022SP3113.

[39] Smit and Bester, "TVET Leaders' Experiences of an Enquiry-Based Blended-Learning Programme"; Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."

[40] Khusni Syauqi, Sudji Munadi, and Mochamad Bruri Triyono, "Sustainable Partnership Strategy: Case Studies in Vocational High Schools and Partner Industries.," *Qualitative Report* 27, no. 8 (2022).

[41] Lucky Zwezwe, "Lecturers' Implementation of Blended Learning Strategies in a Technical and Vocational Education and Training (TVET) College" (University of Johannesburg, 2022).

infrastructure needed to be fully prepared for this technology. The lecturer participants cited by Masindi and Mawonedzo (2020) believe that Blended learning improves teaching and gives students flexibility. This corroborated the views of their students. They value the convenience of accessing lessons anywhere, anytime, and asserted that Blended learning motivates them and helps improve their performance.

The literature analysis shows that different TVET lecturers have different opinions about Blended learning approaches. Some colleges employed Blended learning techniques during the pandemic but encountered difficulties because of a lack of expertise.[42] Although digital learning was hailed for its ease of use, institutions needed attention. Regardless of infrastructure issues, respondent students in their study corroborated that Blended learning made learning more accessible. According to Masindi and Mawonedzo's study, Blended learning enhanced instruction and gave students flexibility, both of which they deemed valuable.[43] The participant students in Masindi and Mawonedzo who were enrolled on practical courses contrasted their lecturers' views by asserting that the home as a learning environment for hands-on practical activities was a hindrance.[44] The Clothing and Textile Technology (CTT) and Building Technology students were affected for meaningful practice. Mbanga and Mtembu.[45] Additionally, students complimented the ease of accessing courses at any time and location, claiming that Blended learning increased motivation and enhanced performance. From presented perceptions, it would be argued that teaching practical subjects online is a contentious issue that requires further studies regarding teacher pedagogy, the types of tools, and the types of courses that may or may not be conducted through blended learning.

Can We Teach Vocational Practical Subjects Online?

The relevance of Blended learning in practical courses is a contentious discourse because every subject depends on the tools used. Lecturers must be aware that online learning poses challenges in vocational education, focusing on specific skills and balancing them with general knowledge and attitudes, requiring more learning in laboratories, fields, or internships. Findings may differ depending on the researcher's pursuits and population.[46] For example, Manditereza and Manditereza's findings in the study of University Electrical Engineering students on Blended learning found that computer-assisted learning enhances students' practical skills by customising learning methods, controlling pacing and time, and creating interactive communities.[47] On the other hand, Teis Els argues that technological advancements pose a challenge to TVET Engineering lecturers, and this necessitates the need for innovative approaches to engage students in the rapidly evolving engineering curriculum.[48] Mlaudzi et al. cited several studies that attributed the challenge to lecturers' inability to engage in innovative ways to use technology in teaching and, secondly, to the Lecturer's failure to shift from traditional to modern teaching methods.[49]

Practical subjects can be taught online, as evidenced by several studies. In one study, students in a fabric design subject found that online classes combined with self-studying Open Educational

[42] Zwezwe, "Lecturers' Implementation of Blended Learning Strategies in a Technical and Vocational Education and Training (TVET) College."
[43] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."
[44] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."
[45] N Mbanga and V N Mtembu, "Digital Learning: Perceptions of Lecturers at a Technical Vocational Education and Training College," *South African Journal of Higher Education* 34, no. 4 (2020): 155–73.
[46] Syauqi, Munadi, and Triyono, "Sustainable Partnership Strategy: Case Studies in Vocational High Schools and Partner Industries."
[47] Manditereza and Manditereza, "Increased Student Intake, Reduced Funding: How Should Engineering Departments React? A Case Study on the Implementation of a Remote Lab Platform. South Africa International Conference on Educational Technologies."
[48] Nixon J P Teis and Christo J Els, "Knowledge, Competencies and Dispositions of Lecturers in Technical Engineering in the Context of Advancing 4IR Technologies," *Journal of Vocational, Adult and Continuing Education and Training* 4, no. 1 (2021): 62–87.
[49] Mbofheni A Mulaudzi, Nixon Jp Teis, and Benjamin Seleke, "Problem-Based Learning for Shifting and TVET Electrical Engineering Lecturers' Practices: A Scoping Review," *Journal of Vocational, Adult and Continuing Education and Training* 6, no. 1 (2023): 1–16.

Resource (OER) materials could be a substitute for face-to-face classes.[50] Another study focused on the online teaching of practical exercises in science subjects and found that teachers conducted classes using synchronous and asynchronous methods. However, they assigned fewer hands-on activities compared to face-to-face lessons. The case study of Janštová. & Zdobinská; Manditereza and Manditereza proved that a remote lab allows the learning and reinforcement of practical subjects. [51]

The cases, though, from Universities confirm that practical lessons can be taught online using Blended learning.[52] Similarly, it supports the possibility of blended learning in the context of electrical engineering as a practical subject, thereby heightening the opportunities for practical skills in virtual learning environments (VLEs). Additionally, in medical education, a framework was developed and implemented for rapidly shifting practical lab teaching to online mode, which was feasible and engaging for students. [53] These studies demonstrate that various methods and technologies can effectively teach practical subjects online. However, all these cases with favourable outcomes differ from the findings presented by Masina & Mawonedzo, whose Clothing and Textile Technology respondents asserted that this subject usually needs hands-on practice in unique rooms (studios) and science rooms (labs). [54] Hence, they could not substitute the class environment with the home environment. However, a study cited by Masina & Mawonedzo by Pastore et al. found that students in the United States still did their hands-on lessons despite the difficulties caused by the pandemic.[55]

Regarding all these findings, this study would like to affirm that it is possible, though, to a certain extent, to use a Blended learning approach in Practical subjects depending on the context. Take, for instance, findings from a study in Zimbabwe. Even though students appreciated the individualisation and self-paced learning Masina & Mawonedzo, the students had other concerns, like where the Home spaces were too small for practical exercises, Food Technology students lacked proper tools and equipment, and remote learning proved less effective for hands-on practices.[56] This current study cautions that the results may only represent some TVET Colleges. For example Masina & Mawonedzo, research seemed biased since participants had to attend a specific workshop.[57] Nathihar et al. found that 59.81% of respondents found online learning ineffective for vocational education, as it focuses more on mastering applied skills than theoretical knowledge. Vocational education, which consists of 60% practice and 40% theory, is still suitable for online learning.

RECOMMENDATIONS

Research on TVET Colleges and Blended learning is very scarce, possibly because of the nature of the curriculum. The study strongly recommends further studies in subjects like Hospitality and Tourism, Art Design, Mechanical Engineering, Hairdressing and Beauty Therapy, and Clothing Design to evaluate how Blended learning impacts practically based courses, especially in areas where

[50] Ka Man Mok et al., "Achieve Intended Learning Outcomes and Improving Digital Literacy Skills for Practical-Based Subjects Using Online Teaching via Propagation of OER Materials," *Journal of Textile Science and Technology* 9, no. 1 (2023): 84–100.
[51] Vanda Janštová and Helena Zdobinská, "Distant Science Practicals–COVID-19 Experience from Czech Lower Secondary Schools," *Eurasia Journal of Mathematics, Science and Technology Education* 19, no. 1 (2023): em2212; Manditereza and Manditereza, "Increased Student Intake, Reduced Funding: How Should Engineering Departments React? A Case Study on the Implementation of a Remote Lab Platform. South Africa International Conference on Educational Technologies."
[52] Sidwell Hlalele and Patrice Umenne, "The Impact of Virtual Learning Environments on the Practical Skills of Open Distance Learning Students in Electrical Engineering," in *2022 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (IcABCD)* (IEEE, 2022), 1–5, https://doi.org/10.1109/icABCD54961.2022.9856040.
[53] Amir Maroof Khan et al., "Rapid Transition to Online Practical Classes in Preclinical Subjects during COVID-19: Experience from a Medical College in North India," *Medical Journal Armed Forces India* 77 (2021): S161–67.
[54] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."
[55] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare"; Francesco Pastore, Claudio Quintano, and Antonella Rocca, "Some Young People Have All the Luck! The Duration Dependence of the School-to-Work Transition in Europe," *Labour Economics* 70 (June 2021): 101982, https://doi.org/10.1016/j.labeco.2021.101982.
[56] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."
[57] Masina and Mawonedzo, "The Impact of COVID-19 Pandemic on TVET Students' Learning Process: A Case of One Polytechnic College in Harare."

infrastructure poses challenges. There is a need for careful planning in using innovative teaching methods and appropriate technologies to achieve beneficial teaching of practical subjects in online or Blended learning environments. Furthermore, there is a need to look into Blended learning and students facing academic challenges to gauge whether Blended learning can be adopted for inclusion and equity within a socially just approach.

Online learning for TVET faces challenges in technology development, infrastructure, human resource management, and economic and policy issues. In contrast, pedagogy approaches and assessment methods are rarely discussed, and the study recommends researching threats and opportunities of technology in Vocational Education. The study calls for emphasising the importance of evaluating teachers' skills, knowledge transfer, and the strong relationship between teachers and instructional materials in Blended learning. Despite the need for a relationship based on resource availability and network stability in Blended learning, the study concurs with Puspitasari.[58] As a result, the authors suggest applying Blended learning in vocational education to improve interest, relevance, and student confidence.

Consequently, educational institutions must plan and implement online learning effectively, adjust teaching methods, design materials, and provide online feedback to improve quality. Teachers need training to enhance online learning, create engaging materials, and enhance learning media. Findings clearly show a need for a framework that can be used in TVET colleges; hence, based on a literature review and analysed cases, this study self-generated a framework that can be adopted in TVET colleges. The study recommends a Framework (Figure 1) for blending practical subjects' content and theory online.

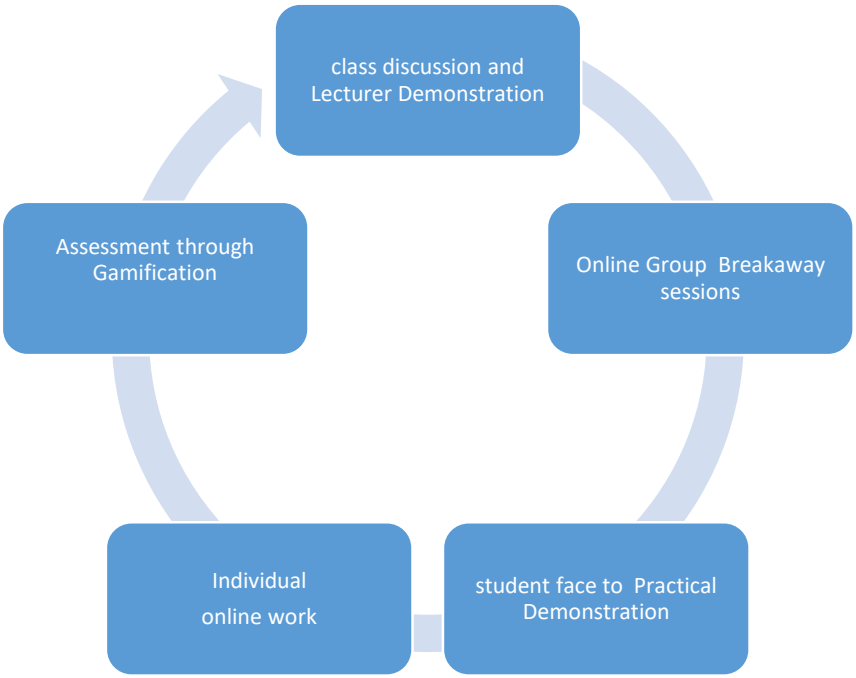

Figure 1: The TVET Blended Learning Framework

The test in the framework outlines a digital learning approach that includes an online Class demonstration of how to access and use content online. To gain confidence and clarification, students may have group breakaway sessions to expand their knowledge and have peer assistance. After that, there should be a face-to-face practical demonstration to reinforce learning. After the student practical demonstration, the students must be given extra activity to work online individually learning through platforms like Google Classroom, regular in-person classes, and the integration of digital tools like

[58] Puspitasari, "Perception of Vocational Education Students on the Utilization of Blended Learning Models."

videos, A.R., V.R., and M.R. It also emphasises infrastructure support, continuous professional development for lecturers, and student digital development through online assessments and in-person evaluations. The practical work can be a gamified activity to encourage immersive learning, motivation, and engagement. This can be done whenever a new practical component is introduced.

CONCLUSION

The literature sources cited indicated that Blended learning in TVET colleges offers unique opportunities over traditional methods, such as better access to quality education, personal growth, and improved student satisfaction. However, academics need to be cognizant that it also presents drawbacks. Although blended learning accords with the student's independence and flexibility and reinforces a learner-centred approach, scholars must look at the relationship between teacher knowledge and content delivery because not all teachers know how to shift knowledge to a technological pedagogy. Despite the outlined threads, Blended Learning holds excellent promise for TVET colleges, offering a more comprehensive understanding of subjects and higher student satisfaction. The study limitations could be based on the inclusion and exclusion criteria and the fewer cases reviewed. Future studies can include more databases to search for cases. In conclusion, the study asserts that Blended learning in TVET institutions offers flexibility for instructors and students but presents challenges in practical skills and work-based learning. Therefore, TVET Institutions are encouraged to integrate ICT into the curriculum for instructor development and student skill enhancement.

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