PCF11
Gaborone Botswana

Innovative Open Education: Fostering Resilient Societies for Sustainable Economic Development

CONFERENCE PROCEEDINGS —
PCF11 SELECTED PAPERS

Tony Mays and Evode Mukama (Editors)

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Editorial

The Commonwealth of Learning (COL) co-hosted the Eleventh Pan-Commonwealth Forum on Open Learning (PCF11) in Gaborone, Botswana on 10–12 September 2025 in partnership with the Ministry of Tertiary Education, Research, Science and Technology Ministry of Education and Skills Development and its implementing agency, Botswana Open University. The first PCF (PCF1) was convened in Brunei Darussalam in 1999. Since then, PCF has been organised around the Commonwealth in Brunei Darussalam, South Africa, New Zealand, Jamaica, the United Kingdom (England and Scotland in different years), India, Nigeria, Malaysia, Canada and now also Botswana.

The focus of the forum is to provide an opportunity for the open, online and flexible learning community to meet, share knowledge and experiences, identify important trends and explore applications of open and distance learning (ODL) in widening access, bridging the digital divide and advancing the social and economic development of communities and countries. The event is particularly important for practitioners and researchers from developing countries.

Over the years, PCF has moved from being a purely academic conference to one providing a platform to share the successes as well as challenges in finding local solutions through research and innovations. It has also become a leading voice to improve capacities and capabilities. Like previous instances, PCF11 offered unparalleled networking opportunities for participants to connect, collaborate and build partnerships across sectors and regions. A typical PCF attracts diverse stakeholders, such as:

- policymakers and development practitioners
- academics and researchers
- technology innovators
- COL stakeholders and partner institutions

The previous PCFs focused mainly on the interconnection between learning and development, with learner support and technology as the common dimensions to provide equitable access to quality educational opportunity and achieve the developmental goals of the member countries.

PCFs have attracted large participation due to their innovative, as well as contemporary, focus on issues that are important to the stakeholders in open, online and flexible learning. Post the Covid-19 pandemic, governments and educational institutions are focused on building more resilient systems that can withstand future disruptions. While distance and online learning remained the main way to keep the door of teaching and learning open during the pandemic, it also presented an opportunity to adopt innovative practices in local contexts. There has been a surge in demand for online learning, for example, which has highlighted the need to develop the self-directed learning capacities that are essential for lifelong learning. Questions of quality and equity have also emerged during this period, as many learners have limited access to technology, bandwidth and mobile broadband, especially in rural and remote areas. At the same time, those with access to the Internet now have access to a growing number of generative artificial intelligence (AI) tools that can contribute to all aspects of ODL provision from curriculum and content development to learner support and assessment to data analysis and automation. There is a need for a change in the mindset

of stakeholders as to the how and what of education and learning in general. It is important to discuss, debate, share and learn from our experiences to accelerate progress towards achieving Sustainable Development Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all by 2030 (United Nations, 2015).

Theme of PCF11: Innovative Open Education: Fostering Resilient Societies for Sustainable Economic Development

Learning has a pivotal role in supporting a resilient society with direct correlations between educational investment and measures of social stability, productivity and peace. Conventional models of teaching and learning provide excellent tools to drive economic prosperity for those with access but inevitably tend to replicate existing social inequalities. In contrast, alternative open models of teaching and learning offer the same economic benefit but accompanied by a narrowing of the gap between those with access and those without, while increasing quality and collaboration.

The data are clear that education is vital for economic success and demonstrate that every dollar invested yields many more in direct and indirect benefits. But these valuable investments in the conventions of education — more classrooms, more teachers, more exams — can also increase stratification, raise barriers and fuel inequity. The conventions of education invest most in those who can succeed, because their parents have already been successful. The alternative, open education, creates social resilience by reaching into the huge reservoir of learning access inequity, creating new successful parents able to support new successful learners (COL, 2020, 2021; Mukama, 2023; Nkwenti, 2023).

The open movement, including themes such as open research, open data, open source, open licensing, open publishing, all recognise the value of sharing and collaboration to drive change. "Open" does not mean "free", nor is it opposed to sustainable business. In fact, since the post-pandemic era, many global institutions have successfully adopted open approaches supported by strong business models, recognising the transformative potential of openness in promoting progress and resilience. As technological changes in telecommunications, online, mobile and AI combine with social and climate shocks, the Commonwealth is perfectly placed to change also. Innovative open models, with creative and collaborative learning and teaching practices derived from distance, and now, online learning, have the capacity to address those chronic challenges, finding creative ways to overcome digital divides (Balaji et al., 2025; Global Education Monitoring Report Team, 2024; Jha et al., 2024; Scott, 2023).

In times of uncertainty, change and fear, it is increasingly important for the Commonwealth to speak with a unified voice that advocates for and embraces openness in all its forms.

Sub-themes

The PCF11 presentations were grouped around four sub-themes:

- Changing mindsets for inclusive open education
- Gender, technology and innovation in open education

- Skills development through lifelong open education
- Sustaining communities of learning and practice in innovative open education

In each of the sub-themes, there was a special focus on emerging technologies for education and training, education for girls and women, and youth:

Sub-theme 1: Changing mindsets for inclusive open education
Focused on underpinning philosophies, pedagogies and approaches for inclusion, access and success through ODL provision — the "why" of learning.

Sub-theme 2: Gender, technology and innovation in open education
Focused on issues of gender, technology and open educational practices (OEP) — the "how" of learning.

Sub-theme 3: Skills development through lifelong open education
Focused on skills and technical and vocational education and training (TVET) development for more people more flexibly for sustainable development — part of the "what" of learning.

Sub-theme 4: Sustaining communities of learning and practice in innovative open education
Focused on resilience and working, sharing and learning together in local communities and as a pan-Commonwealth community — the "who" of open learning practice.

Cross-Cutting Issues

Running across the sub-themes were three cross-cutting issues:

Special focus 1: Emerging technologies for education and training
Technological advancements, particularly digital technologies such as AI, are opening new opportunities for educators to support high quality learning at scale. PCF11 had a special focus on integration of appropriate technologies and innovations in teaching and learning, including approaches such as flipped classrooms, learning analytics, mobile learning, massive open and online courses, AI, blockchain, augmented reality, virtual reality and mixed reality. Suggested topics of interest would be technological innovations for delivering and managing large, as well as small, flexible learning opportunities that are based on principles of quality to create new ways to promote lifelong learning through, for example, micro-credentials.

Special focus 2: Education for girls
Considering that education for women and girls is strategically important for social and economic recovery and in achieving the Sustainable Development Goals (United Nations, 2015), PCF11 had a special focus on women and girls. Many girls drop out of school, thereby creating a permanent loss in human capital and narrowing their chances of improving their living standards. The forum focused on research and presentations related to innovation in offering programmes that enhance the skills and employability of girls to improve their livelihoods. It also addressed measuring the quality of learning in programmes for women and girls, particularly in terms of programme

effectiveness, and promoted the creation of specialised lifelong learning environments for women to support sustainable development.

Special focus 3: Youth
We must emphasise the vital role of youth in driving sustainable development and tackling global challenges. With over 60% of the Commonwealth population under the age of 30 (Commonwealth Secretariat, 2023), there is an urgent need to empower this demographic through education and skills training. But further, to achieve deep social change, the educational agenda must be also opened to a lifelong learner, to empower parents and young workers as we empower youth. With a signature team of powerful inter-governmental organisations and non-governmental organisations, the many nations of the Commonwealth — particularly the small, more agile states — can innovate with new forms of education no longer on the horizon, but here, now. During PCF11, several presentations addressed youth education issues.

Review and Publication Process

A PCF follows a two-phase blind peer review process.

In Phase 1, authors were invited to submit abstracts for papers or proposals for demonstrations, panels, posters or workshops. Authors whose abstracts or proposals were accepted were invited to make full submissions in a separate instance of the paper review platform. PCF11 received 613 abstracts and proposals of which 432 (70%) were accepted for conversion into full submissions.

In Phase 2, authors of accepted abstracts or proposals made full submissions, which again were subject to a peer review process. Authors might need to make one or more revisions to have their full submissions accepted. PCF11 closed on 324 full submissions of which 243 (75%) were accepted for presentation.

Some 200 papers and 50 other submissions were presented at PCF11.

As with previous PCFs, accepted and presented papers are published on COL's Open Access repository as conference proceedings, which process is currently underway at the following link: http://oasis.col.org/handle/11599/2403.

PCF11 has traditionally been an in-person conference, but for PCF10 in Calgary, a hybrid format was followed for the first time allowing both in-person and virtual presentations. The same was planned for PCF11, but technical challenges forced the withdrawal of the virtual option. To compensate, COL is in the process of creating an addendum to the proceedings for authors of papers that were accepted but could not be presented due to the withdrawal of the virtual option.

Another innovation for PCF11 is the publication of this book of selected conference papers. The sub-theme leaders reviewed the peer review reports for all full papers and selected the five to six highest-ranked papers for each sub-theme. We are pleased to share these selected papers here as a standalone publication. Hence, this publication is titled *Innovative Open Education:*

Fostering Resilient Societies for Sustainable Economic Development. Conference Proceedings –
PCF11 Selected Papers.

Selected Papers

The selected papers presented here are organised according to the PCF11 sub-themes for which they were submitted, reviewed and accepted.

Sub-theme 1: Changing Mindsets for Inclusive Open Education

In "Recognition of Prior Learning and Micro-credentials for Enhancing Inclusion, Access and Success in the UCT Postgraduate Diploma in Blended and Online Learning Design: A Social Justice Lens", Tabisa Mayisela, Shanali Govender and Daniela Gachago explore recognition of prior learning and micro-credentials as means for enhancing inclusion, access and success using a social justice lens. They argue that equity — in relation to access and success — is unlikely to be attained unless deliberate attention is paid to the pedagogy of and recognition of prior learning.

In "Changing Mindset for Open and Distance Learning System: University of The Gambia Experience", Kayode S. Adekeye, Ousainou Sarr, Raphael K. Ayeni, Mbemba Hydara, Jane-Frances Agbu and Francisca U. Ezike discuss changing mindsets for ODL systems based on experience in The Gambia. They make policy suggestions related to strengthening awareness and communication of ODL policies, ensuring infrastructure and digital access, scaling and diversifying capacity-building programmes and strengthening strategic collaboration locally and internationally.

In "Unlocking the Potential of Open Educational Practices in Bangladesh — Why Mindset Shift Matters", Mostafa Azad Kamal, Jane-Frances Agbu and Mahfuzur Rahman explore how to unlock the potential of OEP in the context of Bangladesh. They suggest that universities should build the competencies of faculty members who are already familiar with open approaches as well as facilitate training and workshops to change the mindset of teachers who are less familiar to adopt OEP.

In "Pedagogy of Care in a Blended Teaching and Learning Distance Teacher Education Programme", Ruth Aluko and Mary Ooko discuss approaches based on a pedagogy of care in a blended teaching and learning distance teacher education context in South Africa. Situated within Society 5.0 and the ethics of care (Noddings, 2013), the authors seek to shed light on the quality of the programme they offer and provide suggestions for its improvement, which may benefit institutions in comparable contexts running similar programmes.

In "Enhancing Teacher– Student Interaction through Open Education in Hybrid Learning in Cameroonian Universities", Shaibou Abdoulai Haji and Jane-Frances Agbu explore how to enhance teacher-student interaction through open education approaches in hybrid learning in Cameroonian universities. The paper presents strategies to enhance teacher-student interaction through OER, advocating for culturally responsive pedagogy, policy coherence and institutional capacity building.

Sub-theme 2: Gender, Technology and Innovation in Open Education

In "Leveraging Technology-Enabled Learning and Open Educational Resources for Educational Equity: A Case Study in a Small Island State", Romeela Mohee and Anjusha Durbarry present a case study on leveraging technology-enabled learning and OER for educational equity in a small state context. The paper demonstrates how an appropriate regulatory body may support innovation in higher education while ensuring quality and accessibility for students in small island states.

In "Empowering Future Teachers: Skills Development and Training Needs for AI Integration in ODL Teacher Education", Geesje van den Berg discusses how to empower teachers for the future including the integration of AI in education provision. The paper emphasises the need for structured AI and digital literacy integration in teacher education curricula and calls for systematic support to bridge the digital divide in developing ODL contexts.

In "Leveraging AI-Driven Chatbots to Enhance First-Year Student Support: The USP SEM ZERO-GPT Initiative", Raveena Goundar, Rajni Chand and Mohammed Hussein explain how to leverage AI-driven chatbots to enhance first-year student support in the context of the Pacific region. They show how tailored AI solutions can enhance access, inclusion and engagement in higher education, while also raising new pedagogical and ethical questions that need to be addressed.

In "The Use of Artificial Intelligence in Teacher Education Students' Assessment Practices in Open Distance E-learning", Patience Kelebogile Mudau also explores the use of AI but in this case focuses on teacher education students' assessment practices in ODL provision in the context of South Africa. Mudau concludes that digital literacy training should be embedded in teacher education programmes to optimise the ethical use of technology and that institutions need to establish policies governing the ethical use of AI tools to support educational success.

In "Gender and Disability-related Influences on Teachers' Access to Technology-Mediated Professional Learning in Tanzania", Sara Hennessy, Kristeen Chachage, Saalim Koomar, Calvin Swai, Taskeen Adam, Fika Mwakabungu, Winston Massam, Jonathan H. Paskali and Nidhi Singal explore gender- and disability-related influences on teachers' access to technology-mediated professional learning in Tanzania. They offer recommendations for possible ways forward by stakeholders across the system to increase inclusive, equitable access to teacher learning, particularly in increasing access for women and teachers with disabilities or chronic illnesses, and especially in low-resource rural areas.

Sub-theme 3: Skills Development through Lifelong Open Education

In "The Vocational Training Development Institute: An Investigation into the Utilisation of Digital Learning Strategies in TVET to Facilitate Accessibility, Flexibility, Engagement and Skills Development", Jacqueline Solomon-Wallder, Mark McKnight and Roxanne Hinds provide insights into the use of digital learning strategies in TVET to facilitate accessibility, flexibility, engagement and skills development within the Vocational Training Development Institute in Jamaica. They suggest that the following activities are critical: investing in simulation and assistive technologies; aligning digital learning practices with policy; improving digital literacy training; clearly

communicating digital readiness requirements; and conducting strategic assessments prior to technology adoption.

In "Implementing Blended Delivery in TEVET: Insights from a Preparatory (PBDT) Course in Zambia", Twaambo Chiinza and Alice P.hiri Shemi explore the implementation of blended delivery of technical education, vocational and entrepreneurial training in Zambia. They observe that management and ministry-level support were pivotal in achieving a high course completion rate and conclude with policy and practice implications and recommendations to strengthen Zambia's digital transition in TVET.

In "Engaging NEET Youths through Vocational Education: A Case of the Open School of Bangladesh Open University", Mizanoor Rahman and Santosh Panda investigate ways of engaging youths through vocational education in Bangladesh. They identify varying challenges across four themes, highlighting the need for targeted interventions to improve course delivery and student engagement through strengthening pedagogical strategies and support systems tailored to vocational education programmes.

In "Open Schooling in Southern Africa: Progress, Challenges and Opportunities", Ephraim Mhlanga discusses progress, challenges and opportunities related to open schooling provision in Southern Africa. Theoretical notions of openness in education are used as an analytical framework to propose approaches that are likely to alleviate the growing challenge of out-of-school children and youth in the region.

In "Building Resilient Graduates: Moi University's Model for Enhancing Employability and Lifelong Learning in a Dynamic Labour Market", Lumala Masibo and Jako Olivier explore how Moi University in Kenya seeks to nurture more resilient graduates by enhancing employability and lifelong learning. They note how by drawing on COL's employability model and fostering resilient, employable graduates, the university has been effective in addressing unemployment, supporting lifelong learning and driving economic progress in Kenya and beyond.

In "Stakeholders' Perceptions of the Adoption of E-apprenticeship Programmes in Technical and Vocational Education and Training in Nigeria", Michael Shittu, Robert Okinda, Anthony C. Achuenu and Alabi M. Olowo investigate stakeholders' perceptions of e-apprenticeship programmes in TVET provision in Nigeria. They conclude that addressing technological, infrastructural and policy barriers is pivotal to leveraging the benefits of these programmes. They suggest that providers should focus on enhancing digital literacy, ensuring equitable access to resources and integrating hands-on training with virtual platforms.

Sub-theme 4: Sustaining Communities of Learning and Practice in Innovative Open Education

In "Towards a Commonwealth Credit Transfer Framework for Micro-Credentials: Advancing Education for a More Resilient Workforce", Jako Olivier, Jane-Frances-Agbu, Schontal Moore, Sanjaya Mishra, Betty Ogange, Evode Mukama and Robert Okinda reflect on progress towards establishing a Commonwealth credit transfer framework for micro-credentials. The paper outlines the consultative development process and highlights key research findings, challenges in

implementation and strategic recommendations to ensure that micro-credentials contribute effectively to sustainable and inclusive economic development within Commonwealth countries.

In "Collaborative Approaches in Open Education: Leveraging OER Creation, Adaptation and use for Sustainable Development", Shepherd Mlambo, Nokulunga Sithabile Ndlovu and Thabo Gina discuss collaborative approaches in open education, focusing on OER development and use in South Africa. Their study observes that sustained adoption of open educational resources requires flexible funding models, diverse educator involvement, policy guidance and iterative reflection. The authors argue that collaboration should be embedded as a systemic process to develop scalable strategies that enhance resilience and equity in African teacher education.

In "Empowering Voices in Open Education: Reflections and Future Directions from the Global OER Graduate Network's 10th Anniversary", Rob Farrow, Carina Bossu and Beck Pitt also discuss OER, this time focusing on lessons from the first 10 years of the Global OER Graduate Network. The report presents some key historic events that marked the progress of the network and explores its future strategic plans, some of which have already started.

In "Collaborative Peer Learning for International Course Development in the Empowering Women and Girls (EWG) Project: Challenges and Lessons Learned Through this Case Study", Philip Uys explores the role of collaborative peer learning in the Empowering Women and Girls Project. It was observed that while peer learning presents certain challenges, these can be addressed, ultimately enabling participants to gain diverse professional perspectives on each other's work and to collaborate effectively across different cultures and time zones.

In "Building Sustainable Communities of Practice Through Mentor-Supported OER Development: An Iterative Approach in Pacific STEM Education", Amanda Grey, Betty Ogange, Rajni Chand and Ashish Agrawal explore how to build sustainable communities of practice through an iterative mentor-supported OER development process. The study shows how evidence-based programme adjustments can enhance professional development effectiveness while building foundations for sustainable communities of practice in resource-constrained environments.

Overall, these selected papers provide a useful overview of the theme and sub-themes explored at PCF11. The other papers presented during this conference and previous conferences in this series can be accessed from https://doi.org/10.56059/11599/5747.

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Changing Mindsets for Inclusive Open Education

Recognition of Prior Learning and Micro-credentials for Enhancing Inclusion, Access and Success in the UCT Postgraduate Diploma in Blended and Online Learning Design: A Social Justice Lens

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Abstract

Post-school education and training (PSET) is regularly upheld as a key route to addressing South Africa's extreme levels of inequality. However, the PSET sector itself is plagued by inequalities, with access and successful completion being heavily skewed by, inter alia, educational institutions, race and socio-economic background. The recent decades have therefore witnessed a PSET social justice agenda for widening participation and ensuring success. This paper adopts Fraser's (2005) three-dimensional theory of social justice to understand the potential of open learning approaches, such as recognition of prior learning (RPL) and micro-credentials in proactively addressing economic, cultural and political injustices in the Postgraduate Diploma in Blended and Online Learning Design. Candidates who apply through the RPL access route undertake a specialised pedagogy RPL short course designed to introduce the knowledge and literacies necessary to succeed in the programme. This micro-credential gains successful candidates advanced standing for the 10-credit equivalent course in the postgraduate diploma. This reflection paper argues that equity — in relation to access and success — is unlikely to be attained even through representation and appropriate framing of who participates — particularly those who were often excluded in the apartheid era — unless deliberate attention is paid to the pedagogy of the RPL course.

Keywords: access, micro-credentials, recognition of prior learning, specialised pedagogy, social justice

Introduction

In the South African context, post-school education and training (PSET) has consistently been upheld as a key route to addressing extreme levels of inequality (Department of Higher Education and Training [DHET], 2013), through creating a skilled and economically relevant labour force while playing "a vital role in relation to a person's health, quality of life, self-esteem, and the ability of citizens to be actively engaged and empowered" (DHET, 2013, p. 3). The potential for education to provide a "route out of poverty" has been linked to "the achievement of greater social justice" (DHET, 2013, p. 5). However, the PSET sector — made up of both technical vocational education and training colleges and universities — is plagued by historical shades of racial segregation (Wedekind et al., 2016) and the contemporary challenges of poor economic growth leading to unequal access to learning resources (Hodgkinson-Williams & Trotter, 2018), along with political and social disunity (Wedekind, 2016).

In response to such challenges, DHET (2017) developed the Open Learning Policy Framework. Drawing on a definition of "open learning" first offered in the *White Paper for Post-school Education*

and Training (DHET, 2013, p. 48), the framework defines open learning as "an educational approach" combining:

> the principles of learner-centredness, lifelong learning, flexibility of learning provision, the removal of barriers to access learning, the recognition for credit of prior learning experience, the provision of learner support, the construction of learning programmes in the expectation that learners can succeed, and the maintenance of rigorous quality assurance over the design of learning materials and support systems. (DHET, 2017, p. 363)

This paper employs Fraser's (2005) three-dimensional theory of social justice to better understand how open learning — through the recognition for credit of prior learning experience — could potentially remove barriers to access learning and, at the same time, enhance inclusion and success. In this paper, the programme design of the Postgraduate Diploma in Blended and Online Learning Design (PGBOLD), which enables strategies for widening access and success, and the design of the recognition of prior learning (RPL) short course, Becoming a Learning Design Professional, are analysed in terms of the economic, cultural and political dimensions of both the injustice, and the subsequent attempts to remedy it, shedding light not only on how more equitable arrangements in the PSET sector might be brought about but also how the three dimensions of Fraser's theory of social justice might be related to each other.

Literature Review

Unequal Access to PSET Educational Opportunities

The South African PSET landscape continues to bear the marks of colonial-era policies and the separate development claims of the apartheid state, almost three decades after its end (Boughey & McKenna, 2021). The Open Learning Policy Framework highlights the lack of appropriate prior qualifications (DHET, 2017), among others, as an obstacle to equal access to and successful participation in PSET institutions. Research further reveals that access to PSET learning opportunities (and likelihood of success) continues to be shaped by race, class, linguistic background and gender (Govender & Dhurumraj, 2022).

In an attempt to address these contemporary and historical inequalities, particularly the lack of appropriate prior qualifications, the DHET is advocating an open learning approach, including RPL and micro-credentials (Mayisela et al., 2022). The Open Learning Policy Framework claims that open learning is "driven by a concern for social justice" and "motivated by the need for redress, equity in access to opportunity, flexibility and choice, and by an equal concern for quality and real success in learning" (DHET, 2017, p. 412).

RPL and Micro-credentials to Enhance Access, Inclusion and Success

The lack of appropriate prior qualifications and/or experience tends to inhibit access to postgraduate qualifications. One way of addressing this is through "recognition for credit of prior learning experience" (DHET, 2017, p. 363). This paper describes three approaches to RPL: RPL *for*

access (i.e., RPL if applicants do not meet the necessary criteria to apply for a qualification) and RPL *for credit* (i.e., awarding of credits for prior learning) and how the two approaches could be leveraged for what Cooper et al. (2016, p. 124) termed "RPL as 'specialised pedagogy'".

RPL for access is about the recognition of students' prior informal and non-formal learning, often gained through experience and non-formal courses (Cooper et al., 2016). It is used "to formally recognise experiential knowledge, skills and competencies within the frameworks of accreditation, recognition and lifelong learning" and the "formal recognition, assessment, and accreditation of an individual's prior learning experiences [disregards] the context it has been acquired" (DHET, 2024, p. 5) as long as it can enrich the student's academic environments. A shortfall of this form of RPL is that it often places the onus on the potential student to demonstrate through an assessment portfolio how relevant and equivalent their prior knowledge, skills and experience are to the entry requirements of the target qualification. The argument here is that potential students may be competent at translating their prior knowledge, and therefore gain entry into a programme, but may lack epistemological access to the programme because they have not been explicitly inducted into its academic discourses.

RPL for credit involves allocating "credit value" to knowledge produced and acquired through experience and non-formal learning, including completing massive open online courses, short courses and forms of micro-learning (Gredley & Hodgkinson-Williams, 2022, p. 19). This may include recognising competences already assessed and certified through micro-credentials by another education provider — loosely referred to as 'credit-exchange' (Gredley & Hodkinson-Williams, 2022). This practice is well established in the formal education space, where, through the credit accumulation and transfer process, students can transfer credits between programmes within a single institution or between the same programme across institutions — to a maximum of 50% credits. Currently, there is still a lot of controversy in the non-formal, micro-credentials space on how to determine credit value for non-credit bearing offerings. Oliver (2019), writing from Australia, has suggested that to make a micro-credential credit-bearing, the micro-learning offering needs to intentionally mirror a course of the target formal qualification in terms of curriculum, notional hours, assessments and academic standards. In the South African context, the South African Qualifications Authority (SAQA) recommends an amenable approach of *inward-facing* micro-credentials or part qualifications, where a part qualification is an "assessed unit of learning which is registered as part of a qualification" (SAQA, 2022, p. 6). It is along these lines that SAQA has recently settled on a working definition for a micro-credential — "a small unit of learning that is credit-bearing, stand-alone, may be stackable, assessed, quality assured and certified for lifelong learning" (SAQA, 2024, as cited in Paterson & McDonald, 2024, p. 16). The PGBOLD is adopting this approach by offering courses as part of the postgraduate diploma but also as stand-alone short courses. Participants who have successfully completed a BOLD short course (with a 70% pass) can be granted RPL for advanced standing for the equivalent course in the programme (maximum six short courses or 50% of the credit load of the qualification). This is for students who, otherwise, meet the entry requirements for the postgraduate diploma.

The third approach, RPL as a *specialised pedagogy*, can draw on the strengths of the first two approaches and further provide epistemological access to students who use the RPL for access route. This RPL approach takes the form of a specialised pedagogy, where students undertake a short course that introduces them to the knowledge and practices of a target programme (Cooper

et al., 2016). A strength of this approach is that it provides the tools for "understanding the social and epistemological determinants of what knowledge and forms of learning are to be recognized" (Ralphs, 2012, p. 90) by the RPL candidate. As an example, in a postgraduate diploma in management, RPL candidates undertake a two-week online module and complete assessments (Brenner et al., 2022). This did not only expose them to first- and fourth-year commerce course content but also the academic and digital literacies necessary for success in the programme (Brenner et al., 2022), thereby enhancing epistemological access. This approach is being explored for applicants who do not meet the PGBOLD entry requirements. Instead of an assessment portfolio of their prior knowledge, skills and experience, applicants take a six-week short course, Becoming a Learning Design Professional, and produce a personal and professional development plan for their final assessment. Those who pass the course with a minimum of 70% may be accepted into the postgraduate diploma and granted advanced standing for this course in the programme. However, even in the case of non-acceptance into the programme, students may be awarded a certificate of attendance or participation for completing the short course[1].

Through Fraser's social justice framework, this paper now examines how the PGBOLD RPL process, particularly through the adoption of a specialised pedagogy approach, aims to enhance inclusion, access and, ultimately, progression to success for students who may have otherwise been unable to enrol in the programme.

Fraserian view of social justice

Fraser connecte social justice to "parity of participation", associating this with "social arrangements that permit all (adult) members of society to interact with one another as peers" (Fraser, 1998, p. 102). Parity of participation is achieved when "all the relevant social actors … participate, as peers in social life" in a process governed by "fair and open processes of deliberation" (Fraser, 2005, p. 87). Fraser's trivalent model argues that unjust social configurations arise when maldistribution, misrecognition, misrepresentation and misframing occur.

Responding to a tendency to understand problems of justice as primarily related to either the distribution of resources (economics) or the recognition of status (culture), Fraser (1998, p. 102) first proposed a bivalent model, bringing the *economic* dimension of injustice into conversation with what she calls the *cultural* dimension, "without reducing one to the other". Economically, injustice can be produced by the *maldistribution* of material resources, whereby some individuals lack the necessary resources to participate fully in an activity. For instance, access to higher education and students' likelihood of success can be constrained by, inter alia, a lack of funds to purchase the necessities for studying, for example, devices, data and learning materials. Culturally, injustice can result from the construction of status in society, which Fraser (2005) termed *misrecognition*. For instance, misrecognition can be revealed by the role that geolocation, gender and language play in one's participation in a given activity, such as when students have to use only English as the medium of instruction and are judged based on what they lack "(i.e., proper English)" instead of appreciating the "abilities they possess such as learning across multiple languages and cultures" (Lambert et al., 2022, p. 53). Politically, injustice includes:

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[1] For more information on the PGBOLD and the short course entry route, please see
https://humanities.uct.ac.za/school-education/postgraduate-diploma-blended-and-online-learning-pgbold.

1. *Misrepresentation*, which asks the "ordinary-political" question of representation — who is involved in decision-making processes (Fraser, 2005, p. 76).
2. *Misframing*, which addresses the question of "who counts as a member in the first place" (Fraser, 2009, p. 19) — what are the criteria for inclusion?
3. *Meta-political* injustice of (mis)representation, which can fruitfully allow us to think about where injustices and, consequently, appeals for justice might be located (Fraser, 2009, p. 25).

Drawing on the latter, Hölscher and Bozalek (2020, p. 13) pointed out that injustices in the South African higher education context are often problematically "located in individual higher education institutions rather than the education system as a whole". These are seldom directly addressed, although decolonial and critical theory perspectives highlight these challenges.

When an entity (e.g., government, higher education institution), group or individual tries to correct a given injustice, Fraser (2005) has argued that such responses may be "affirmative" or "transformative". Affirmative (or "ameliorative") responses "[correct] inequitable outcomes of social arrangements" while transformative responses seek to disturb the generative structures that produce unjust conditions (Hodgkinson-Williams & Trotter, 2018, p. 207). Essentially, affirmative approaches can be seen as accepting (or "affirming") "the social structures and institutions that have framed the social practices that need changing", while transformative approaches "interrogate the frames themselves" (Luckett & Shay, 2017, p. 51). The former deals with symptoms, the latter with root causes.

Finally, although it is tempting to view Fraser's three dimensions as discrete, matters of maldistribution and misrecognition are "usually interimbricated so as to reinforce one another dialectically" (Fraser, 1995, p. 72). Fraser accords a particularly significant role to the political dimension:

> Those who suffer from misrepresentation are vulnerable to injustices of status and class. Lacking political voice, they are unable to articulate and defend their interests with respect to distribution and recognition, which in turn exacerbates their misrepresentation. (Fraser, 2005, p. 79)

Understanding how the three dimensions act on each other in differing circumstances may play a critical role not only in redressing social injustice when it occurs, but weakening the very structures that generate socially unjust conditions.

What follows, is a reflection on how the PGBOLD programme design in general, and the RPL course in particular, is informed by these social justice principles.

PGBOLD Overview and RPL Course Design

PGBOLD Structure

The PGBOLD programme addresses the critical need for skilled professionals in online and blended learning across Africa's educational landscape. BOLD may be taken as a 120-credit postgraduate

diploma over two years. It consists of at least 12 ten-credit courses, with two compulsory courses in each cluster. Alternatively, participants in a BOLD short course (from Clusters 1–3 only) can transfer and stack up to six short course micro-credentials as part of the diploma. The four clusters (Learning Design: Practices, Process or Emerging Field?; Learning Design for Social Justice; Designing for Digital Habitats; Critical and Caring Reflective Perspectives on Learning Design) and courses are reflected in Figure 1.
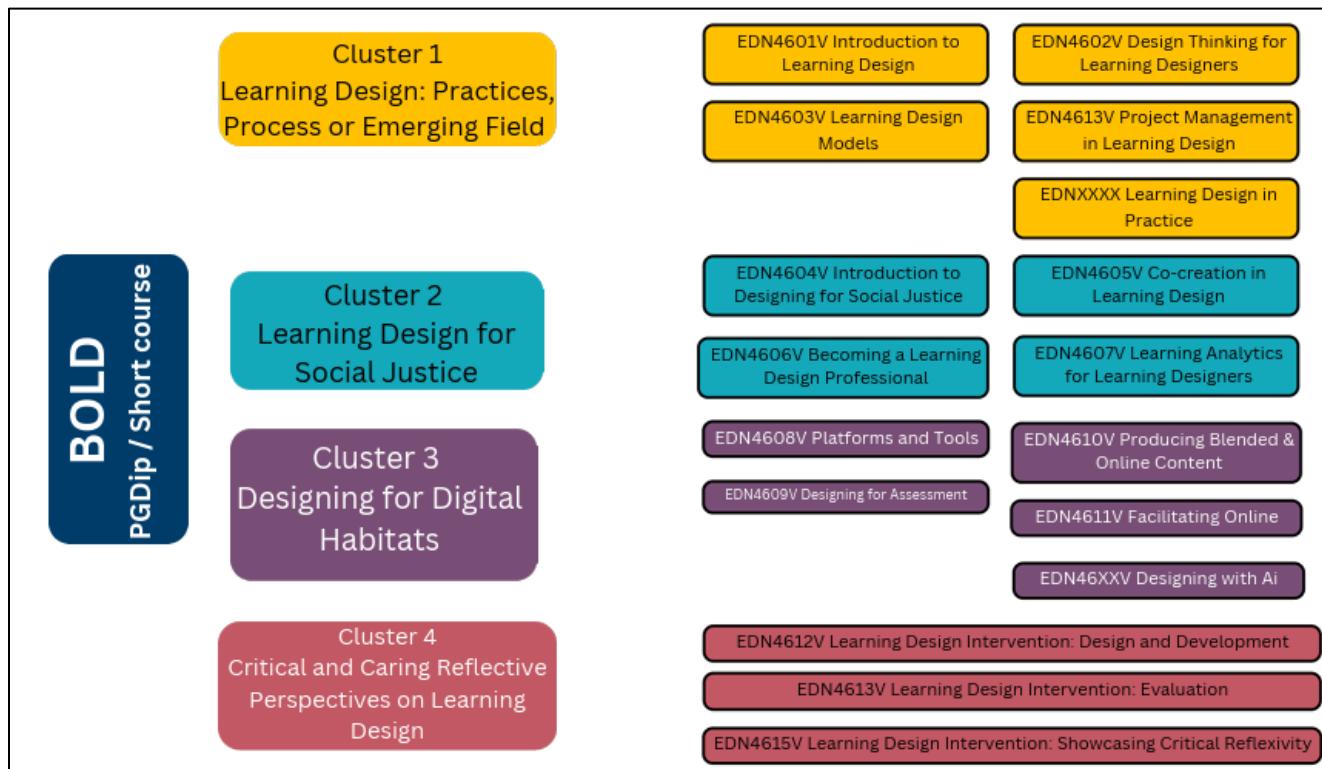
Figure 1: BOLD clusters & courses.

Source: PGBOLD material

RPL candidates are encouraged to take the Cluster 2 course Becoming a Learning Design Professional as a stand-alone short course, in October–November of the year they apply for the PGBOLD.

BOLD Participants: The RPL Persona

BOLD targets academic professionals, educators, instructional designers, educational technologists and training specialists who contribute to online learning and teaching in various sectors. As part of the design process for BOLD, based on our awareness of this diversity, we initially created five personas to guide and inform our design choices. Personas were used as a strategy for the design team to remember authentic user journeys and constraints rather than abstract learner categories, ultimately creating more responsive and inclusive educational experiences that address the actual contexts where learning design work happens. These personas highlighted key dimensions of difference, including age (25–48), racial diversity (white, Black, Coloured), gender balance, and sectoral variation across higher education, school teaching, corporate training, educational

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technology and non-governmental sectors, and varying access to resources in these contexts. Personas also reflected varying digital capacities from "chalk and talk" approaches to tech-savvy digital natives, and varied motivations for learning and ways for supporting their studies.

However, these sectors include professionals who may come from fields such as information technology, media and graphic design and may only now, some time into their careers, be seeking postgraduate qualifications, as a precursor to a progression or a shift in their career. These potential participants, although possessing deep sectoral experience, may not typically have access to further educational opportunities in learning or instructional design. Thus, as part of our design process, we added a sixth persona to reflect the paths and routes of non-traditional students seeking to undertake the PGBOLD. Figure 2 represents the persona for an RPL candidate.

Figure 2: Persona for an RPL candidate.

Source: PGBOLD material

Stories like that of Krish, a mid-career multimedia designer navigating the intersection of creative work, educational technology and professional development, while managing financial constraints and self-directed learning, help the BOLD programme designers anticipate challenges such as self-funding limitations, the need for immediately applicable skills and the balance between existing expertise and new learning requirements that many working professionals face.

RPL Course Design Choices informed by RPL Candidate Persona

Figure 3 provides an overview of the RPL course followed by a description of some of the design choices to support participatory parity in the course.

Course Overview

This course examines learning designers (LDs) as change agents within their professional contexts, with particular emphasis on how personal positionality shapes practice and influence. Through critical reflection on identity, power dynamics, and contextual factors, participants will develop a deeper understanding of their role as learning design professionals and explore pathways for career progression across diverse settings.

The course addresses the varied entry points into learning design work and the resulting challenges for professional identity formation. Participants will engage with frameworks for understanding change management, power structures, and professional development while building strategies to amplify their voice and influence as learning designers.

Learning Outcomes

Upon successful completion of this course, participants will be able to:

- Analyze and apply models for managing change and power dynamics across different professional contexts
- Critically examine their own positionality and its impact on learning design decision-making processes
- Evaluate and reflect on leadership approaches for self, teams, and communities within learning design contexts
- Assess their agency and sphere of influence within their specific professional environment
- Develop a personalized professional development plan for advancement in learning design spaces
- Identify and implement strategies to strengthen and amplify the learning designer voice in organizational settings

Course Structure

Week 1: Personal Identity and Learning Design Practice Integration
Week 2: Power Dynamics and Positionality in Collaborative Environments
Week 3: Professional Identity and Voice Development
Week 4: Creating Your Professional Development Roadmap

Assessment and Activities

The course combines theoretical engagement with practical application through materials, activities, and assessments designed to support both individual and collective professional growth. A key component includes participation in a personalized coaching session to support individual development planning.

Figure 3: Becoming a Learning Design Professional overview.

Source: PGBOLD material

Design Choices in Relation to Economic Parity

To offer participants a genuine choice, we have priced the short courses comparatively, basing them on the cost of the 10-credit diploma courses. RPL candidates take the RPL course for access, and at the same time, because it is equivalent to 10 credits, they can transfer it into the PGBOLD via RPL 'for credit' (and gain advanced standing). In the case that they are not accepted into the programme, they will at least receive a short course certificate and would have had a chance to reflect on their career progression as part of the personal and professional development plan. This costing model helps counter arguments that these kinds of specialised pedagogy RPL courses often incur human resources that are not budgeted for by schools or departments. By offering this short course, we distribute the costs of the RPL process and provide value to the potential student, regardless of the success of their application.

Design Choices in Relation to Cultural Parity

As mentioned before, we draw on personas as a design tool. We also engage with potential RPL applicants prior to the course, and this gives us an opportunity to better design for meaningful learning. Offering access to RPL candidates means we are valuing different knowledges and skills and recognising the wealth of experience they bring with them. Focusing on these students' needs necessitates a pedagogy of care that frames our course design; creating spaces where students feel a sense of belonging, being seen, and that their needs are met. To enhance epistemic access, all our courses offer personalised support in academic and digital literacies, which is particularly important for RPL candidates, whose last engagement with formal education might have been in the distant past. The RPL course also offers RPL candidates a networking opportunity with other professionals from contexts different to theirs.

Design Choices in Relation to Political Parity

RPL challenges us to rethink representation in postgraduate diplomas and acknowledge the potential for non-traditional students to succeed in formal higher education. PGBOLD responds to this by offering an RPL process that reframes who can be successful in a postgraduate programme. By repositioning the RPL course as an integral part of the programme design, PGBOLD normalises the presence of previously marginalised students in the higher education space.

Discussion and Way Forward

In this paper, we explored how we can widen access to higher education in a socially just way by repositioning and re-centring an RPL process in a postgraduate diploma. Fields of practice such as learning design and instructional design have not, thus far, received much attention in the higher education space, but are well established in industrial practices. By mainstreaming the RPL process in the PGBOLD, we recognise and affirm a multiplicity of knowledges, such as the ones emerging from industry, while bringing this into conversation with more theoretical and critical perspectives. In this way, RPL candidates become legitimate participants in the programme (and not an afterthought), bringing in their work experience from a variety of contexts, allowing us to value the diverse practices of learning designers beyond higher education.

Framing our study through Fraser's participatory parity helped us to think about how the three dimensions intersect and the importance of transformative approaches to social justice. It is essential that we pay deliberate attention to the frame with which we decide on eligibility, and that we make changes to the structural elements that exclude potentially suitable candidates. The costing of the short course (micro-credential) makes it relatively affordable, while it enabled alternative access into the programme. By foregrounding questions of power, positionality and voice in our design processes through the deliberate inclusion of a persona with an RPL requirement, we were able to operationalise one aspect of the social justice agenda. This required that the design, not just courses, but of the programme itself, centre participants and construct curricula in relation not only to the sector but also to participants' capacity to access and find resonance in the curriculum. In the RPL as a specialised pedagogy model, RPL becomes a relational activity, characterised by a bidirectional learning experience of educators and students.

Our aim was to explore RPL as a specialised pedagogy, an approach that would support and affirm RPL candidates in their journey into higher education. While recognising the South African accreditation system tensions brought about by micro-credentialing and allocation of credit value to short courses, we hope that the adoption of an inward-facing part qualification approach in this paper will provide insights for higher education RPL practitioners. adrienne marree brown (2017) reminds us that small changes repeat at large across the system if you have built a network of receptive allies in the institution. In our case, the review of the continuing education policy dovetailed with our attempts at introducing more flexible curricula and micro-credentials. This continuing education policy, which is under review, emphasises the importance of articulation between non-credit bearing short courses and credit-bearing formal qualifications, supporting our attempts at providing multiple entrance routes into our postgraduate diploma.

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Changing Mindset for Open and Distance Learning System: University of The Gambia Experience

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Abstract

Open and distance learning (ODL) is a vital tool for democratising education, reducing inequalities and driving socio-economic advancement in developing nations. This study provides insight into the experiences of the University of The Gambia (UTG) regarding the implementation of ODL. The following questions guided this study: Are there changes in mindset regarding ODL by UTG stakeholders? What is the focus of the UTG ODL policy guidelines and the status of implementation so far? What are the learning experiences and recommendations that emerged from the capacity-building exercises for ODL implementation? What is the influence of collaboration on ODL implementation at UTG? Both primary and secondary data sources were utilised for this study, while a purposive sampling technique was employed to draw up participants, comprising stakeholders who participated in the ODL capacity-building workshops. To achieve the objectives set, a survey was conducted using a questionnaire and a self-administered interview of stakeholders. Participants were randomly selected from senior management, staff and students of UTG. Descriptive and inferential statistics using mean, t test and ANOVA methods were employed to analysed the data. Thematic analysis was applied to qualitative responses from interviews and policy documents. The result of the study shows a notable shift in stakeholders' perceptions towards ODL. The majority (80%) of respondents have participated in ODL training with improved confidence (85.5%) and understanding (87.4%). The study revealed gaps in policy awareness and readiness for institutional implementation, with only 1.8% feeling *extremely aware* of UTG's ODL policy framework. Administrative support was perceived as *moderate* to *very supportive* with about 60%, but over 50% were *unsure* if a learning management system was available, indicating inadequate communication or infrastructure gaps. Internet reliability was highlighted as an ongoing systemic constraint, mostly rated *moderate* to *poor* (81.8%), and *major* technological challenges (76.4%) for poor Internet and low digital literacy (70.9%). The study provides policy recommendations revolving around strengthening awareness and communication of ODL policies, ensuring infrastructure and digital access, scaling and diversifying capacity-building programmes and strengthening strategic collaboration locally and internationally.

Keywords: mindset, open and distance learning (ODL), stakeholders' perceptions, digital access, strengthening awareness, University of The Gambia (UTG)

Introduction

The University of The Gambia (UTG), established in March 1999 by an Act of the National Assembly of The Gambia, is the premier public university in The Gambia (Ministry of Higher Education, Research, and Technology, 2016). The mission is to offer high-quality education underpinned by the holistic liberal arts model of learning to enable students to realise their full potential and participate successfully in the world. The vision is to be the powerhouse for the transformation of The Gambia through the creation, application and transfer of knowledge. To achieve its mandate as enshrined in its vision and mission statements, the university has faced numerous challenges of space, limited qualified academics, funding and reduced human resources or workforce.

Open and distance learning (ODL) systems have been identified as a solution to mitigate against the aforementioned challenges of space, limited qualified academics and reduced human force. However, UTG's community understanding and perception of ODL is at the lower ebb. Several training workshops for staff of UTG were held between 2023 and February 2025 with full support from the Commonwealth of Learning. The workshops aimed to:

- sensitise and engage university stakeholders on ODL
- develop and validate the ODL policy document for the university
- enhance participants' skills in creating effective instructional materials for ODL courses
- train staff on the Moodle learning management system (LMS)
- build capacity for online facilitation and use of AI for teaching and learning
- enhance the understanding of learners' support processes and develop clear guidelines for effective learner support in ODL

There are theories in the literature on the behavioural dynamics of humans on performance and quality in educational policy implementation. Flexibility threshold theory of change perception, for example, is inspired and drawn from cognitive psychology and change management (O'Brien, 2024). This theory posits that thresholds of individuals shift based on circumstances and can be helpful in a situation where a learner is hesitant to change for different reasons. In short, flexibility threshold theory advocates for a gradual approach to the implementation of new policies and programmes and can help guide the design of experiences and foster engagement, confidence and gradual adaptation.

ODL is one of the modern trends in education that higher education institutions are embracing to attract the working class and adult learners (Maxwell, 1995; Nwabueze & Isilebo, 2022). Specifically, Marwell asserted that ODL provides students with the opportunity to select courses by factoring in their time and constraints, which in-person education hardly accords learners. Notwithstanding, ODL completion and gender disparities were observed in Tanzania. According to Komba (2009), in Tanzania, the aggregate ODL graduation rate between 1972 and 2006 was 20.4%. Moreover, Komba used a gender indicator to gauge graduation rates in ODL programmes and discovered a big difference between male (21.9%) and female (10.7%) students. Therefore, it becomes clear that there should be continuous monitoring of completion and gender imbalance as far as ODL initiatives are concerned in developing countries.

The importance of technology in ODL cannot be underestimated. In fact, technology is the bedrock for running ODL programmes (Fozdar, 2015; Sarr, 2021). Consequently, both instructors and students must gravitate towards technology as far as ODL programmes are concerned. Fozdar posited that improving science and technology is a prerequisite for rolling out ODL programmes. As a result, ODL programmes nowadays require learning platforms and equipment supported by information and information technologies; without these, the objectives and outcomes of the programme can never be achieved (Fozdar, 2015). Thus, technology is a game changer during times of crisis in education. According to Sarr, in The Gambia, the COVID-19 pandemic pushed institutions of higher learning and school systems to use technology and radio communication to facilitate teaching and learning during the lockdown periods.

Benchmarking for quality education for ODL is a profound subject of discussion among stakeholders (Koul, 2010; Pande et al., 2020). Quality education for ODL is perceived as inferior to traditional formal education in person. In view of this perception, Pande et al. (2000) in a review study on the ODL institutions, discovered that learner admissions, enrolments, the evaluation process and courseware development positively impacted on the quality assurance deliverables in higher education institutions. Similarly, Koul (2010) provided five components (curriculum, transaction, support services, learner achievement and learning resources) needed to achieve quality education for ODL programmes. For the curriculum component, Koul asserted that it needs to be fit its purpose. Similarly, transaction as a component of quality education for ODL refers to the instructional design adopted to facilitate teaching and learning. Support services and learners' achievement are also useful hallmarks for quality education for ODL (Koul, 2010). Lastly, Koul posited that enough learning resources are needed to achieve quality education for ODL programmes.

The success of any ODL programme is dependent on the commitment of both educators and learners (Dewi et al., 2022; Law et al., 2025; Maity et al., 2016). Maity et al. claimed that teachers play vital roles in ODL programmes since they coach and mentor learners. In addition, teachers plan lesson delivery, maintain quality standards, serve as tutors, assessors and counsellors for ODL students (Maity et al., 2016). Similarly, learners also have a responsibility in ODL programmes. Dewi et al. highlighted student responsibility in ODL programmes, including being punctual, knowing their schedules, completing their assignments and engaging in all discussions and activities. In a related manner, professional development is a prerequisite prior to the operationalisation of any ODL programme. Therefore, lecturers need some form of training on LMSs and instructional design to upload content, set activities, assignments and grading rubrics for assessments (Kruger et al., 2012; Mahlangu, 2017). Likewise, learners should be trained on how to register in ODL platforms, access resources and complete their assignments as required of them (Kruger et al., 2012; Mahlangu, 2017). Qadri (2018) identified the key features from the e-learners' perspective on the quality assurance toolkit for ODL institutes. A major takeaway from the literature reviewed reveals that ODL increases access to education especially to adult learners, but also requires technological infrastructure and skills, professional development, quality standards and commitment from all players (Dewi et al., 2022; Koul, 2010; Mahlangu, 2017; Maity et al., 2016). In contrast, the current state of scholarship as portrayed above on ODL in The Gambia is virtually non-existent, warranting the need to study the perception of stakeholders on UTG's ODL initiative.

This research investigated the evolving perceptions of UTG stakeholders towards ODL and assessed the university's approach to addressing these challenges. At the heart of the implementation of the UTG ODL policy and programmes is the need to evaluate achievements made and the state of stakeholder perceptions and changing mindset regarding the ODL system. Different implementation approaches may be adopted to determine this. However, exploring the changing mindset for ODL systems underscores the motivation for conducting this study and UTG as a case study.

Research Questions

1. How has the mindset of UTG stakeholders evolved regarding ODL implementation?
2. What are the key focus areas of UTG's ODL policy, and how far has implementation progressed?
3. What are the learning experiences and recommendations that emerged from the capacity-building exercises for ODL implementation?
4. How does collaboration influence the implementation of ODL at UTG?

Goal and Objectives

The goal of this study was to assess the implementation of ODL at UTG and examine the changing perceptions of stakeholders towards its adoption. Specifically, the study sought to:

1. assess changes in stakeholders' mindset towards ODL at UTG
2. evaluate UTG's ODL policy focus and its implementation progress
3. assess the learning experiences from ODL capacity-building initiatives
4. explore the role of collaboration in enhancing ODL adoption at UTG

The specific objectives were achieved under the four thematic areas, namely:

1. assessment of mindset evolution of UTG stakeholders
2. ODL implementation progress at UTG
3. assessment of learning experiences from ODL capacity-building initiatives
4. role of collaboration in enhancing ODL adoption at UTG

Methods

This study employed a mixed-methods approach, integrating both qualitative and quantitative research techniques to achieve the specific objectives. Primary data were collected through surveys and interviews with UTG stakeholders, including faculty, students, and administrators involved in ODL capacity-building workshops.

Survey Questionnaire

To achieve the specific objectives of this study required quantitative data collected through self-administered surveys using questionnaires. Along with a structured questionnaire, in-depth key

informant interviews were used. The justification for this choice of instrument is that a questionnaire with Likert-scale items measured changes in attitudes quantitatively, while in-depth interviews with key stakeholders (faculty, students and administrators) provided qualitative insights into their perceptions and concerns about ODL. There are about 200 academic staff at UTG, out of which about 60 have participated in at least one training programme on ODL. Purposive sampling technique was used to select sample size of 55, which comprised 70% participants in ODL training and 30% non-participants. The inclusion of non-participants in ODL training was to assess external perception of ODL by those who were not directly involved, to design better engagement strategies for future trainings.

The indicators of the identified concepts and variables in the objectives are captured as thematic areas. The following are possible moderators and served as cross-cutting issues in examining changes in stakeholder mindset towards ODL at UTG: gender, age, years of online exposure, academic discipline, highest academic qualification of individuals and years of affiliation with UTG. To this effect, the following null hypotheses were tested:

- H01: There is no difference in the changed mindset about ODL across groups with different genders.
- H02: There is no difference in the changed mindset about ODL across groups with different ages.
- H03: There is no difference in the changed mindset about ODL across groups with different academic disciplines.
- H04: There is no difference in the changed mindset about ODL across groups with different highest academic qualifications.
- H05: There is no difference in the changed mindset about ODL across groups with different years of affiliation with the university.
- H06: There is no difference in the changed mindset about ODL across groups with different years of online exposure.

Qualitative Method: Structured Key Informant Interview

To evaluate UTG's ODL policy focus and its implementation progress, key informant interviews were combined with the survey instruments. Although the survey instrument measured the length and breadth dimensions, the key informant interviews measured the depth. Interviews with university management and administrators helped assess the level of implementation and challenges faced. There are two major concepts in the objective. These are policy focus and implementation progress. The identified variables on which data were collected are as follows:

1. policy focus indicators: existence of a formal ODL policy document, stakeholder
2. awareness and understanding of ODL policy
3. implementation progress indicators: infrastructure readiness: availability of ODL
4. LMSs, accessibility of digital learning resources, number of faculty and staff trained in ODL methodologies, frequency of capacity-building workshops, faculty confidence in delivering ODL courses

5. collaboration and partnerships: level of engagement with external partners (e.g., government, international organisations)

Analytical Techniques

The study utilised descriptive and inferential statistical methods to analyse survey data. Thematic analysis was applied to qualitative responses from interviews and policy documents. Additionally, regression analysis was employed to assess relationships among stakeholder engagement, policy implementation and ODL adoption rates. Analysis of variance was used to evaluate cross-cutting issues control relating to control variables like demographic factors, access to technology, digital literacy levels and past exposure to online learning models.

Findings and Discussion

Demographic Information and Qualifications of Respondents

Table 1 presents a summary of demographic characteristics and qualifications of the respondents from UTG. The categories include gender, age group, highest qualification and role at UTG.

Table 1: Demographic characteristics, academic qualifications and institutional roles of respondents

Gender			Highest qualification		
	N	*%*		*N*	*%*
Female	12	21.8%	Bachelor's	6	10.9%
Male	43	78.2%	Master's	9	16.4%
Age group			PhD	27	49.1%
	N	*%*	Undergraduate	13	23.6%
18–25	7	12.7%	**Role at UTG**		
26–35	12	21.8%	Non-academic	1	1.8%
36–45	9	16.4%	Academic	30	54.5%
46–55	14	25.5%	Administrator	9	16.4%
56–65	13	23.6%	Student	15	27.3%

There were 55 respondents in total. A large majority were male (78.2%) while females represented 21.8% of the sample. This demographic information is in conformity with Komba's (2009) submission that there are gender disparities in Tanzania in terms of ODL access among educators. Overall, the gender disparity suggests that there is a need to explore further whether the mindset towards ODL differs by gender and what interventions can promote female participation. The majority of participants were aged between 46 and 65 (49.1% combined). The smallest age group was 18–25 (12.7%), likely students or early-career individuals. This shows that a significant portion of the participants were older adults, who may be less receptive to new technologies or less digitally literate. Age can influence resistance to change. Older academic staff might struggle with or resist adapting to ODL systems. This draws attention to the need for tailored capacity-building or change management strategies, necessary for different age groups. Nearly half of the respondents hold doctorate degrees (49.1%), undergraduates make up 23.6%, likely students. Fewer hold master's

(16.4%) and bachelor's (10.9%) degrees. This reflects a well-educated workforce that could potentially grasp ODL pedagogy quickly, but may also be entrenched in traditional teaching models. It is possible for highly qualified academic staff to hold rigid academic traditions, which may require targeted attitude change interventions. It is equally possible that the higher qualification equates to acceptance of ODL. The majority were academic staff (54.5%), which aligns with the high number of doctorate degree holders. Students made up 27.3%, consistent with the number of undergraduates. Administrative staff were 16.4%, and non-academic staff were a small minority (1.8%). This result is in line with those of Kruger et al. (2012) and Mahlangu (2017).

Table 2: Academic background, institutional tenure and online experience of respondents

Academic discipline			Years affiliated with UTG		
	N	*%*		*N*	*%*
Agricultural and environmental sciences	2	3.6%	Less than 1 year	1	1.8%
Applied and social sciences	13	23.6%	1–3 years	20	36.4%
Business and public administration	11	20.0%	4–6 years	12	21.8%
Education	9	16.4%	7–9 years	3	5.5%
Information technology and communication	5	9.1%	10 years and above	19	34.5%
Journalism and digital media	4	7.3%	**Years of online exposure**		
Law	3	5.5%	Less than 1 year	9	16.4%
Medicine and allied health sciences	8	14.5%	1–3 years	19	34.5%
			4–6 years	20	36.4%
			7–9 years	4	7.3%
			10 years and above	3	5.5%

The largest discipline group in Table 2 was applied and social sciences (23.6%), followed by business and public administration (20%). Health and medical fields (14.5%) and education (14.5%) are also strongly represented. Technical fields were underrepresented (9.1%), because there are fewer staff in the field at UTG. The majority of respondents have been affiliated with UTG for more than 3 years (62%), with 34.5% having over 10 years' experience. These are veteran staff who may have more institutional knowledge but may also be less flexible or slower to adapt. A significant portion (36.4%) is relatively new (1–3 years), suggesting fresh perspectives. These mixed experience levels offer a good balance for this study. The majority (70.9%) of respondents have 3 years or fewer online experience, showing a relatively new engagement with digital platforms. Only 5.5% have long-term (10+ years) exposure to online environments. This suggests that both faculty and students are still developing digital fluency. This diversity of affiliation years and online exposure is an asset for this study, as it offers a good test group for mindset transformation, allowing comparison between those ready for change and those more reluctant. As asserted by Koul (2010), support mechanisms must be put in place for relatively new faculty members who are least experienced in ODL.

Theme 1: Assessment of the Mindset Evolution of UTG Stakeholders

Figure 1 presents findings on the assessment of mindsets of stakeholders with regard to ODL at UTG. The assessment was conducted with five indicators: initial perception of ODL before open educational resources intervention, perceived benefits and challenges of ODL, level of confidence in

using ODL platforms, current perception of ODL (post-intervention) and willingness to adopt and engage with ODL.
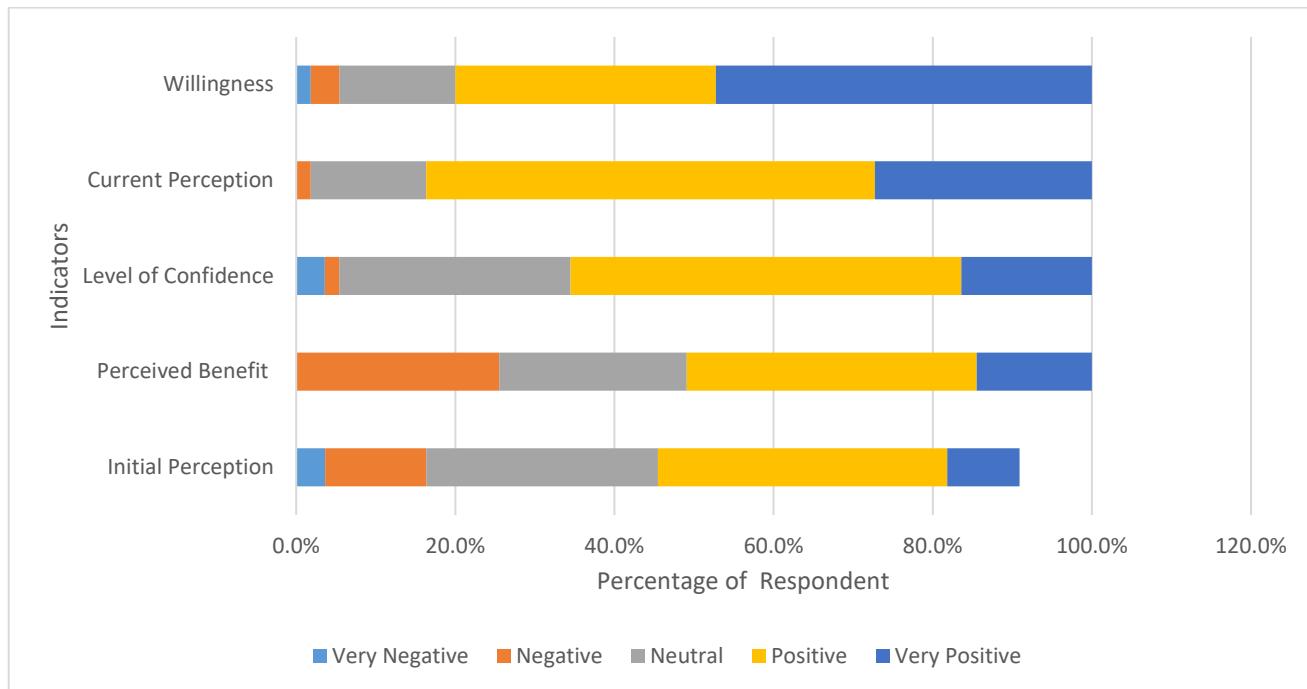
Figure 1: Assessment of stakeholders' mindset on ODL.

Findings in Figure 1 show that there was a shift towards positive perception. The combined *positive* and *very positive* perceptions before engaging with ODL was 45.5%, which increased to 83.7% under the current perception, indicating a 38.2% increase in positive mindset. This is coupled with a decreasing negativity. *Very negative* dropped from 3.6% to 0% in the current perception, *negative* perception dropped from 12.7% to 1.8%. There was also an improved willingness to continue to engage in ODL. A combined 80% of the stakeholders of UTG were willing to continue engaging in ODL. An increase in confidence in quality is also portrayed in the findings in Table 3. About 50.9% (*positive* + *very positive*) believe ODL can deliver quality education, with 23.6% still neutral, indicating room for further advocacy. As alluded to by Maity et al. (2016), Dewi et al, (2022), Jabin (2025) and Law et al. (2025), assessing educator and learner commitment to ODL is crucial for the success of any ODL programme; therefore, the data on perception both pre- and post-ODL in UTG showing that faculty members are ready to embrace it is encouraging.

Figure 2: Key influencing factors on stakeholders' perception of ODL in UTG.

The bar chart in Figure 2 displays the results of a survey question: "What aspects of ODL influenced your current perception the most?" Participants were allowed to select multiple options. Findings show that accessibility and convenience were the most influential aspects, selected by 40 out of 55 respondents (72.7%). The quality of course content was the second most influential, with 35 respondents (63.6%) choosing it. Interaction with instructors and peers was selected by 28 respondents (50.9%). Technical challenges were the least selected factor, with only 16 respondents (29.1%) choosing it. Inferences from the findings on the assessment of changes in stakeholders' mindset towards ODL at UTG can be summarised as follows:

1. There is a marked reduction in negative and neutral perceptions over time.
2. There is a notable increase in positive and very positive attitudes, especially in current perception and willingness to continue engaging in ODL.
3. Initial scepticism, particularly around ODL's ability to deliver quality, has substantially improved.
4. There is an indication that stakeholders in UTG highly value the flexibility and ease of access provided by ODL platforms.
5. The majority find the course materials to be a significant factor in shaping their view of ODL, which significantly changed their mindset.
6. About half of the participants consider the availability of communication and engagement in the learning environment as a key factor of their perception.
7. Technical issues, while present, are not the primary influence on stakeholders' perception of ODL, or most think that they are relatively manageable.

It becomes clear that this inquiry gathered all vital information to gauge participants' perceptions on ODL. As a result, the summary above (1–7) serves as what Koul (2010) characterised as the criteria of a roadmap to achieve the overarching objectives of any ODL programme.

Cross-cutting issues: Moderators to the changing mindset

Statistical tests were conducted on the six cross-cutting variables. The test results of the various tests are presented in the Appendixes. Table 3 summarises the findings.

Table 3: Hypothesis testing of cross-cutting variables

Variable	Statistical test	Conclusion
Gender influence	Independent sample *t* test (see Appendix A).	There is no statistically significant difference in changed mindset about ODL between genders. Gender does not appear to influence the change in mindset about ODL in UTG.
Age group	One-way analysis of variance (ANOVA) (see Appendix F).	There is a statistically significant difference in changed mindset about ODL across age groups. Older individuals, possibly with less initial exposure or more scepticism, experience a more noticeable shift in perception once engaged with ODL.
Highest academic qualification	One-way ANOVA (see Appendix D).	There is a statistically significant effect of the highest academic qualification on the changed mindset about ODL. Individuals' educational backgrounds influence how their mindset towards ODL has changed.
Past online exposure	One-way ANOVA (see Appendix E).	There is a significant effect of years of online exposure on individuals' changed mindset about ODL. The number of years a person has been exposed to online learning influences their shift in mindset about ODL.
Years of affiliation	One-way ANOVA (see Appendix B).	There is no statistically significant difference in changed mindset scores based on years of affiliation. This means that how long someone has been affiliated with the institution does not significantly influence their shift in mindset about ODL.
Academic discipline	One-way ANOVA (see Appendix C).	There is no statistically significant difference in the changed mindset about ODL across different academic disciplines. This suggests that the discipline one belongs to does not influence how their mindset has changed regarding ODL.

Theme 2: ODL Implementation Progress at UTG

The objective here was to evaluate UTG's ODL policy focus and its implementation progress. This was done under four indicators: policy adoption and institutional support, infrastructure and technological readiness, awareness and sensitisation efforts.

Policy adoption and institutional support
Table 4 presents findings on policy adoption and institutional support readiness for implementing ODL at UTG**.** The evaluation includes four dimensions: policy understanding, administrative support, access to an LMS and Internet reliability.

Table 4: Policy adoption and institutional support readiness for ODL in UTG

Dimension	Not at all	Slightly (25%)	Moderately (50%)	Very (75%)	Extremely (above 75%)
Understanding UTG's ODL policy and strategic framework	43.6%	12.7%	25.5%	16.4%	1.8%
How supportive is UTG's administration in implementing ODL	18.2%	9.1%	32.7%	27.3%	12.7%
	No	**Not sure**	**Yes**		
Provide access to an online LMS for ODL	10.9%	52.7%	35.4%		
	Excellent	**Very good**	**Moderate**	**Poor**	**Very poor**
Reliability of Internet access for ODL at UTG	3.6%	14.5%	47.3%	20%	14.5%

Findings from the key informants' interview confirmed that there are key policies for the formation of ODL in UTG. These informants, who are mostly administrators of UTG, highlighted that the ODL policy covers areas such as course roll-out, lecturer-student interaction, infrastructure and student support. They hinted that the ten courses have been developed under the ODL framework, and over 30 staff members have been trained in the course and delivery. The university is making provision for students to take part in this learning landscape; there will be room for course modules through the university's Module platform. The modules will not only support virtual hearing but also track student engagement and performance. They noted that there are still gaps in the awareness level of ODL that need to be covered for effective implementation. This submission was confirmed and clarified by the findings of the quantitative survey.

It can be seen in Table 4 that a significant 43.6% of respondents, who are stakeholders, do not understand UTG's ODL policy at all. Only 18.2% (*very + extremely*) show a high level of understanding of the policy. This indicates a major knowledge gap, suggesting the need for more awareness campaigns, sensitisation and training on UTG's ODL strategy. On the issue of perceived support from UTG administration in implementing ODL, a majority (72.7%) perceive at least *moderate* support from the administration. Only 27.3% (*very + extremely*) see strong support. The implication of this is that, although administrative backing is evident, it may lack intensity or visibility, requiring more proactive engagement from UTG leadership. This implication is buttressed by the findings on access to an LMS. Only 35.4% of the stakeholders confirmed LMS access, while a majority (52.7%) were uncertain. This suggests poor communication or inconsistent deployment of LMS tools. There is a need for clearer deployment, awareness and training on LMS availability and use in UTG. Nearly one third (34.5%) of the respondents rated Internet access as *poor* or *very poor*, which is not very high. Only 18.1% viewed it positively (*excellent* or *very good*). The majority (47.3%) perceived it as *moderate*, indicating that although Internet reliability remains a key challenge to effective ODL delivery, it may not hinder the implementation.

Infrastructure and technological readiness

As regards infrastructure and technological readiness, some participants of the key informants' interview noted during the interview section that digital labs are available and accessible for students, but there has not been any form of implementation on ODL. There is also a lack of awareness among some students and staff of UTG on ODL, suggesting a need for more awareness amongst students and staff for effective implementation of ODL. Figure 3 presents the findings on the digital tools and platforms available for ODL at UTG.

What digital tools and platforms are available for ODL at UTG? (Select all that apply.)
55 responses
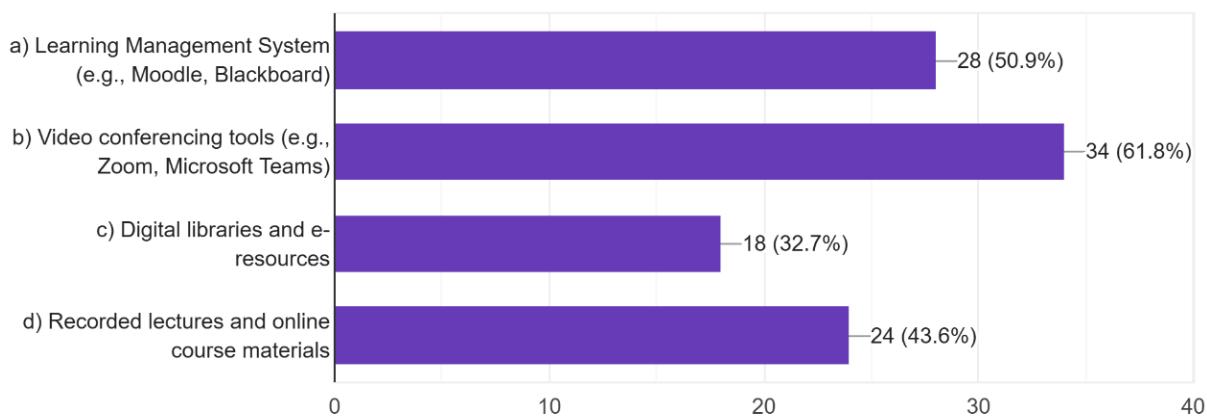
Figure 3: Available digital tools for ODL.

Findings in Figure 3 show that UTG's ODL infrastructure seems to lean heavily on videoconferencing (61.8%) and LMS platforms (50.9%)**,** suggesting a hybrid or synchronous learning model. These were the most commonly acknowledged tools, suggesting that synchronous (real-time) online learning is a major feature of ODL at UTG. However, fewer than half of the respondents were aware of or used recorded content (43.6%) and digital libraries (32.7%)**,** which are vital for flexible, self-paced learning. These results indicate a moderate presence of asynchronous learning resources, though there is room for growth. It also suggests a lack of awareness or utilisation, especially as regards to digital libraries and e-resources. These findings suggest a need to expand and promote access to comprehensive digital resources, particularly asynchronous content and digital libraries**,** to enhance the overall effectiveness of ODL in UTG.

As regards technological challenges, some of the challenges identified are poor Internet connectivity, lack of digital literacy among faculty and students, insufficient information technology support and limited access to computers and devices, as presented in Figure 4. Among these challenges, the most pressing challenge for ODL at UTG is Internet connectivity, which was the most reported challenge selected by 76.4% of the respondents. This is followed by digital literacy gaps, as a significant number of users (70.9%) face difficulties due to limited skills in using digital tools**,** indicating a strong need for training and digital education. The third is weak information technology support**,** potentially hampering troubleshooting and daily operations. All these are foundational to a functioning online learning system**.** Over half of the respondents also faced issues with access to

necessary devices, further compounding the digital divide. To overcome technological challenges for ODL programmes, Fozdar (2015) and Sarr (2021) have posited that investment in technology and infrastructure is the game changer. Therefore, UTG must ensure it invests heavily on ODL infrastructure to run a successful ODL programme.

What are the major technological challenges in implementing ODL at UTG? (Select all that apply)
55 responses
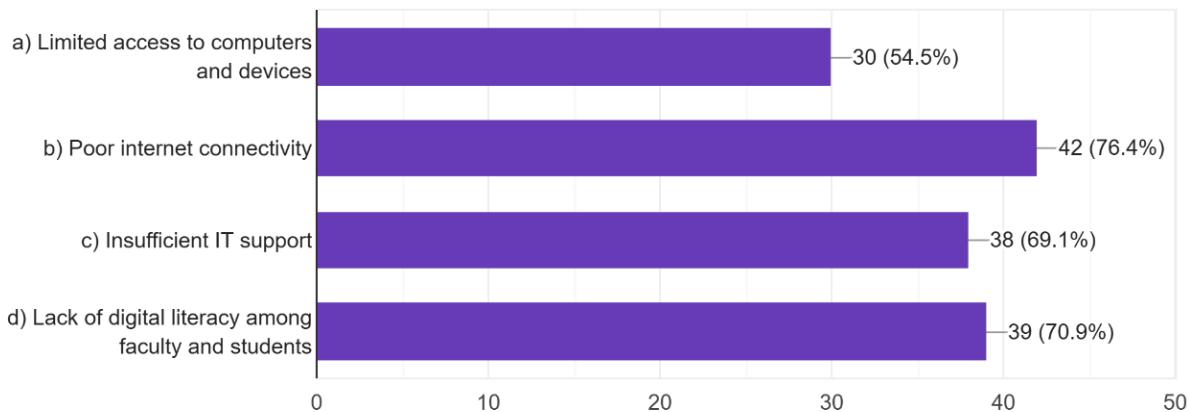
Figure 4: Major technological challenges in implementing ODL in UTG.

Theme 3: Assessment of Learning Experiences from ODL Capacity-building Initiatives

This thematic assessment covered assessing learning experiences from ODL capacity-building initiatives at UTG. It focused on participation, effectiveness, frequency, quality of materials and relevance of training programmes. Table 5 presents the survey results of the assessment.

Table 5: Results of assessment of learning experiences from ODL capacity-building initiatives

	No	Not sure	Yes
Participating in ODL training programme in UTG	16.4%	3.6%	80%
Effectiveness of training in enhancing understanding of ODL	5.5%	7.3%	87.4%
Training improves confidence in using ODL tools	5.5%	9.1%	85.5%
Frequency of attending ODL training session	**2–3 times**	**> 3 times**	**Once**
	43.6%	29.1%	27.3%
Quality of training materials provided	**Excellent**	**Fair**	**Good**
	32.7%	14.5%	47.3%
Relevance of training topics to academic and work responsibilities	**Highly relevant**	**Not relevant**	**Somewhat relevant**
	65.5%	3.6%	30.9%

It can be seen in Table 5 that a strong number (80%) of the respondents have participated in ODL training at UTG. This indicates broad engagement in institutional capacity-building efforts. Most participants (87.4%) found the training effective in improving their understanding of ODL, suggesting the training content is impactful and well delivered. A large majority (85.5%) felt more confident using ODL tools after the training workshops, showing that the programme has positive practical outcomes in capacity-building in UTG. Most participants (combined 72.7%) attended multiple sessions, with 43.6% attending 2–3 times and 29.1% more than 3 times. This indicates consistent and repeated engagement in professional development. A combined 80% of respondents rated the training materials as *good* or *excellent*, showing general satisfaction with the resource quality of the training programmes. A strong majority (65.5%) found the topics *highly relevant* to their roles, reinforcing the practical value of the training programmes. Inferences from the assessment of learning experiences from ODL capacity-building initiatives in UTG can be summarised as follows:

- There was *high* participation and repeat attendance in ODL training, which suggest strong institutional uptake.
- The training programmes were effective, confidence boosting and relevant to most participants.
- Training materials are well regarded, though there is still opportunity to improve from *good* to *excellent*.
- These results indicate that ODL capacity-building efforts at UTG are successful and valued, but continuous improvement in materials and delivery could further enhance outcomes.

A major finding from the key participant interviews conducted is low students' engagement in the ODL training. Students need to be actively engaged in ODL. One of the key informants noted during the interview that ODL has proven to be the most effective way to allow students to remotely take part in class. Although it is not mandatory to attend classes on campus, students must take exams physically on campus.

Theme 4: Role of Collaboration in Enhancing ODL Adoption at UTG

Findings from key informants' interviews suggest that the university is actively seeking partnerships with organisations and companies to support ODL. The university needs devices and Internet subsidies to build a dedicated learning space. The goal is to create an environment where education is not hindered by power outages, lack of devices, or connectivity issues. Partnerships will be key to facilitating ODL in the university. The survey responses regarding the role of collaboration in enhancing ODL adoption at UTG confirm this assertion. The results are presented in Table 6.

Table 6: Survey results on the role of collaboration in enhancing ODL

Role	No	Not sure	Yes	
Awareness of collaborative efforts to enhance ODL at UTG	21.8%	29.1%	49.1%	
	Greatly improved	**Moderately improved**	**Slightly improved**	**No impact**
Collaboration influence on effectiveness of ODL at UTG	29.1%	41.8%	16.4%	12.7%
	Government support	**Industry collaborations**	**Non-governmental organisation and private sector support**	**Partnerships with international institutions**
External collaboration contributing most to ODL growth at UTG	10.9%	1.8%	14.5%	72.7%

The survey focused on internal awareness, perceived impact and key sources of external collaboration. Only half of the respondents were *aware* of collaborative efforts supporting ODL at UTG. The other half were either *unsure* or *unaware*, suggesting that internal communication or visibility of such efforts is limited. Despite the average internal awareness recorded, most respondents (over 70%) believe collaboration has at least *moderately improved* ODL effectiveness, with 29.1% saying it has *greatly improved*. This reflects a positive perception of collaborative efforts, though a minority (12.7%) still see no impact, pointing to inconsistent results or limited involvement in those efforts. As advocated by Sarr (2021), partnership building is one of the strategies to overcome inadequate resources of organisations, Thus, international partnerships are perceived as the primary drivers of ODL growth at UTG, far surpassing other types of external support such as from government and non-governmental organisations. This suggests that global institutions play a critical role in providing resources, technical expertise or strategic support. Furthermore, government and industry collaborations remain minimal or underutilised.

Conclusions

From the findings of both the quantitative and qualitative approaches used in this study, it can be concluded that there is a notable shift in stakeholders' perceptions towards ODL. The majority of respondents have participated in ODL training (80%) and reported *improved* confidence (85.5%) and understanding (87.4%) of ODL. However, substantial proportions still report low awareness of UTG's ODL policies (43.6% *not at all*) and *moderate* institutional support, suggesting that although attitudes are improving, deeper institutional buy-in is still evolving and should be intensified. Findings reveal gaps in policy awareness and readiness for institutional implementation, as only 1.8% felt *extremely aware* of UTG's ODL policy framework. Administrative support is perceived as *moderate* to *very supportive* by around 60%, but over 50% were *unsure* if an LMS is available, indicating inadequate communication or infrastructure gaps. Internet reliability was mostly rated as *moderate* to *poor* (81.8%), and major technological challenges, including poor Internet (76.4%) and low digital literacy (70.9%), highlight ongoing systemic constraints. Despite this, stakeholders

rated their learning experiences positively, with most training participants (87.4%) finding the training *effective* and *relevant* (65.5% rated topics *highly relevant*).

Moreover, over 70% have attended multiple training sessions, and materials were rated *good* or *excellent* by 80%. This shows that capacity-building efforts are well received and impactful, albeit needing broader reach. Collaboration has had a *moderate* to *great* impact on ODL effectiveness for over 70% of respondents. Yet, only 49.1% are aware of such efforts, indicating weak internal visibility. Importantly, international partnerships (72.7%) are seen as the primary drivers of ODL progress, while local partnerships with government, industry and non-governmental organisations remain marginal.

Recommendations

This study provides four strategic recommendations based on the findings from the four thematic assessments.

1. Strengthen awareness and communication of ODL policies
    - UTG management should conduct institution-wide sensitisation campaigns to ensure faculty, students and non-academic staff understand UTG's ODL strategic framework and policy goals.
    - There should be regular updates on ODL developments via newsletters, webinars, and internal platforms like the university portal.

2. Infrastructure and digital access enhancement
    - Invest more in robust Internet infrastructure and negotiating with telecommunication providers to offer affordable data bundles for students and staff.
    - Improve LMS visibility and accessibility across all faculties.
    - Promote a balanced mix of synchronous and asynchronous tools to cater to diverse learner needs.

3. Scale and diversify capacity-building programmes
    - Offer hands-on training continuously, while incorporating advanced digital competencies and subject-specific ODL strategies.
    - Regularly update training materials and collect feedback to ensure content remains relevant and practical.
    - Expand training to reach non-participating staff, especially students, non-academic and technical staff, and integrate incentives for participation.
    - Strengthen the university's information technology support systems, including help desks, on-call technicians and user guides.

4. Deepen and strengthen strategic collaboration, both local and international
    - Although international collaborations are strong, UTG should engage national government agencies to integrate ODL into higher education policy. They should strive not to carry all their eggs in one basket.

- Create a dedicated central ODL unit that will be responsible for policy implementation, stakeholder engagement, technical support and monitoring and evaluation. This unit should also manage collaboration portfolios and lead innovation in ODL delivery.

By addressing these recommendations, UTG can consolidate the gains already made, address existing gaps and build a resilient, inclusive and high-quality ODL system that meets the needs of all learners and educators.

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Appendixes: Statistical Tests on Cross-Cutting Issues

Appendix A: Independent Sample t Test on Gender Influence on Changed Mindset of Individuals

		Levene's test for equality of variances		t test for equality of means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean difference	Std error difference
Changed mindset	Equal variances assumed	.57	.451	-.427	53	.671	-.09884	.23166
	Equal variances not assumed	7		-.515	*24.444	.611	-.09884	.19188

Note. *Welch–Satterthwaite approximation was used, which usually results in a non-integer (decimal) value.

Appendix B: One-Way ANOVA Test on the Influence of Years of Affiliation with UTG on Changed Mindset of Individuals

Ho: Years of affiliation does not influence changed mindset

Source of variation	Sum of squares	Df	Mean square	F	Sig.
Between groups	2.426	4	.606	1.245	.304
Within groups	24.350	50	.487		
Total	26.776	54			

Appendix C: One-Way ANOVA Test on the Influence of the Academic Discipline of Individuals on their Changed Mindset

Ho: Changed mindset does not differ according to academic discipline

Source of variation	Sum of squares	Df	Mean square	F	Sig.
Between groups	2.189	7	.313	.598	*0.75
Within groups	24.587	47	.523		
Total	26.776	54			

Appendix D: One-Way ANOVA Test on the Influence of the Highest Academic Qualification of Individuals on their Changed Mindset

Changed mindset and highest academic qualification

Source of variation	Sum of squares	Df	Mean square	F	Sig.
Between groups	9.272	3	3.091	9.005	.000
Within groups	17.504	51	.343		
Total	26.776	54			

Appendix E: One-Way ANOVA Test on the Influence of Years of Online Exposure on their Changed Mindset

Changed mindset and years of online exposure

Source of variation	Sum of squares	*Df*	Mean square	*F*	*Sig.*
Between groups	6.395	4	1.599	3.922	.008
Within groups	20.381	50	.408		
Total	26.776	54			

Appendix F: One-Way ANOVA Test on the Influence of Age of Individuals on their Changed Mindset

Changed mindset and age of individual

Source of variation	Sum of squares	*Df*	Mean square	*F*	*Sig.*
Between groups	10.251	4	2.563	7.754	.000
Within groups	16.525	50	.330		
Total	26.776	54			

Unlocking the Potential of Open Educational Practices in Bangladesh — Why Mindset Shift Matters

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Abstract

There are numerous programmes aimed at increasing the use of open educational practices (OEP) in higher education, but few examine educators' competencies and mindset to welcome open approaches. The emergence of open education aims to democratise education and provide learners with inclusive, accessible opportunities. However, in addition to institutional policies and technological tools, its success is largely dependent on the inclusive mindset of educators, students and legislators. The research investigated the influence of latent variables, including perceived usefulness, information and communication technology competency, awareness of OEP, and institutional support, on the adoption of OEP via the mediating role of the mindset of educators. This research developed a conceptual model and employed structural equation modelling using partial least squares to examine the effect of the mindset of educators at Bangladesh Open University and intention to adopt to OEP. This study argues that, within the framework of the open education movement, mentality change is the main driver of substantial, long-lasting and equitable educational reform rather than merely a supporting component. In order to increase OEP, this paper suggests that universities should build the competencies of Bangladesh Open University faculty members who are already familiar with open approaches as well as facilitate training and workshops to change the mindset of teachers to adopt OEP.

Keywords: Bangladesh, open education, open educational practices (OEP), mindset shift

Introduction

Open educational practices (OEP) are defined as "practices which respect and empower learners as co-producers on their lifelong learning paths, promote innovative pedagogical models, and support the (re)use and production of Open Educational Resources through institutional policies" (Ehlers, 2011, p. 4). OEP encompass the creation, use and reuse of open educational resources (OER), as well as open pedagogy and teaching practices. It is widely acknowledged that these practices have the potential to improve university effectiveness, quality and accessibility (Tlili et al., 2023). However, it appears that few universities formally promote openness through open education policies including facilitating teachers' awareness, motivation and ability to operate in the open education space — one of the primary facilitators for mainstreaming the adoption of OEP (Zhang et al., 2020). It is challenging to quantify the faculty members' OEP capacity, because openness is a social construct that changes over time.

OEP are influenced by educators' open practices and are dependent on their attitudes and cultural behaviours (Lambert & Funk, 2022). The potential advantages of open education may be widely acknowledged by academic leaders, policymakers, researchers, teachers and managers; however,

they might not have a comprehensive picture of the extent to which educators are adopting OEP (Nascimbeni et al., 2018). Openness can mean different things to different educators in different contexts, and this multifaceted continuum influences OEP awareness and adoption. Numerous studies show that teachers are typically more open in some areas of their work than others, depending on their individual approach to striking a balance between sharing and privacy, as well as contextual factors like national laws and institutions' openness to open approaches (Ballatore et al., 2023; Bozkurt et al., 2023).

Literature Review and Hypotheses Development

Researchers and open education practitioners assert that OEP go beyond content-centred approach, reorienting the emphasis from resources to practices and allowing teachers and students to collaborate on knowledge-creation processes (Halder, 2022; Hood & Littlejohn, 2017). Teachers' use of OEP is intricate, individualised and situational; it is also constantly negotiated. At the individual level, OEP depends on many factors like perceived usefulness, information and communication technology (ICT) competency, awareness, institutional support and the mindset of teachers.

Perceived Usefulness

The assessment of perceived usefulness is critical because it can aid in the adoption of OEP (Naidu & Karunanayaka, 2024). Thus, the perceived usefulness of the OEP can be used to determine how well the learning process is progressing. This suggests that the perceived usefulness of OEP can be employed to evaluate the adaptability of creative teaching methods and the sharing of resources between teachers and students — all of which ultimately improve student learning outcomes (Tlili et al., 2023). The hypothesis presented below examined the relationship between perceived usefulness and OEP adoption:

- H1: There is a significant positive relationship between perceived usefulness and the adoption of OEP.

ICT Competency

Although the advantages of OER and, more generally, OEP have been acknowledged, little research has been done on the competencies required to allow teachers to use these practices (Nascimbeni et al., 2024). The ability to use OEP can be enhanced by ICT proficiency. Digital literacy is a prerequisite for educators who want to use a learning management system and create instructional materials. Additionally, Ghosheh Wahbeh et al. (2022) have indicated that teachers' competencies include managing a classroom, helping students with learning and assessment and creating a welcoming and secure learning environment for students digitally — all of which support OEP. The hypothesis presented below examined the relationship between ICT competency and OEP adoption:

- H2: There is a significant positive relationship between ICT competency and the adoption of OEP.

Awareness of OEP and OER

The pursuit of a more resilient blended education strategy would be greatly aided by increased awareness of OER and engagement with OEP (Halder, 2022). The use of OER and OEP to sustain education faces various challenges at both institutional and individual levels. Bayaga (2022) and Halder (2022) discovered that a lack of awareness of OER, motivation to use OER and training in the use of OER impedes OEP in various contexts. Some teachers are concerned that allowing students to actively participate in course activities by co-creating and contributing would result in their losing control of the teaching process (Menzli et al., 2022). The hypothesis presented below examined the relationship between awareness and OEP adoption:

- H3: There is a significant positive relationship between awareness and the adoption of OEP.

Institutional Support

By engaging teachers in innovative educational experiments and successful teaching strategies, the institution establishes an OER platform to promote education and learning, foster a culture of open education participation and offer chances for a systematic shift in the subject matter of instruction (Halder Adhya et al., 2024). The platform provides the community with an abundance of educational resources that can help create and support meaningful learning and high-quality curricula (Halder, 2022). It also gives students access to courses and educational resources that help them to learn (Stagg et al., 2023). This suggests that institutional support makes it easier to utilise OER, which can help advance OEP. The hypothesis presented below examined the relationship between institutional support and OEP adoption:

- H4: There is a significant positive relationship between institutional support and the adoption of OEP.

OEP are heavily influenced by teachers' practices and mindsets (Naidu & Karunanayaka, 2024). Again, perceived usefulness, ICT competency, awareness and institutional support all help teachers improve their practice and mindset. Teachers' comfort with reusing others' educational content, as well as their understanding of the benefits of collaboration and resource sharing, promote OEP. The following hypotheses examined whether the relationship between the latent variables used in this study and the adoption of OEP is mediated by teachers' mindsets:

- H5: Teachers' mindset mediates the relationship between perceived usefulness and the adoption of OEP.
- H6: Teachers' mindset mediates the relationship between ICT competency and the adoption of OEP.
- H7: Teachers' mindset mediates the relationship between awareness and the adoption of OEP
- H8: Teachers' mindset mediates the relationship between institutional support and the adoption of OEP.

Conceptual Framework

After reviewing several resources (Baharuddin et al., 2024; Naidu & Karunanayaka, 2024; Tarling & Gunness, 2021), we arrived at the following conceptual framework (Figure 1). In this framework, we hoped to ascertain how much of an effect awareness of OEP (AWR), perceived usefulness (PU), ICT competency (ICT), institutional support (IS) and educators' mindset (EM) have on the adoption of OEP (AOEP). A potential moderating factor is the educators' mindset (EM).
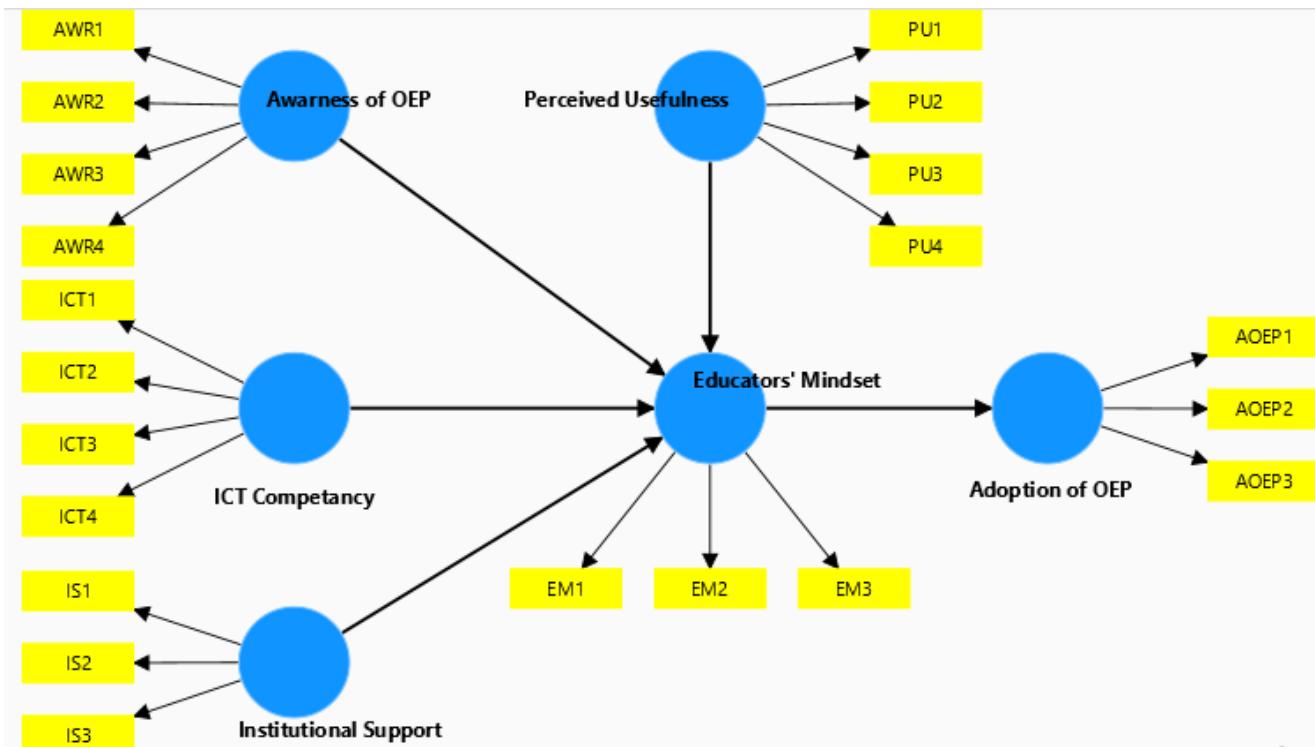
Figure 1: Framework for direct as well as specific indirect effect of the variables.

Source: Authors' own work

Methods

The study employed a reflective multi-indicator model to examine hidden factors and construct scales to determine how the variables influence OEP adoption among Bangladesh Open University faculty members. A survey questionnaire was sent to all 147 Bangladesh Open University teachers in December 2024 and January 2025. A five-point Likert scale with the options of *strong agreement* or *strong disagreement* was included in the questionnaire for this investigation. A total of 53.74% of respondents completed the survey. Of the 79 responses received, 6 were excluded due to incomplete data, resulting in 73 valid responses, which were used for the final analysis.

The data was analysed using structural equation modelling, which establishes connections between latent variables and observed indicators in a theoretical model. The model parameters were calculated using the statistical tool Smart PLS version 4.0. The Smart PLS analysis began by evaluating the measurement model, which includes the reliability and accuracy of the study's

measurements. The direction and intensity of the latent variable connections were then validated against the structural model using route analysis. Through mediation analysis, the impact of a mediator on OEP adoption was also investigated.

Table 1: Demographic characteristics of the respondents

Characteristic	Total	Percentage (%)
Gender		
Male	41	56%
Female	32	44%
Age group in years		
30–40	33	45%
40–50	29	40%
50–60	11	15%
Experience in years		
0–10	40	55%
10–20	21	29%
20–30	12	16%

Source: Authors' compilation.

The demographic data (Table 1) of the respondents shows that male respondents numbered more than female respondents. Additionally, most of the respondents were in the 30–40 age range and had fewer than 10 years of working experience.

Table 2: Constructs and their measurement

Variable	Code	Measurement statement	Source
Adoption of OEP	AOEP1	I regularly use open educational resources (OER) in my courses.	Tai & Ku (2013); Zhou et al. (2010)
	AOEP2	I publish my own materials under an open license (e.g., Creative Commons).	
	AOEP3	I collaborate with peers online to co-create learning resources.	
Perceived usefulness	PU1	Using OEP enhances the quality of my teaching.	Frenzel et al. (2023); Jain et al. (2022);
	PU2	OEP helps students access learning materials more easily.	
	PU3	Adopting OEP allows for more flexible and innovative teaching practices.	
	PU4	OEP positively contributes to student learning outcomes.	
ICT competency	ICT1	I am confident in using learning management systems (e.g., Moodle, Google Classroom).	Al-Mamary, (2022); Foon & Fah (2011)
	ICT2	I know how to upload and share my teaching materials online.	
	ICT3	I am able to apply Creative Commons or other open licenses to my work.	
	ICT4	I regularly use digital platforms to collaborate with other educators.	
Awareness of OEP	AWR1	Slow Internet speeds have significant impact on using blended teaching	Featherman & Pavlou (2003)
	AWR2	Server unavailability has an impact on using BT for financial transactions.	

Variable	Code	Measurement statement	Source
	AWR3	BT may not function properly and mishandle financial transactions.	
	AWR4	It worries me, if transactions go wrong, they may not be corrected.	
Educators' mindset	EM1	I feel comfortable reusing others' educational content with proper credit.	Tai & Ku (2013)
	EM2	Open practices are risky and reduce the uniqueness of my work.	
	EM3	I believe students benefit when educators collaborate and share resources.	
Institutional support	IS1	I have access to resources and training on OEP.	Tang et al. (2024)
	IS2	Policies at my institution support the use of open licensing.	
	IS3	There are incentives for faculty to adopt OEP.	

Results and Discussion

Structural Model Assessment

Table 3: R-square

Particulars	R-square	R-square adjusted
Adoption of OEP	0.356	0.349
Educators' mindset	0.534	0.514

Source: Authors' computation.

The model explains 35.6% of the variance in the adoption of OEP (Table 3). The adjusted R^2 of 34.9% is marginally lower, suggesting that certain factors may not be significantly contributing. Furthermore, the model accounts for 53.4% of the variance in educators' mindset. The adjusted R^2 of 51.4% indicates a satisfactory fit, suggesting that the majority of predictors have significant contributions. If the objective is to comprehend the educators' mindset, the model is more dependable. When explaining how things are used, the model does not fit perfectly, so more parts may be needed to make better predictions.

Table 4: Construct reliability and validity

Construct	Cronbach's alpha	Composite reliability (rho_a)	Average variance extracted (AVE)
Adoption of OEP (AOEP)	0.900	0.900	0.834
Awareness of OEP (AWR)	0.927	0.928	0.872
Educators' mindset (EM)	0.901	0.910	0.771
ICT competency (ICT)	0.876	1.025	0.708
Institutional support (IS)	0.944	0.952	0.856
Perceived usefulness (PU)	0.921	1.003	0.859

Source: Authors' calculation.

Extensive research (Bergmann et al., 2022; Cheung et al., 2024; Izah et al., 2023) on the constructs' validity and reliability has shown high levels of internal consistency and measurement accuracy.

The reliability ratings for all structures range from 0.876 to 0.944 (Table 4), which is considered high to exceptional. Composite reliability (ρ_a) values also surpass 0.90, which further supports the measuring approach's resilience. Further investigation is warranted due to the possibility of multicollinearity or estimation mistakes, as both ICT and PU have combined reliability scores greater than 1.0. Strong convergent validity is indicated by AVE values greater than 0.70. What this means is that the indicators of each concept account for a significant portion of the total variation. Validity and reliability of the measurement model are demonstrated by the outcomes. Nevertheless, it is possible that a few tweaks are necessary to address the unexpectedly high composite reliability numbers.

Table 5: Discriminant validity

	AOEP	AWR	EM	ICT	IS	PU
Heterotrait-monotrait (HTMT) ratio						
AOEP						
AWR	0.653					
EM	0.613	0.702				
ICT	0.453	0.461	0.412			
IS	0.505	0.563	0.495	0.513		
PU	0.305	0.462	0.400	0.237	0.449	
Fornell-Larker criterion						
AOEP	0.913					
AWR	0.596	0.934				
EM	0.554	0.650	0.878			
ICT	0.445	0.481	0.427	0.842		
IS	0.467	0.533	0.462	0.505	0.925	
PU	0.286	0.455	0.376	0.237	0.439	0.927

Source: Authors' calculation.

The HTMT ratio and Fornell-Larcker criterion evaluate discriminant validity, ensuring that constructs within a model are distinct (see TAble 5):

- HTMT ratio interpretation: The HTMT values should preferably be below 0.85 (some research (Mohd Dzin & Lay, 2021; Rosli et al., 2024) permits values up to 0.90). The majority of values are below 0.85, signifying sufficient discriminant validity. The maximum HTMT value is 0.702 (between EM and AWR), which falls within an acceptable range. This indicates that components are distinctly defined in the model; nevertheless, EM and AWR exhibit some correlation and may require additional analysis.
- Interpretation of the Fornell-Larcker criterion: The square root of each construct's AVE is shown by the diagonal values. The values should exceed the correlations found in their respective rows and columns. The values located on the diagonal of this table exceed those found in the corresponding off-diagonal positions. The variance associated with each construct exceeds that of the other constructs. This confirms sufficient discriminant validity across the model.

Result Interpretation and Hypotheses Testing
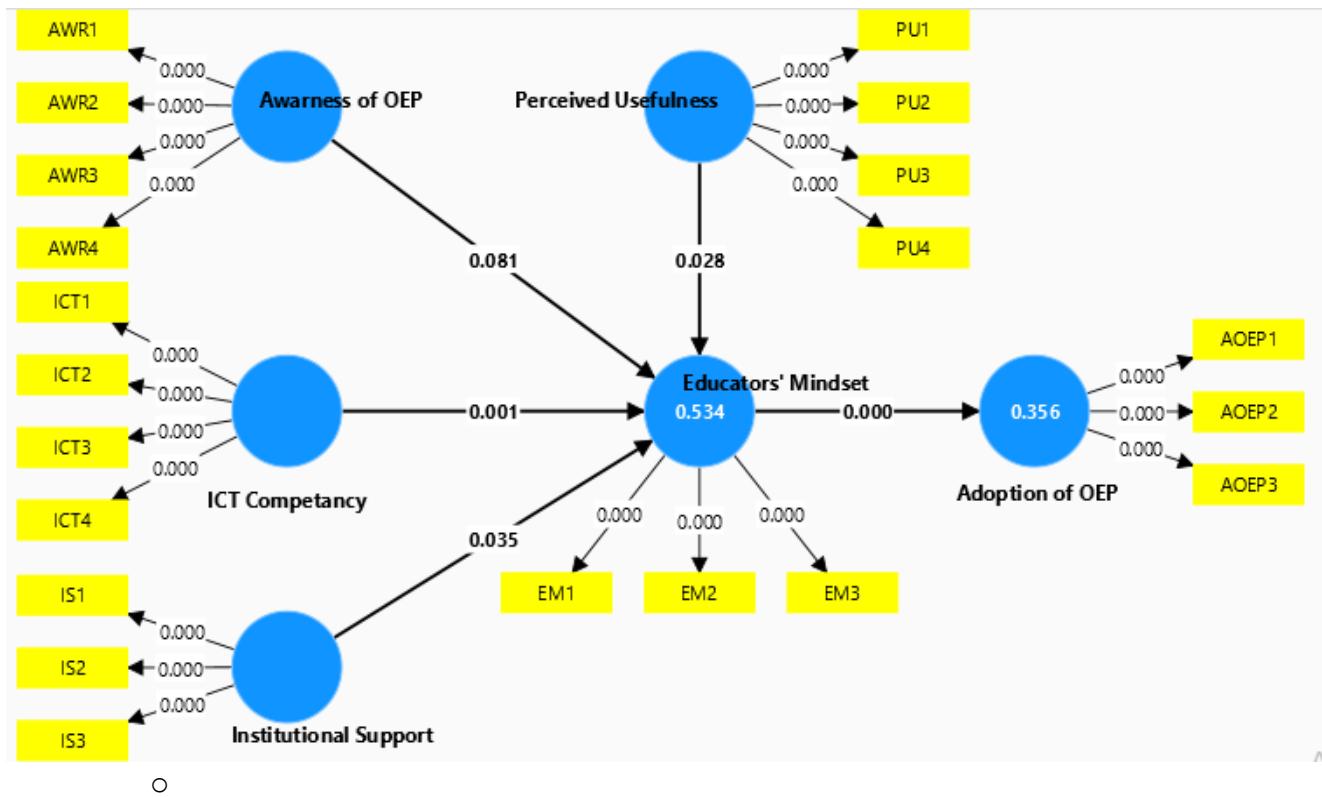
Figure 2: Result for testing the hypotheses.

Source: Authors' own work

Table 7: Direct effect analysis

Relationship	Beta (β)	SD	t statistic	p value	Decision
AWR ---> AOEP	0.596	0.079	7.596	0.00	Significant
EM ---> AOEP	0.433	0.135	3.203	0.001	Significant
ICT ---> AOEP	0.168	0.077	2.197	0.028	Significant
IS ---> AOEP	0.170	0.098	1.744	0.081	Not significant
PU ---> AOEP	0.177	0.084	2.104	0.035	Significant

Source: Authors' own calculation.

The findings of the path analysis show that AWR has a considerable impact on Adoption of OEP (β = 0.596, p = 0.000), which means that users' awareness is a very good indicator of their adoption of OEP (Table 7). ME significantly affects AOEP, as shown by a coefficient of 0.433 and a p value of 0.001. Both ICT and PU have significant but relatively weak effects (β = 0.177, p = 0.035 and β = 0.168, p = 0.028, respectively). Factors such as peer pressure and security worries impact user intent. IS does not significantly impact AOEP in this scenario, since IS (β = 0.170, p = 0.081) is not statistically significant. According to the data, EM is the most important factor in determining whether or not an open education system is used, but PU, ICT and IS of use all play a role.

Table 8: Mediating effect analysis

Relationship	Beta (β)	SD	*t* statistic	*p* value	Decision
ICT ---> EM ---> AOEP	0.258	0.092	2.804	0.005	Significant
PU ---> EM ---> AOEP	0.100	0.048	2.098	0.036	Significant
IS ---> EM ---> AOEP	0.102	0.062	1.651	0.099	Not significant
AWR ---> EM ---> AOEP	0.106	0.052	2.040	0.041	Significant

Source: Authors' own calculation.

These results show that ICT, PU and AWR have an immense impact on AOEP through ME, but IS does not (Table 8). The most robust indirect predictor is ICT (β = 0.258, *p* = 0.005), indicating that users who perceive the system as user-friendly are more inclined to intend to use it and then participate in real usage. AOEP (β = 0.106, *p* = 0.041) and PU (β = 0.100, p = 0.036) have significant indirect effects, indicating that these factors influence AOEP via EM. Nonetheless, IS (β = 0.102, *p* = 0.099) is not statistically significant, suggesting that users' anticipations regarding institutional support do not significantly influence AOEP through EM.

Conclusions and Recommendations

The shift to OEP is more closely associated with the mindset of educators and policymakers than it is with technological lag or a lack of appropriate regulations. The study's conclusions directly address the need for a change in perspective. The use of traditional pedagogy and resources impedes the advancement of OEP and poses the biggest risk of copyright infringement. To make education more accessible and affordable, more research may be done to determine the main obstacles that educators and policymakers still face when attempting to mainstream OEP into the educational system in developing nations like Bangladesh.

Based on the findings of the study, we recommend the following strategies:

- Training and development: Include digital literacy and pedagogy with an OEP focus in teacher preparation programs.
- Co-creation culture: Support faculty members and students in co-creating, adapting and sharing open resources with one another.
- Institutional culture and policy: Create institutional guidelines that encourage cooperation, creativity and open sharing.
- Acknowledgment of best open practice: Give credit to teachers who support open education programmes.
- Motivate students to train students to access, evaluate and co-create OER responsibly.
- Awareness campaigns: Start nationwide awareness campaigns to debunk myths about OEP and highlight its advantages for lifelong learning and equity.
- Collaboration and partnerships: Encourage cooperation between non-governmental organisations, government agencies, universities and international OEP communities.

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Pedagogy of Care in a Blended Teaching and Learning Distance Teacher Education Programme

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Abstract

With the push towards Society 5.0, which places human beings at the centre of technology, the pedagogy of care becomes very important. Although well known in a face-to-face teaching and learning context, there is still a deficit of research in the blended environment. This ongoing study adopted a sequential explanatory mixed-methods research design using a survey, a paired interview and three individual interviews. The study's purpose was to examine the extent to which the pedagogy of care is embedded in teaching and learning. The population comprised postgraduate teacher education students and presenters or tutors at a university in an emerging economy. A purposive and convenient sample was used. Data analysis involved descriptive statistics and thematic analysis. Situated within Society 5.0 and the ethics of care of Noddings (2013), the findings are envisaged to shed light on the quality of the programme and proffer suggestions for its enhancement, which will be useful for institutions in similar settings running similar programmes.

Keywords: teacher education, pedagogy of care, Society 5.0, blended teaching and learning, quality

Introduction

Japan coined the term *Society 5.0* in 2016 to reflect the society following the hunter (1.0), agrarian (2.0), industrial (3.0) and information societies (4.0) (Yulianto, 2021). It is a super smart society that envisages the seamless incorporation of the physical and virtual worlds into a more balanced and all-encompassing society (De Villiers, 2024). It is a society "that can solve various social challenges and problems by utilising various innovations that were born in the era of the Industrial Revolution 4.0… to improve the quality of human life" (Yulianto, 2021, p. 275). Its focus shifts to the human-centredness of technology.

Technology (with its fluidity) has influenced all facets of human life, which necessitates continual change in education practices. This has led to the teaching approach known as face-to-face, hybrid, blended and online learning. Integrating technology into education may not necessarily lead to the envisaged human-focused sustainable society unless educators develop innovative practices and skills (De Villiers, 2024). Critics of technology in education assert that neoliberalism has regularised the participation of "big tech" in education at the cost of care and humanising practices (Gleason & Mehta, 2022). Therefore, digital transformation, digital literacy and creative thinking in response to students' learning needs should be paramount (Tavares et al., 2022). One cannot undermine the technological affordances that make care possible. If only educators and students could be assisted to maximise them through ongoing training and practices, and adequate infrastructure (Vieira et al., 2023).

Caring for students in a face-to-face mode is a given because of the personal contact between lecturers and students. Due to its immediate value, a mode that adopts online teaching, irrespective of the percentage of online content, needs attention (Kızılcık & Dewan Türüdü, 2022). Although still in its embryonic stage, literature on blended learning reveals some research on how a pedagogy of care can be integrated into the online space, taking the affordances of technology into consideration (Kızılcık & Dewan Türüdü, 2022).

Pedagogy of Care in Blended Teacher Education

Noddings' (2013) pedagogy of care theory was adopted as a theoretical basis for this study. The study focuses on caring through the eyes of students (Wardak, 2021). Noddings's theory and the core framework of Society 5.0 (Yulianto, 2021) both focus on the human-centred value of care. Gordon et al. (1996, p. 13) described care as "a set of relational practices", which is action orientated. It is related to other attributes such as empathy, compassion and "the use of communication and the development of rapport" (Strachan, 2020, p. 54).

Educators who exhibit a pedagogy of care illustrate an openness to "getting to know students, their needs and concerns", seeing students as "important participants in the learning process", allowing their voices to be heard and their experiences valued (Thayer-Bacon & Bacon, 1996, as cited in Strachan, 2020, p. 54). Care encourages active engagement, better self-esteem and well-being, especially for at-risk students, and a safe and supportive learning environment for establishing relationships (Wardak, 2021).

Noddings (2005, 2012) developed a framework with four interrelated components: modelling, dialogue, practice and confirmation.

Although technological advancements provide affordances to mimic face-to-face care pedagogy, the literature confirms they work differently online (Henriksen et al, 2022), which necessitates ongoing training and support. This is very true in blended learning, which uses additional asynchronous content and is widely used in developed and emerging economies to mitigate contextual challenges (Glover & Stewart, 2023). The purpose of the study was to examine the extent to which care pedagogy is embedded in the teaching and learning of a postgraduate distance teacher education programme in an emerging economy.

Methods

Research Design

The sequential explanatory mixed-methods research design, which combines quantitative and qualitative methods, was adapted. This was done to involve more students and further probe findings from the survey (Creswell, 2014).

Population and Sample

Convenience and purposive sampling were used to select the participants. For the survey, a sample of 263 teacher education students was selected from a population of 1,800 using the table of Krejcie and Morgan (1970). Based on this table, a sample of 317 is required for a population of 1,800. However, only 263 of the 330 questionnaires that were sent out were returned.

Context

The participants were from an uneven technological landscape, with the majority being middle aged. The learning management system (LMS), clickUP, supports the blended mode.

Instruments

A Google survey form (with closed and open-ended question items) was developed with four biographical question items and 22 questions guided by the components of Noddings' (2013) pedagogy of care theory. An interview guide was developed from the survey data.

Procedure

Survey
Before sending the link to the survey, Student Administration sent an alert SMS to the students.

Interviews
The respondents received an SMS to request their voluntary participation in the interview. One paired interview and three individual interviews were conducted. The data collection adhered to institutional ethical guidelines.

Data Analysis

Google analysed the close-ended question items presented in descriptive statistics, while the open-ended questions and the focus group discussion transcription were analysed thematically (Creswell, 2014).

Findings

The findings from both the quantitative and qualitative data have been reported corroboratively to examine the extent of the pedagogy of care embedded in the programme's teaching and learning. Survey findings are based on the validated data from 261 respondents who answered all or the majority of the questions, with the exclusion of two respondents who answered fewer than half the questions. S1 refers to responses from the survey and P1 to P5 refers to the interview participants.

Demographic information of respondents

Of the respondents, nearly half, 43.3% (113), were aged 25-34 years, 33.7% (88) were aged 35-44 years and 18.8% (49) were aged 45-54 years, while fewer than 2% were aged 18-24 years, 55-64 years and 65 years and older.

Pedagogy of care

This section is structured according to the four elements in Noddings' (2013) pedagogy of care theory.

Modelling

Responses on the extent to which respondents felt welcome at the beginning of the module were as follows: 29.5% (77) felt *extremely welcome*, 29.5% (77) felt *somewhat welcome*, 19.9% (52) did *not* feel *very welcome* and 20.8% (53) did *not* feel *welcome at all*. Cumulatively, 59.0% (144) felt *welcome*, while 40.2% (105) did *not* feel *welcome*. A reason provided was the difficulty of the research module (S39).

Table 1 illustrates the respondents' impression of the extent to which the module co-ordinator took time to plan the module. Cumulatively, 86.9% (227) confirmed the availability of clear, detailed explanations, 80.8% (211) confirmed that simplified resources were used, 73.2% (191) confirmed that understanding was checked and monitored, 53.3% (139) confirmed the provision of relevant resources, while 42.2% (110) did not.

Table 1: Respondents' impression of the module co-ordinator's planning of the module

Items	Strongly agree	Agree	Disagree	Strongly disagree	No response	Total
Clear, detailed explanations	99 (37.9%)	128 (49.0%)	20 (7.7%)	4 (1.5%)	10 (3.8%)	261
Providing a variety of resources relevant to your context	0 (0.0%)	139 (53.3%)	19 (7.3%)	91 (34.9%)	12 (4.6%)	261
Using simplified resources	83 (31.8%)	128 (49.0%)	33 (12.6%)	6 (2.3%)	11 (4.2%)	261
Checking and monitoring your understanding	71 (27.2%)	120 (46.0%)	47 (18.0%)	12 (4.6%)	11 (4.2%)	261

A reason provided for agreement was, "I could relate to the content and the way the learning material was prepared" (P2). Reasons given by those who disagreed related to their perception of the module's difficulty level and the extra assistance needed with academic writing. The availability of recorded lectures on the LMS was confirmed by 82.4% (215), while 14.9% (39) did not. Follow-up with P3 showed that the interviewee had never accessed clickUP.

Considering the respondents' impression of the tutor's helpfulness in terms of sending reminders, 44.8% (117) found this *extremely helpful*, 39.5% (103) found it *somewhat helpful* and 12.3% (32) found it *unhelpful*. Furthermore, 35.6% (93) found turnaround time on assessment feedback *extremely helpful*, 41.0% (107) found it *somewhat helpful* and 19.1% (50) found it *unhelpful*. Likewise, 39.5% (103) found willingness to help *extremely helpful*, 37.5% (98) found it *somewhat helpful*, and 18.0% (47) found it *unhelpful*. In terms of responding to needs in a supportive manner, 37.9% (99) found it *extremely helpful*, 39.5% (103) found it *somewhat helpful*, and 18.4% (48) found it *unhelpful*. The reasons given for unhelpfulness included "communication with rude tutors" (S59) and "lack of academic support by experienced tutors" (S200).

Dialogue

Regarding communication, 57.9% (151) used the number in the Student Administration Booklet for administrative matters, while 41.4% (108) did not. Furthermore, 68.6% (179) sent an email to the unit, while 30.7% (80) did not. In addition, 65.1% (170) knew the numbers to call for academic matters, while 34.9% (91) did not. Finally, 36.4% (95) have called these numbers, while 63.2% (165) have not.

Respondents rated the quality of service received after sending an email to the Unit for Distance Education as follows: *excellent*: 29.5% (77), *very good*: 27.6% (72), *good*: 28.4% (74), *fair*: 7.3% (19), *poor*: 2.7% (7). Cumulatively, 92.7% (242) found the service impressive. The call to the unit was rated *excellent*: 21.5% (56), *very good*: 23.4% (61), *good*: 31.8% (83), *fair*: 8.8% (23), *poor*: 3.8% (10). Cumulatively, 85.5% (223) found the service impressive. They rated administrative matters as *excellent*: 28.7% (75), *very good*: 26.4% (69), *good*: 27.2% (71), *fair*: 8.4% (22), *poor*: 2.7% (7). Cumulatively, 90.8% (237) found the service impressive. They rated academic matters *excellent*: 26.8% (70), *very good*: 22.6% (59), *good*: 32.6% (85), *fair*: 7.3% (19), *poor*: 3.4% (9). Cumulatively, 89.3% (233) found the service impressive. Generally, the findings attested to the quality and promptness of the services.

The respondents' use of the discussion board in clickUP was rated as follows: *to a great extent*: 26.4% (69), *somewhat*: 29.9% (78), *very little*: 25.3 % (66), *not at all*: 18.4% (48). The feedback on the value the respondents placed on others' usage of the discussion board showed that other students are valued *to a great extent*: 49.0% (128), *somewhat*: 28.4% (74), *very little*: 16.9% (44), *not at all*: 4.6% (12). Tutors were valued *to a great extent*: 37.9% (99), *somewhat*: 31.4% (82), *very little*: 18.4% (48), *not at all*: 7.7% (12). Although those who used the platform placed much value on others' usage of it, most of the interviewees did not participate much on the platform. One commented, "But I didn't engage too much on the discussion board because at times you'd see about 30 participants, but only two were participating. And whenever you pose a question, sometimes a question will just get ignored" (P2).

Practice

Respondents rated their opportunities to interact with other students in the module. They rated the use of shared online documents: *to a great extent*: 42.9% (112), *somewhat*: 31.4% (82), *very little*: 14.6% (38), *not at all*: 8.0% (21); their use of the discussion board: *to a great extent*: 37.9% (99), *somewhat*: 39.5% (103), *very little*: 11.9% (31), *not at all*: 6.1% (16); and their use of group work: *to a great extent*: 28.0% (112), *somewhat*: 36.0% (94), *very little*: 19.5% (51), *not at all*: 13.0% (34).

They also rated their respect for one another's views in the module: *to a great extent*: 34.5% (90), *somewhat*: 33.0% (86), *very little*: 18.8% (49), *not at all* 10.7% (28). Connectedness was rated as follows: with learning materials: *to a great extent*: 48.7% (127), *somewhat*: 33.3% (87), *very little*: 11.1% (29), *not at all*: 5.0% (13); with tutor: *to a great extent*: 26.4% (69), *somewhat*: 38.3% (100), *very little*: 22.6% (50), *not at all*: 9.2% (24); and with other students: *to a great extent*: 37.5% (98), *somewhat*: 35.6% (93), *very little*: 15.7% (41), *not at all*: 8.0% (21). The same sub-theme was rated as follows: *greatly*: 37.2% (97), *somewhat*: 28.0% (73), *very little*: 19.2% (50), *not at all*: 13.8% (36).

Confirmation
Respondents rated their tutors' expectations: high expectations: 33.0% (86), *somewhat*: 34.5% (90), *very little*: 18.0% (47), *not at all*: 13.8% (36); receiving praise from their tutor: *greatly*: 16.9% (44), *somewhat*: 29.1% (76), *very little*: 30.7% (80), *not at all*: 16.5% (43); constructive feedback from assessment: *greatly*: 24.2% (62), *somewhat*: 33.0% (86), *very little*: 25.3% (66), *not at all*: 16.1% (42); and constructive feedback on their assessment: *strongly agree*: 24.5% (63), *agree*: 33.5% (86), *disagree*: 25.7% (66), *strongly disagree*: 16.3% (42).

Table 2: Respondents' impression of the extent to which tutors valued individuality, respected fundamental humanity, gave room for equity, inclusivity and diversity and showed respect

Statement	Strongly agree	Agree	Disagree	Strongly disagree	No response	Total
My individuality is valued.	77 (29.5%)	142 (54.4%)	22 (8.4%)	12 (4.6%)	8 (3.1%)	261
Fundamental humanity is respected.	93 (35.6%)	141 (54.0%)	10 (3.8%)	8 (3.1%)	9 (3.4%)	261
There is room for equity.	89 (34.1%)	134 (51.3%)	24 (9.2%)	8 (3.1%)	6 (2.3%)	261
There is room for inclusivity and diversity.	90 (34.5%)	134 (51.3%)	19 (7.3%)	9 (3.4%)	9 (3.4%)	261
I feel respected.	97 (37.2%)	129 (49.4%)	11 (4.2%)	10 (3.8%)	14 (5.4%)	261

Cumulatively, 83.9% (219) accepted that their tutor valued their individuality, 89.6% (234) accepted that their tutor respected their fundamental humanity, gave room for equity: 85.4% (223) and inclusivity and diversity: 85.8% (224), and they felt respected: 86.6% (226).

Major challenges faced by the respondents were communication with administrative personnel, students and tutors were most mentioned, followed by the lack of timely feedback on assignments, ineffective communication from the discussion board, lack of interaction with tutors and classmates, the problem of isolation, module content, time management, lack of resources, deficiency in technological skills, lack of respect and support.

Discussion

The demographic findings showed that the students currently enrolled for the Bachelor in Education (Honours) programme are younger, with a tendency to be more open to the use of technology (Aluko, 2021a). The mode perfectly fits into Society 5.0, which facilitates the integration

of both the physical and virtual worlds (Yulianto, 2021). The findings are discussed in terms of the four elements of the Noddings' (2013) pedagogy of care theory.

Modelling refers to a lecturer's ability to serve as an example of care. Most of the respondents agreed that the module co-ordinator had taken the time to plan the module. According to Noddings (2013), one cares for something or someone one has regard for. However, the negative responses showed not all the respondents enjoyed care in the module. Nonetheless, most of the respondents felt welcome. They also found the tutors helpful and supportive. However, not all of them agreed. An expression such as "There is not much care and support shown to distance education students" (S170) was concerning. We also wondered why 14.9% (39) of the respondents claimed recorded lectures were not available on the LMS. This was found to be false. One of the interviewees (P4) had never logged onto the LMS. Research (Aluko & Ooko, 2022; Anderson & Rivera-Vargas, 2020) indicates diverse reasons for this in the study context, among which could be the laggers. This could be an early indication of non-completion, which has plagued this mode of learning (Aluko, 2021b). In addition, the findings corroborate findings that tutors are a large and valuable part of distance education staffing (Maré & Mutezo, 2020).

Dialogue refers to engagement with students, including personal communication opportunities (on administrative and academic matters), prompt responses to emails, and feedback on various course elements and nurturing a feeling of care (Kızılcık & Dewan Türüdü, 2022). Generally, although the institution has made diverse forms of support available, about a third of the respondents were yet to maximise these. Nonetheless, the majority of the respondents were positive about the quality of the service provided due to its promptness and their needs being met. The quality of the services rendered could explain why many did not see a need to send an email or call the helpline. The findings also revealed that a number of respondents did not use the discussion board or used it sparingly, which appears to be a trend in the institution's distance education programmes (Aluko, 2021a). Literature asserts that students rarely participate in this tool when they know there are no incentives attached to it. They mostly use it only to ask questions, which could indicate a lack of in-depth learning (Fourie, 2019). Conversely, non-usage could be due to technological challenges as indicated by a respondent (S83): "Use of technology? To be honest, I'm not good at it, I would prefer hard copies". However, Burke and Larmar (2020) have emphasised the need for academics to be intentional in module planning to integrate prospects for dialogue.

Practice refers to opportunities created by the module co-ordinator to allow students to interact with other students, tutors and their learning materials. This creates connectedness, which is important for practising and reflecting on care (Noddings, 2005). The respondents were given opportunities to practise care, thus switching roles and becoming carers to understand, share and support others (Kızılcık & Dewan Türüdü, 2022). Again, there were respondents who never availed themselves of these opportunities. Reasons may be related to technological challenges.

Care can be shown through *confirmation.* Smith (2024) described care as an act of fostering and inspiring the best in others. Although the findings show much confirmation by the tutors in the module, evidence from the open-ended responses illustrated an encounter with "rude tutors" (S101). Research shows that confirmation motivates students (Rubie-Davies & Hattie, 2024). There was also the question of feeling isolated. A comment such as "lack of face-to-face interaction with instructors and classmates exacerbate feelings of isolation. This emotional challenge further

impacts motivation and time management" (S20) was worrisome. Although technological advancements provide affordances to mimic face-to-face care pedagogy, the literature confirms they work differently online (Henriksen et al., 2022). This necessitates ongoing training and support for users. Furthermore, the problem could be a lack of access to technology, as exemplified by this statement: "Living far away and lack of technology resources and no data". There is evidence that emerging economies need to do more to improve connectivity (Tian, 2025), while institutions should be more innovative.

Although findings show the programme mostly aligns itself with the elements of Noddings' (2013) pedagogy of care and Society 5.0 (Yulianto, 2021), the shortcomings do not entirely demonstrate a desirable way of caring for others (Noddings, 2005). In distance education, a student can represent a substantial number of students due to the large numbers enrolled in a programme. Therefore, negative views should be taken seriously.

Conclusion and Recommendations

Effective teaching takes place within the confines of interactions between students and lecturers (Strachan, 2020). At the core of caring is a relationship (Gordon et al., 1996). This study focused on the sparse area of students' perceptions of the pedagogy of care. Technology affordances, if used well, can assist module co-ordinators to build care into modules. This is true in blended learning, which uses additional asynchronous content and is widely used in developed and emerging economies to mitigate contextual challenges (Aluko, 2021a; Glover & Stewart, 2023). For care to be more embedded in this mode, providing initial and continuous training for tutors in their roles is important. In addition, module co-ordinators need to be trained on how to build care into their module from its inception. Attaching marks to student participation on the discussion board can serve as an incentive for them to use more technology, enhancing their sense of care. Lastly, institutions should constantly monitor their programme offerings to ensure quality. "Research shows that students who believe their teachers are caring for them are more likely to engage with the class and exhibit higher levels of self-esteem and well-being" (Wardak, 2021, p. 319).

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Enhancing Teacher–Student Interaction through Open Education in Hybrid Learning in Cameroonian Universities

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Abstract

The rapid expansion of hybrid learning following the Covid-19 pandemic has significantly transformed the pedagogical landscape of Cameroonian universities. Although it has increased access and flexibility, it has also compromised meaningful teacher–student interaction, a key determinant of academic success. Open educational resources (OER), as freely accessible and adaptable instructional materials, emerge as viable tools to bridge this interactional gap. This paper used a mixed-methods case study involving the Universities of Yaoundé I and Buea to examine the current use of OER in hybrid settings and their influence on pedagogical interaction. Findings suggest that although OER improve access to content, interaction remains limited by infrastructural deficits, digital illiteracy and policy gaps. Drawing on both local data and global case studies, the paper presents strategies to enhance teacher-student interaction through OER, advocating for culturally responsive pedagogy, policy coherence and institutional capacity building.

Keywords: open educational resources, hybrid learning, teacher–student interaction, Cameroon, digital pedagogy, higher education

Introduction

The Covid-19 pandemic catalysed a global transition in education, accelerating the adoption of hybrid learning models that combine online and face-to-face instruction. In higher education, this shift has been particularly pronounced in Sub-Saharan Africa, where digital transformations were previously uneven and often fragmented (Gudoniene et al., 2025). In Cameroon, the abrupt move to hybrid learning exposed significant infrastructural, pedagogical and policy gaps, especially in maintaining meaningful teacher–student interaction — a cornerstone of quality education (Béché, 2020; Haji 2022).

In the Cameroonian context, teacher–student interaction has historically been shaped by face-to-face, lecture-centred approaches rooted in a rigid educational culture that emphasises teacher authority and rote learning (Haji 2022). The transition to digital learning environments disrupted this dynamic, demanding new pedagogical strategies and technological integration. However, the deployment of hybrid models has not always been accompanied by adequate training, resource investment or reorientation of instructional practices (Haji 2024; Ministry of Higher Education, 2021). As a result, many instructors and learners struggle to engage meaningfully, leading to increased transactional distance and reduced motivation, particularly in large public institutions like the University of Yaoundé I and the University of Buea.

Open educational resources (OER) have emerged as a potentially transformative solution. Defined as openly licensed teaching and learning materials freely accessible for use and adaptation (UNESCO, 2019; Wiley, 2014), OER offer a promising avenue to address both the equity and interactional challenges of hybrid learning. In theory, OER can support dialogic pedagogy, encourage learner agency and foster collaborative knowledge construction especially in low-resource settings where access to quality materials is limited (Hilton, 2016; Mishra, 2017). Nevertheless, their potential remains underutilised in many Cameroonian universities due to institutional silos, lack of policy coherence,and minimal investment in capacity building (Haji, 2024).

Recent global research reinforces the importance of intentional instructional design in hybrid environments. Studies by Eslit (2023) have shown that hybrid learning requires sustained teacher presence, timely feedback and emotionally resonant engagement to be effective. In South and South-east Asia, Puspitasari (2023) has documented how the integration of culturally contextualised OER significantly improves student motivation and interaction. Similarly, Van der Rijst et al. (2023) emphasised the role of collaborative synchronous sessions in increasing student participation and reducing cognitive isolation. These insights highlight that the effectiveness of OER is not automatic but depends on pedagogical intentionality, localised design and supportive ecosystems.

Cameroon's policy environment reflects growing interest in digital education. Initiatives such as the University Digital Development Project have aimed to strengthen information and communication technologies infrastructure and promote blended learning across state universities (Ministry of Education, 2022). However, the absence of a national OER policy, limited inter-institutional collaboration and weak copyright literacy continue to inhibit systemic adoption. Although the use of platforms like Google Classroom and WhatsApp has increased, their application is often restricted to delivering content rather than fostering meaningful interaction (Haji, 2021).

This study examined the extent to which OER are being used to enhance teacher–student interaction within hybrid learning environments in Cameroonian universities. Specifically, it focuses on two major public institutions — University of Yaoundé I and University of Buea, which have been at the forefront of hybrid learning implementation. Employing a mixed-methods case study design, the research explored the prevalence and nature of OER usage, its impact on interaction and the challenges educators face in leveraging OER effectively.

Literature Review

This literature review explored five key thematic areas relevant to the integration of OER in hybrid learning environments: (1) conceptualising OER, (2) teacher–student interaction in hybrid learning, (3) global perspectives on OER-enhanced interaction, (4) the African and Cameroonian context and (5) theoretical frameworks underpinning interaction in digital education.

Conceptualising OER

OER refer to any teaching, learning or research materials that reside in the public domain or have been released under an open license, permitting no-cost access, use, adaptation and redistribution

(UNESCO, 2019; Wiley, 2014). The 5Rs framework (retain, reuse, revise, remix and redistribute) provides a foundation for OER use and innovation in diverse educational contexts (Hilton, 2016). These affordances make OER especially valuable for low-resource environments where textbook shortages, content obsolescence and economic barriers limit access to quality education.

OER are increasingly recognised not only for their cost-saving potential but also for their ability to support inclusive and dialogic pedagogy. As Mishra (2017) has asserted, OER can be leveraged to address disparities in access while also fostering constructivist learning environments. According to Hilton et al. (2020), institutions that adopt OER report not only greater access to materials but also increased student engagement and satisfaction. However, successful OER integration depends on institutional readiness, teacher capacity and alignment with pedagogical goals (Bossu et al., 2014).

Teacher–Student Interaction in Hybrid Learning Environments

Teacher–student interaction is a cornerstone of effective teaching and learning, particularly in hybrid and online settings where physical cues and immediacy are diminished (Garrison & Vaughan, 2008; Moore, 1989). In Moore's theory of transactional distance, interaction is classified into three types: learner-content, learner-instructor and learner-learner. The absence of meaningful interaction can increase psychological distance and negatively impact learner engagement and academic outcomes.

Dhawan (2020) has emphasised that synchronous and asynchronous modes of communication both play critical roles in facilitating interaction in digital learning environments. Although tools like Zoom, Moodle forums and instant messaging apps (e.g., WhatsApp) have become common in hybrid settings, their effectiveness depends on how they are used pedagogically. Eslit (2023) has noted that teacher presence characterised by clarity, feedback and emotional support is essential for maintaining motivation and performance in hybrid classrooms.

Furthermore, Alizadeh (2024) has highlighted that interaction in digital spaces must be deliberately designed. In immersive flipped learning environments in Japan, for instance, students exhibited improved academic performance and engagement when teachers used interactive videos and collaborative tools. This underscores the importance of instructional design that embeds interaction within the learning process.

Global Perspectives on OER-enhanced Interaction

Several international studies have confirmed that OER can enhance teacher–student interaction if properly contextualised and integrated into hybrid models. In South-east Asia, Puspitasari (2023) found that academic motivation mediated the relationship between teacher feedback and student engagement in online learning environments. The use of culturally tailored OER, coupled with interactive platforms, led to higher levels of participation.

In India, Muraleedharan and Singh (2021) reported that contextualised OER and experiential learning significantly improved learner agency and reduced drop-out rates. In the Philippines, Puspitasari (2023) observed that flexibility and content relevance were key in sustaining

engagement through OER, despite challenges with infrastructure and digital skills. Similarly, studies in South Africa and Ghana have shown that Moodle plug-ins, co-creation of content and open licensing policies enhance interactivity and accessibility (Miao et al., 2022).

Lu and Zhang (2024) identified that WhatsApp-based learning communities contributed to a stronger sense of community, especially in rural settings where formal learning management systems were underutilised. Van der Rijst et al. (2023) highlighted the value of collaborative synchronous learning in increasing retention and performance in hybrid models. These global insights emphasise that OER effectiveness is contingent upon technological tools, policy ecosystems and pedagogical intent.

African and Cameroonian Contexts

In Africa, OER adoption has been largely driven by external donor-funded initiatives such as OER Africa, African Virtual University and Teacher Education in Sub-Saharan Africa. These programmes have supported OER localisation, faculty training and open access publishing (Bateman et al., 2012). However, national governments have been slow to institutionalise OER policies, resulting in fragmented implementation.

Ghana provides a promising example where OER was integrated into the National Teacher Education Curriculum, leading to increased digital engagement among pre-service teachers (Bateman et al., 2012). Kenya's Open University initiative also illustrates how structured OER policies can expand access and support interaction. In Nigeria, collaborative platforms such as NOUN's iLearn have improved dialogic learning by embedding quizzes, feedback loops and peer review into OER usage (Oni & Ngongpah, 2025).

In Cameroon, the situation is more complex. The Ministry of Higher Education (2022) has promoted digitisation through the University Digital Development Project, but OER has not been centrally emphasised. According to Ndille and Fonjong (2021), many universities rely on ad hoc strategies such as uploading PowerPoint slides or sharing YouTube videos via WhatsApp to implement hybrid learning. There is a lack of co-ordinated institutional frameworks or repositories to support the creation, adaptation and dissemination of OER. Nkwenti and Abeywardena (2019) also noted a general lack of copyright literacy among faculty, which limits the development of customised content.

Cultural attitudes towards pedagogy also influence the adoption of OER. Traditional Cameroonian classrooms are dominated by teacher-centred practices that discourage questioning and collaborative learning (Haji, 2022). Such norms are at odds with the open and participatory ethos of OER. Nkwenti and Abeywardena (2019) have suggested that for OER to truly enhance interaction, institutions must embrace constructivist pedagogies and retrain instructors in digital instructional design.

Theoretical Frameworks for Interaction underpinning Interaction in Digital Education

This study was grounded in two theoretical perspectives: Moore's (1989) theory of transactional distance and CAST's (2018) universal design for learning framework. Moore's theory is particularly

relevant in hybrid contexts where poor interaction design can lead to psychological disengagement. The reduction of transactional distance depends on increased dialogue, timely feedback and learner autonomy elements, which OER can support when intentionally used.

The universal design for learning framework, on the other hand, emphasises multiple means of engagement, representation, and expression (CAST, 2018). Instructors can use OER to provide varied content formats (text, audio, video), allow for differentiated assessments and encourage learner choice and voice. This theoretical approach is particularly useful in Cameroon, where learner diversity (linguistic, regional, digital) necessitates adaptable and inclusive instructional strategies.

Blended learning models based on the community of inquiry (Garrison et al., 2000) also underscore the interplay between cognitive, social and teaching presence. Research shows that OER can foster all three dimensions when used in interactive ways through annotations, collaborative writing and peer assessments (Gudoniene et al., 2025). However, in Cameroon, these possibilities remain largely untapped due to infrastructural limitations and limited faculty development.

Methods

Research Design

This study adopted a convergent parallel mixed-methods design, as proposed by Creswell and Plano Clark (2018), to comprehensively investigate the role of OER in enhancing teacher–student interaction within hybrid learning environments. The mixed-methods approach allowed for the simultaneous collection of both quantitative and qualitative data, providing a more nuanced understanding of how OER are integrated and experienced by stakeholders in two major Cameroonian universities: the University of Yaoundé I and the University of Buea. This design was chosen because it enables the researcher to triangulate findings from multiple data sources, thereby enhancing the credibility and validity of the results. Quantitative data provided insight into the prevalence, patterns and perceptions of OER use, while qualitative data helped explore the lived experiences and contextual challenges associated with implementing OER in hybrid teaching and learning.

Research Setting and Rationale

The research was conducted at two state universities — University of Yaoundé I and University of Buea — both of which are recognised for their early adoption of digital education strategies under the Ministry of Higher Education's (2022) University Digital Development Project. These institutions were purposively selected due to their linguistic diversity (Anglophone and Francophone regions), heterogeneous student populations and documented engagement in hybrid and online learning reforms (Haji, 2021; Ndille & Fonjong, 2021).

Target Population and Sampling

The target population comprised university lecturers, undergraduate and postgraduate students in faculties of education and arts, where OER integration into hybrid teaching was reportedly more advanced. These faculties were also involved in piloting digital and blended learning programmes during and after the Covid-19 pandemic. Using stratified purposive sampling, 220 students and 56 lecturers were selected across both institutions. Stratification was based on academic level (undergraduate and postgraduate) and faculty affiliation, ensuring balanced representation. This sample size was deemed adequate based on Creswell's (2014) guidelines for mixed-methods studies and allowed for robust data triangulation.

Data Collection Instruments

Three primary instruments were used for data collection: structured surveys, semi-structured interviews and document analysis.

Surveys
Online surveys were administered via Google Forms to both lecturers and students. The questionnaires included both closed-ended and Likert-scale questions measuring:

- awareness and frequency of OER use
- types of digital platforms used (e.g., Moodle, Google Classroom, WhatsApp)
- perceived impact of OER on teacher–student interaction
- satisfaction with hybrid learning models
- challenges experienced in using OER

The student survey contained 25 items while the lecturer version contained 30 items, both piloted for clarity and reliability.

Semi-structured Interviews
Semi-structured interviews were conducted with 14 lecturers and 10 student leaders (e.g., class delegates, peer tutors). These participants were selected purposively based on their active involvement in hybrid courses. The interviews explored:

- perceptions of how OER influenced interaction and engagement
- instructional strategies used in hybrid classrooms
- cultural and institutional barriers to OER integration
- recommendations for improvement

Interviews were conducted via WhatsApp voice calls, lasting between 30 and 45 minutes each, and were audio-recorded with participant consent.

Document analysis
Institutional documents were collected and analysed to understand formal OER policies and implementation frameworks. These included:

- digital education strategic plans
- faculty syllabi
- course evaluation reports
- university e-learning policies and guidelines

The document analysis aimed to reveal gaps or alignment between institutional intentions and classroom realities.

Data Analysis Procedures

Quantitative analysis
Survey responses were exported to Microsoft Excel and analysed using SPSS (v. 26). Descriptive statistics (frequencies, means and percentages) were used to describe general patterns, while cross-tabulations identified variations across faculty and institution. Inferential statistics, including chi-square tests and Pearson correlation, were used to examine relationships between OER usage and perceived teacher–student interaction.

Qualitative analysis
Interview transcripts were transcribed verbatim and analysed using thematic coding (Braun & Clarke, 2006). Initial codes were generated inductively, then grouped into broader themes such as pedagogical resistance, interactive practices and infrastructure challenges. Data from the document analysis were coded deductively based on UNESCO's (2019) OER implementation framework.

Themes emerging from the qualitative data were used to contextualise and interpret quantitative results, ensuring deeper insight into the structural and cultural dynamics shaping OER integration.

Validity and Reliability

Several measures were taken to ensure research validity and reliability:

- Instrument pilot testing: Survey tools were piloted with a small group of students and lecturers to refine question clarity and eliminate ambiguity.
- Triangulation: The use of multiple data sources (survey, interviews, documents) helped cross-validate findings.
- Member checking: Interviewees were given summaries of their responses to confirm accuracy and interpretation.
- Peer debriefing: Two academic peers reviewed the data collection and analysis process to enhance credibility.

Findings

This section presents the key findings from the survey, interviews and document analysis conducted at the Universities of Yaoundé I and Buea. The data are organised around three core

themes: (1) integration of OER in hybrid learning, (2) impact on teacher–student interaction and (3) challenges to effective OER utilisation.

Integration of OER into Hybrid Teaching

Survey data revealed that 74% of lecturers across both universities reported using some form of OER in their hybrid teaching practices (Table 1). The most commonly used platforms were Google Classroom (51%), Moodle (38%) and downloadable PDFs (29%). A smaller portion (22%) reported using other formats such as open-access journal articles, mobile apps or localised learning objects shared via WhatsApp.

Table 1: OER platforms used by lecturers

OER platform used	Percentage of lecturers using (%)
Google Classroom	51%
Moodle	38%
PDFs	29%
Others	22%

Despite high levels of OER usage, only 21% of lecturers indicated they regularly adapted the materials to fit Cameroonian cultural or curricular contexts. Most used OER as-is, often downloading freely available English-language resources without local alignment. Faculty noted time constraints, copyright concerns and lack of technical skills as barriers to customising OER content.

From the document analysis, it was evident that neither university has a centralised OER repository. Instead, lecturers independently selected and uploaded content to Google Classroom, Moodle or share links via messaging platforms. This uncoordinated approach results in significant duplication, inconsistent quality and minimal knowledge sharing across departments.

Impact on Teacher–Student Interaction

The introduction of OER in hybrid environments had mixed effects on teacher–student interaction. On one hand, 81% of surveyed students felt that OER improved clarity of instruction particularly when multimedia formats (e.g., videos, diagrams) were used. They appreciated asynchronous access to recorded lectures, instructional PDFs and annotated slides.

However, interaction patterns remained largely one-directional (Table 2). The survey showed that teacher-content interaction was the most prevalent (89%), followed by teacher–student interaction (56%) and peer-to-peer interaction (38%). Real-time engagement tools like polls, collaborative writing apps (Google Docs) and annotation platforms (e.g., Hypothes.is) were rarely used.

Table 2: Prevalence of interaction types in hybrid learning

Interaction type	Prevalence (%)
Teacher–content	89%
Teacher–student	56%
Peer–peer	38%

Interviews with students and lecturers reinforced this finding. Several lecturers admitted that although they uploaded content regularly, they lacked strategies to promote active student engagement. One lecturer from the University of Yaounde I noted, "I use Google Classroom to share materials, but it's hard to know if students are even reading them".

Some successful practices were noted. WhatsApp groups were cited by 62% of students as platforms where they could ask questions and receive rapid responses. One student delegate said. "Our lecturer created a WhatsApp group where we post questions anytime. He usually responds within a few hours".

However, this form of interaction was informal and not integrated into official learning management systems.

A few courses incorporated OER-based student activities such as content co-creation (infographics, explainer videos), peer reviews and group presentations using open-source tools. These were associated with higher engagement but were not common across the board.

Challenges to effective OER Utilisation

The study identified four main categories of challenges limiting the potential of OER to enhance interaction (Table 3).

Table 3: Reported challenges to effective OER utilisation

Challenges	Percentage reporting (%)
Inadequate Internet and electricity	68%
Limited digital literacy	56%
Lack of institutional policy	42%
Pedagogical resistance	34%

Infrastructure
Both students and lecturers cited erratic Internet connectivity and frequent power outages as major barriers. This was particularly acute in the Faculty of Arts at the University of Yaoundé I, where many students commute from areas with limited access to digital infrastructure. Although mobile data packages help, they remain expensive for low-income students.

Digital literacy
A large percentage of both students and staff lacked the digital skills required to maximise the potential of OER. For lecturers, challenges included difficulties in embedding interactive tools, customising open content or managing learning management system features. Students struggled

with downloading large files, using hyperlinks and navigating different file formats (e.g., ePub, HTML5).

Policy and institutional support
Neither institution had formal policies guiding the selection, localisation or quality assurance of OER. Most lecturers used freely available content without training in copyright, open licenses or instructional design. Furthermore, there were no incentives —such as recognition or workload compensation — for faculty to develop or adapt open materials.

Cultural and pedagogical constraints
Traditional pedagogical norms in Cameroonian universities emphasise teacher authority and content mastery, making participatory methods such as peer review or collaborative content creation relatively unfamiliar. As one lecturer noted, "When I tried to assign group video projects, some students were confused, they thought learning only meant reading lecture notes". This resistance to active learning both from instructors and students limits the potential of OER to foster engagement and interactive pedagogies.

Discussion and Conclusion

Discussion

The findings of this study confirm that although OER are increasingly used in Cameroonian hybrid learning environments, their potential to enhance teacher–student interaction remains underexploited. From a theoretical standpoint, the prevalence of teacher-content interaction over teacher–student and peer–peer interaction aligns with Moore's (1989) concept of high transactional distance. Instructors often focus on content dissemination rather than fostering dialogue, thereby reducing the richness of interaction that is central to hybrid learning.

Globally, effective hybrid education models emphasise the importance of reducing this transactional distance through intentional instructional design and affective presence. As shown in studies by Eslit (2023) emotional support, clarity and timely feedback are critical for student motivation and participation. In contrast, the Cameroonian context reveals a strong reliance on unidirectional content delivery, with limited integration of collaborative or real-time engagement tools.

The findings also resonate with the universal design for learning framework (CAST, 2018), which advocates for multiple means of engagement, representation and expression. In this study, student-generated content such as infographics and peer-led videos proved effective but were isolated practices rather than institutionally supported strategies. Without clear policies or incentives, these pedagogical innovations remain the exception rather than the norm.

The use of platforms such as Google Classroom, Moodle and WhatsApp reflects a hybrid infrastructure common in low-resource settings. WhatsApp emerged as a tool that extended teacher presence informally and provided real-time clarification similar to what Lu and Zhang (2024) observed in rural Asian contexts. However, the lack of formal integration of such tools into

institutional learning management systems suggests missed opportunities for structured engagement and data-informed pedagogy.

A major barrier to effective OER integration is the absence of national or institutional frameworks guiding their adoption. This reflects the policy vacuum also noted in other African countries, though Ghana and Kenya have made significant strides by embedding OER into national teacher education programmes (Bateman et al., 2012). In Cameroon, most OER use is improvised and dependent on individual lecturer initiative, often unsupported by training, recognition or quality assurance processes. Cultural pedagogical norms also play a significant role in limiting interaction. The deeply rooted emphasis on teacher authority, rote learning and summative assessment constrains participatory pedagogies required for OER-enabled interaction. As Zou et al. (2025) have noted, the traditional view of teaching as the transmission of knowledge clashes with constructivist approaches central to OER and hybrid learning. Therefore, any reform strategy must include not only technological investment but also a reorientation of teaching philosophies through professional development.

Infrastructure challenges including unreliable internet and frequent power outages undermine the potential of even the most well-designed OER. These findings corroborate research from other low-income contexts where hybrid learning has been unevenly adopted due to infrastructural and socioeconomic disparities (Gudoniene et al., 2025). Digital literacy was another recurring issue. Many lecturers lacked the skills to embed quizzes, use collaborative documents or tailor OER to local contexts. Students similarly faced challenges in navigating formats, platforms and even basic file management. Addressing these gaps requires continuous capacity-building initiatives, ideally embedded in both pre-service and in-service training curricula.

Conclusion

OER offer a significant opportunity to enhance teacher–student interaction in Cameroonian hybrid learning environments. However, their effectiveness depends on more than just availability, it requires strategic alignment of pedagogy, policy and technology. The findings of this study suggest that although the use of OER is growing, interaction remains limited by infrastructural deficits, digital skill gaps and entrenched teaching cultures.

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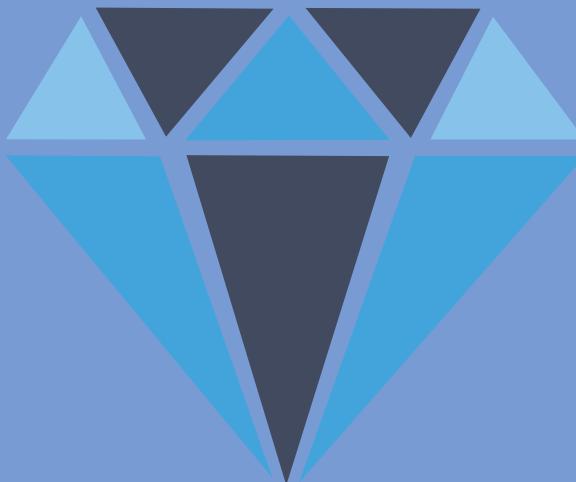
Gender, Technology and Innovation in Open Education

Leveraging Technology-Enabled Learning and Open Educational Resources for Educational Equity: A Case Study in a Small Island State

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Abstract

The integration of technology-enabled learning (TEL) and open educational resources (OER) in Mauritius offers a transformative opportunity to overcome geographical and resource-based challenges in higher education. The adoption of TEL and OER in Mauritius is the primary focus of this article, along with the actions taken to integrate this advancement into the island's higher education system. It explores the collaboration between the Higher Education Commission and the Commonwealth of Learning to deploy TEL across six institutions. A national guideline on technology-enabled learning was formulated to standardise practices across the participating institutions, and as part of this initiative, five institutional policies on TEL were developed to guide the effective use of technology in teaching and learning. Key aspects of this initiative included capacity building for academic staff and the creation of online and blended courses. Over three years, 88 courses were developed across these institutions, demonstrating an improvement in academic staff's capacity to deliver blended learning programmes. Through capacity-building efforts, over 100 academic staff being trained through various TEL workshops. The results highlight how the regulatory body may support innovation in higher education while ensuring quality and accessibility for students in small island states.

Keywords: technology-enabled learning (TEL), open educational resources (OER), small island state

Introduction

Technology, particularly digital technology that enables communication, collaboration and learning across distance, is a formidable tool and a source of innovation and expanded potentials (International Commission on the Futures of Education, 2020). There has been a sudden transition on a rapid scale within the higher education realm. Researchers, such as Chen and Bonk (2008), Maro (2008) and Usluel and Mazman (2009), have documented a range of educational technologies being adopted by educators within the education sector. An analysis of 131 meta-analytical studies on the use of technology in education showed that student learning improved through the integration of technology in classrooms, as well as in online and blended learning environments (Commonwealth of Learning [COL], 2024). The implementation of digital tools and equipment provides an active learning environment that is more interesting and effective for both teachers and students. Digitalisation is a broad concept, and the impact of the Covid-19 pandemic in Mauritius has prompted authorities responsible for higher education to review the standards of teaching and learning by focusing on implementing a technology-enabled learning (TEL) strategy to facilitate and improve access to quality education.

This study was initiated in response to the unique challenges faced by Mauritius as a small island developing state during the rapid transition to emergency online learning in higher education. The need for scalable, inclusive and quality-assured digital education strategies became particularly urgent in the aftermath of the Covid-19 pandemic. Mauritius's approach is distinguished from similar initiatives in other small island developing states through its national regulatory authority, the Higher Education Commission (HEC), which played an active role not only in strategy formulation but also in institutional implementation and continuous monitoring.

Context

Small island developing states are transforming into small island digital states, leveraging digital technologies to enhance governance, public services and economic opportunities (Handforth, 2024). The report (*Small Island Digital States: How Digital can Catalyse SIDS Development*) indicates that although the extent of technology adoption differs among governments, many small island developing states face a shortage of experienced and highly skilled technical civil servants, especially in emerging fields like data science.

HEC is a statutory body established in Mauritius under the *Higher Education Act 2017 (No. 23 of 2017)* and responsible for dealing with regulation, funding and the promotion of higher education including research (Mauritius General Assembly, 2017). According to its strategic plan developed for the period ranging 2022–2025, HEC has defined its strategic objectives clearly to cater for aligning to technology enabled learning. In this context, HEC signed an agreement with COL in 2022 regarding developing a technology-enabled framework to support and facilitate teaching and learning in higher education institutions through research, consultation, capacity building, monitoring and evaluation. Initially, four public universities working under the aegis of the Ministry of Tertiary Education Science and Research in Mauritius, namely the University of Mauritius, University of Technology Mauritius, Open University of Mauritius and Université des Mascareignes, were selected to promote innovative approaches especially in a TEL initiative (Gunness et al., 2023). Two publicly funded institutions, Mahatma Gandhi Institute and Mauritius Institute of Education, were also selected for the project. The objectives of this endeavour were to:

- enable continuity of learning
- ensure quality of learning in TEL
- increase use of TEL by learners
- increase use of TEL by academic staff
- increase number of courses using TEL for teaching and learning
- improve student learning through use of TEL

The higher education landscape in Mauritius comprises ten public and 36 private higher education institutions and a wide panoply of programmes. Some 610 programmes, ranging from certificate to PhD, which cater for the needs of different categories of learners, are available locally. The public institutions provide some 432 programmes and private and distance education providers 178 programmes. These programmes encompass a wide diversity of fields and are delivered either on a full-time, part-time or flexible distance learning mode basis. These institutions show differential

stages of development with significant variation in their academic programmes, student numbers and infrastructural and physical facilities, amongst others (HEC, 2023).

Theoretical Framework

The study was underpinned by the policy–capacity–technology framework (Mishra & Panda, 2020), which emphasises the alignment of institutional policy development, capacity building, and technological infrastructure to achieve systemic educational transformation, as illustrated in Figure 1. This framework was essential in guiding the phased implementation across institutions.
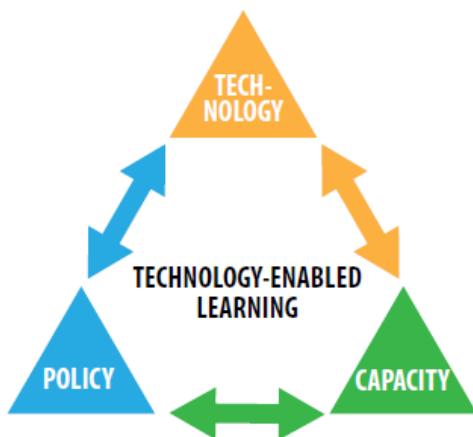
Figure 1: Three key pillars for TEL implementation.

Source: Sankey & Mishra (2019, p. 4)

Methods

The methodology adopted for the implementation of the TEL initiative in Mauritius followed a systematic, multi-phase approach grounded in the policy–capacity–technology model. The model provides a structured framework for embedding technology in education by aligning policy development, institutional capacity building and technological integration (Mishra & Panda, 2020). The approach was rooted in both evidence-based and evidence-informed practices, ensuring that each stage of the project was supported by research, contextual realities and global best practices. A mixed approach was adopted and the following were incorporated:

- Baseline surveys were conducted at the institutional level to map digital infrastructure, academic staff readiness, and TEL governance capacity. Three survey questionnaires were administered across public higher education institutions in Mauritius. The instruments were developed by COL (Gunness et al., 2023; Rampersad & Chadeea, 2023) and reviewed by the national regulatory authority. Upon approval from COL, the surveys were activated, and unique sharable links were generated and provided to the co-ordinating body for distribution to participating institutions.
- Interviews were held with academic leaders and TEL champions. Focus group meeting were held to understand the pedagogical changes that the academic brought in.

- Analysis was undertaken to benchmark existing institutional TEL policies against national and global standards. Col TEL benchmarking tools were used to assess the different domains
- Quantitative data on enrolment, completion and course development were gathered to assess uptake and effectiveness. A survey questionnaire was administered to students who had completed the courses developed under this project.

The project was initially based on three distinct phases, each building upon the previous to create a sustainable, institution-wide transformation in teaching and learning, as follows.

Phase 1

This foundational phase involved consultations with institutional stakeholders to develop institutional strategic plans for TEL. A baseline study was conducted at each participating public higher education institution to assess existing infrastructure, readiness, digital literacy and governance structures. The findings informed the development of context-specific strategies and action plans, tailored to institutional needs and aligned with national priorities.

Phase 2

The focus was on strengthening institutional and human capacity. Academic staff and instructional designers received training in online and blended learning pedagogy, content development using open educational resources (OER) and digital assessment tools.

Phase 3

Once TEL strategies and blended courses were implemented, the project entered the maturation phase, which involved monitoring and evaluation of the TEL initiatives. Data were collected on course enrolment, completion rates,and learner feedback to determine the effectiveness, accessibility and inclusivity of TEL practices. This phase was also an extension of Phase 2 where more capacity building was conducted.

An additional, Phase 4 was included, and this final phase expanded the scope of TEL by monitoring and evaluation of hybrid learning modalities and exploring the role of artificial intelligence (AI) in higher education. A focused study was conducted to evaluate the extent to which academic staff adopted hybrid methodologies and their impact on student engagement, performance and satisfaction. It also included development of guidelines for the use of AI and capacity building in AI.

Results and Analysis

Serving as the regulatory authority for higher education in Mauritius, HEC has spearheaded the TEL initiative and successfully completed Phase 1, Phase 2, Phase 3 and Phase 4 of the project. Overall, the capacities of these institutions have improved substantially due to the availability of policy related to TEL, trained teachers in blended learning, quality-assured blended courses and the offering of blended courses to the students.

NATIONAL GUIDELINES
A comprehensive, **national guideline** for TEL was developed by HEC, establishing a standardizes framework to enhance learning across all institutions

FACULTY TRAINING
Over **100 academic staff** members were equipped with skills in developing online/blended courses, expanding instructional capacity

STUDENT ENROLMENT AND SUCCESS
2094 students enrolled in TEL supported courses, with 1018 achieving successful course completion, reflecting the program's broad reach and effectiveness

WORKSHOPS AND TRAINING
A series of **11 workshops and training** sessions were conducted to support and enhance TEL across institutions, fostering a culture of continuous learning and capacity building

INSTITUTIONAL POLICIES
Five institutional policies for TEL were formulated and adopted by the participating institutions, strengthening the structural foundations for TEL

COURSE DEVELOPMENT
A total of **88 OER-based blended** courses were developed with COL's support, offering innovative, flexible learning options

DOCUMENTATION OF OUTCOMES
Two comprehensive reports are available on COL's OASIS platform and a brochure on HEC's website

SETTING UP OF OER COMMITTEE
A High-Level Committee for the monitoring of the National OER Policy has been set up at the level of the HEC. Four meetings have been held and uploading of documents on the OER repository is under process

Figure 2: Outcome of the TEL project.

The outcomes are as follows:

Baseline Study Reports on TEL

A total of five baseline study reports were developed to assess the existing capacity, infrastructure and readiness of the five public higher education institutions in Mauritius to implement TEL. These reports provided a foundational understanding of institutional gaps, technological resources and human resource capabilities, thereby guiding strategic planning and informed decision-making for the integration of TEL (Gunness et al., 2023; Rampersad & Chadeea, 2023).

National Guideline on TEL

HEC, in collaboration with COL, developed a comprehensive national guideline to establish a standardised and coherent framework for the implementation of TEL across all higher education institutions. This guideline outlines best practices, quality assurance measures and operational strategies for deploying TEL to ensure consistency, inclusivity and alignment with global education standards. HEC has been a major catalyst in guiding the participating higher education institutions to deliver a concrete TEL policy. The steps taken right from the initiation phase, conducting the baseline study and bringing together stakeholders from all levels for the visioning workshop, have led to the construction of an effective set of guidelines. The guideline shouldered the concept of a common framework based on strategic pillars that the higher education institutions should align with to develop their TEL policy.

The TEL framework is centred around five pillars (Figure 3).

Figure 3: TEL framework.

Source: HEC (2022, p. 2)

Institutional TEL Policies

Five higher education institutions successfully formulated and adopted individual institutional policies tailored to their unique contexts. These policies embedded TEL principles into institutional governance and academic strategies, thereby reinforcing a structured approach to integrating digital learning tools and methodologies into teaching, learning and assessment practices.

Faculty Training in TEL

Over 100 academic staff members from the participating institutions underwent rigorous training focused on the design, delivery and management of online and blended learning courses. This professional development initiative significantly expanded institutional instructional capacity and enhanced educators' digital competencies, preparing them to engage learners through innovative and effective TEL approaches.

Development of 88 OER-based Blended Courses

With technical and pedagogical support from COL, the institutions collaboratively developed 88 OER-based blended courses. These courses cater to diverse subject areas and academic disciplines, promoting flexible learning pathways, increasing accessibility and encouraging resource sharing across the higher education sector.

Student Enrolment and Completion in TEL Courses

A total of 2,094 students enrolled in TEL-supported courses, demonstrating growing interest and uptake of TEL options. Of these, 1,018 students successfully completed their courses, indicating a positive reception of TEL modalities and validating the effectiveness of blended and online learning in supporting academic success.

Guidelines for the Use of AI in Higher Education

As part of the future-oriented direction of the TEL strategy, a set of national guidelines on the responsible and ethical use of AI in higher education was developed. These guidelines aim to ensure that AI integration supports pedagogy, enhances learning outcomes and aligns with data privacy, equity and quality assurance standards.

Capacity Building on Teaching with Generative AI

To prepare faculty for the evolving digital landscape, 60 academic staff members were trained in teaching methodologies involving generative AI tools. This training focused on responsible use, content creation, assessment innovation and the integration of AI-powered platforms into hybrid and online classrooms.

Development of Six Institutional TEL Benchmarking Reports

Each of the six participating public higher education institutions developed a TEL benchmarking report to evaluate their progress against key indicators. These reports offer critical insights into institutional performance, highlight areas for improvement and facilitate peer learning and cross-institutional collaboration to sustain and scale TEL adoption across the sector.

Furthermore, in a study conducted by Bhagat (2025), the outcomes of the above interventions were examined by investigating students' digital literacy, motivation and experiences in blended learning environments. The study also explored the impact of gender, institutional contexts and learning attitudes, and aimed to identify key predictors of student satisfaction. By doing so, the study contributed to understanding how strategic, policy-driven TEL interventions influence teaching and learning outcomes in a developing country context. The study demonstrated that TEL can enhance student motivation and satisfaction when grounded in sound instructional design and supported by institutional readiness. However, it also revealed the importance of explicitly integrating the gender dimension and anticipating operational challenges to inform scalable, equitable and effective TEL adoption in similar developing contexts.

Recommendations

The implementation of blended and TEL in Mauritius has been marked by a strong governance framework and active regulatory oversight. HEC, acting as the central regulatory body, played a critical role in steering the project, ensuring that its execution aligned with national education priorities and quality standards. This collaborative and well-coordinated approach contributed to the overall success of the initiative, as it provided the necessary institutional support, accountability structures and guidance. The following analysis outlines the major trends, regulatory developments, international alignment and future directions that have emerged from this transformative process.

Towards Blended Learning

Many institutions have adopted hybrid learning models, combining traditional classroom teaching with online learning platforms. This trend has led to the integration of learning management systems, allowing students to engage with course materials remotely.

Regulatory Perspectives

From a regulatory standpoint, there is a growing recognition of the need for standardised guidelines governing blended learning programmes in Mauritius. Institutions have called for the establishment of clear policies that ensure equitable access to digital resources, data privacy protections, and quality assurance mechanisms for online courses. These policies would help harmonise the delivery of blended learning across institutions and safeguard the integrity of online assessments.

Alignment to International Practices

There is a need for alignment with global standards in blended learning to ensure that institutions remain competitive on the international stage. This includes adopting quality assurance frameworks that measure not only academic performance but also student engagement and satisfaction with online learning. The importance of regulatory bodies, such as HEC, in playing a proactive role in creating these standards is therefore emphasised.

Future Directions in Blended Learning

Looking to the future, it is anticipated that AI and machine learning will play a major role in personalising learning experiences by tailoring content to individual student needs and learning styles. The exploration of AI-driven platforms to provide real-time feedback and adaptive learning pathways will enable students to progress at their own pace. Therefore, guidelines or frameworks from a regulatory will assist in responsible use of AI in higher education.

Future-Ready Workforce

At a broader level, there is a growing focus on preparing students for the evolving demands of the workforce. Emphasising digital skills training is essential to ensure that students are equipped to navigate an increasingly technology-driven job market. This aligns with the government's vision of transforming Mauritius into a knowledge-based economy, where digital literacy will be a key driver of economic growth.

Discussion and Conclusion

The strategic implementation of TEL in Mauritius, spearheaded by HEC in collaboration with COL, marks a significant transformation in the country's higher education landscape. This initiative has not only enhanced the digital capacity of public higher education institutions but has also fostered inclusive and gender-responsive policies, promoted OER and expanded access to quality learning opportunities through blended and hybrid modes. By exceeding several predefined targets such as

the development of 88 OER-based blended courses and the implementation of five institutional policies, Mauritius has demonstrated strong institutional commitment and readiness to transition towards digitally driven education systems.

The experience of implementing TEL and OER in Mauritius presents a robust and transferable model for other countries, especially small island developing states and low- to middle-income nations aiming to modernise their higher education systems. Central to its success was a strong governance structure, national-level coordination and regulatory leadership, which ensured that the initiative was aligned with strategic education goals and quality benchmarks. For replication elsewhere, countries should begin with a national policy commitment, supported by readiness assessments and clearly defined roadmaps. Institutional buy-in must be backed by strategic capacity-building efforts, particularly in digital pedagogy, instructional design and policy development. Partnerships with organisations such as COL can accelerate progress through access to expertise, tools and frameworks tailored for developing contexts.

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Empowering Future Teachers: Skills Development and Training Needs for AI Integration in ODL Teacher Education

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Abstract

The study explored the skills development among student teachers and examined the training and support structures needed to facilitate effective artificial intelligence (AI) integration within open and distance learning teacher education. The AI-TPACK framework, which integrates technological, pedagogical and content knowledge with AI literacy, guided the study. A single case study design was employed, and data were collected through an online open-ended questionnaire completed by 197 participants. Thematic analysis, supported by the Galaxy.ai tool, revealed that students developed key competencies, such as digital literacy, critical thinking, communication, time management and self-confidence. However, gaps were identified in foundational digital skills, ethical AI use and personalised learning support. Students also highlighted the need for instructor and peer support and hands-on training. The findings emphasise the need for structured AI and digital literacy integration in teacher education curricula. The study contributes to the ongoing debate on equipping future teachers with the competencies required for teaching in an AI-driven world and calls for systematic support to bridge the digital divide in developing open and distance learning contexts.

Keywords: artificial intelligence, open and distance learning, student teachers, skills development, training needs

Introduction

The role of artificial intelligence (AI) in education, and specifically higher education, is increasingly important, transforming traditional pedagogical approaches and reshaping the educational landscape. Specifically, generative AI tools are revolutionising instructional design by facilitating customised learning experiences and improving learner engagement. This integration of AI technologies, including natural language processing and machine learning, enhances the interaction between students and educational systems (Gallastegui & Forradellas, 2024). However, because the scalability of these innovations remains a challenge, I am in agreement with Fowler (2023) that ongoing research and careful consideration of their ethical implications are needed, particularly regarding academic integrity and inclusivity. The growing reliance on AI technologies, such as chatbots and automated grading systems, raises concerns about maintaining originality and preventing plagiarism.

At the same time, the digital divide, which refers to the gap between those who have reliable access to digital technology and those who do not, remains a pressing concern. Students in underresourced or rural areas may have limited Internet connectivity, outdated or shared laptops or inadequate digital literacy. This will prevent them from opportunities to benefit from AI tools. If left unattended,

the digital divide could increase inequalities and negatively affect the potential of AI in education (Ahmed, 2024). Addressing the digital divide can enhance the educational experiences of student teachers, particularly for open and distance learning (ODL) rural students in remote areas. ODL refers to technology-enabled education that reduces the distance between students and lecturers, ensuring equal educational opportunities for diverse groups, including those with geographical distance or work-related conflicts (Cosmas, 2018). The integration of ODL technologies surged during the Covid-19 pandemic, when face-to-face education was impossible. ODL has emerged as a viable alternative to traditional education, further enhanced by AI technologies like ChatGPT, Grammarly and adaptive learning management systems, which improve learning and teaching methods. ChatGPT specifically is recognised for its potential to assist in comprehensive lesson plans, enabling teachers to focus on active teaching time (van den Berg & du Plessis, 2023). AI tools like ChatGPT offer real-time feedback, helping personalised learning for students and supporting teachers to create data-informed strategies to enhance classroom time management and efficiency (Pimentel et al., 2024). Successful implementation of technologies in teacher education depends on overcoming challenges in technology readiness and pedagogical training. The goal is to equip teachers with the skills to develop critical thinking and creativity in students, preparing them for an AI-driven future (Ekeh et al., 2025).

The current landscape of ODL reveals several challenges in integrating AI into teacher education, primarily due to skills gaps and insufficient training for future teachers. Although AI holds significant potential to improve education, many programmes lack emphasis on AI literacy and related training. For example, research by Wijaya et al. (2024) showed low levels of teacher confidence and understanding of AI-related applications, while Adu and Zondo (2024) reported limited digital competencies that hinder the effective use of AI tools in technology-supported learning environments. The lack of adequate frameworks to incorporate AI in ODL contexts exacerbates these challenges, emphasising the necessity for comprehensive training programs that integrate digital and AI literacy in teacher education programmes.

From the above, this study addressed the following research questions:

- Which AI and technology-related skills do students develop in ODL?
- What training and support structures are required to enhance AI integration in ODL teacher education?

Literature Review

Digital skills are essential for 21st-century teachers, specifically in ODL, where teaching and learning rely on technology. Digital literacy involves fundamental technical competencies to navigate digital platforms and critically evaluate digital tools. AI literacy encompasses a deeper understanding of AI technologies and their responsible use in education. Zhang et al. (2024) have defined AI literacy as including technical knowledge, practical application and ethical awareness, while Ng et al. (2021) have emphasised critical engagement with AI systems to ensure competent and ethical integration into pedagogical practices. Mutawa and Sruthi (2023) referred to UNESCO's AI competency framework as an influential model advocating the development of such skills,

underpinning the need for comprehensive teacher preparation aligned with emerging educational technologies.

Integrating digital and AI literacy into teacher education is essential for developing confident, competent and ethically responsible teachers (Hazari, 2024). Park (2023) has highlighted the effectiveness of targeted AI training and the importance of comprehensive professional development. An integrative approach to digital and AI literacy supports pedagogical innovation and promotes the equitable, ethical and transparent use of technology in alignment with core educational values.

Despite the increasing importance of AI in education, many teacher training programmes inadequately prepare future teachers to effectively integrate AI into their teaching (Ng et al., 2023). This gap limits instructional innovation and contributes to teachers' anxiety and reduced confidence, negatively affecting their efficacy and student learning outcomes (Alsheri, 2023). The absence of structured AI education in teacher training is a critical oversight. As AI continues to influence various sectors, it is essential for teacher education to evolve. Teachers need to be prepared not only to use AI but also to integrate it effectively and ethically into their classroom strategies. The ethical integration of AI in the classroom presents complex challenges, including concerns related to data privacy, equity and transparency (Bibi, 2024). Overcoming these concerns requires the deliberate incorporation of ethical education to ensure that teachers and learners can critically engage with AI technologies.

Theoretical Framework

The study is grounded in the AI-TPACK framework, an evolution of the technological pedagogical content knowledge (TPACK) framework by Mishra and Koehler (2006), originally conceptualised as an extension of Shulman's (1986) pedagogical content knowledge framework. The TPACK framework integrates technology, pedagogy and content to provide a comprehensive framework for teacher expertise (Voogt & McKenney, 2016). In response to the growing influence of AI in education, Ning et al. (2024) extended this model to develop the AI-TPACK framework, based on the increasing integration of AI into teaching and learning practices. The AI-TPACK framework provides teachers with the opportunity to master subject matter, pedagogical strategies and the effective incorporation of AI tools in their teaching practice.

The adapted framework introduced by Ning et al. (2024) is shown in Figure 1.
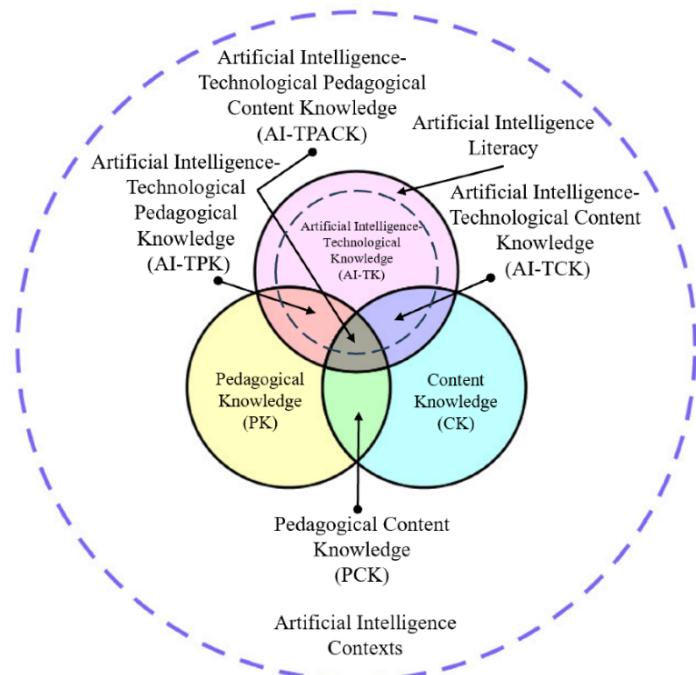
Figure 1: AI-TPACK framework.

Source: Ning et al. (2024, p. 5)

The framework makes provision for specific knowledge related to the integration of AI technologies into subject-specific content. It includes being able to articulate concepts using AI technologies, creatively apply pedagogical skills using these technologies, use AI to address students' learning challenges and use AI applications to develop new knowledge and skills or strengthen existing ones based on conventional foundations (Ning et al., 2024). The framework, therefore, served as a lens to interpret the data.

Methods and Context

This study employed a qualitative single case study research design within an interpretive framework to explore future teachers' perceptions of the technology-related skills they have developed as students in ODL. Furthermore, it examined the training and support structures they consider essential for enhancing AI integration in ODL teacher education. The population comprised all first-year students enrolled for the Bachelor of Education programme at an ODL institution in South Africa. An online questionnaire link was sent to all 424 students enrolled in a curriculum studies module. A total of 197 student teachers responded, forming a purposive and convenience sample. Of these, 100 were registered for the Senior and Further Education and Training phase, and 97 for the Intermediate phase. The sample included 125 female and 68 male participants, while four did not disclose their gender. In total, 94 participants were from rural areas, and 103 from urban or semi-urban environments, which was an important contextual aspect in a developing country like South Africa, where access to technology remains uneven. These disparities, along with differences in digital confidence and AI acceptance, emphasise the importance of understanding students' perceptions of their skills and training needs to enhance their engagement with emerging technologies.

The questionnaire was developed using literature and input from three faculty members experienced in AI integration in education. After revisions, the final version was distributed online for completion in about 20 minutes. To address the aim of the study, students responded to five open-ended questions exploring their perspectives on their AI-related skills and their needs for related training and support.

Thematic analysis was used to identify, analyse and report patterns from the qualitative data sets (Forbes, 2021). Braun and Clarke's (2019) six-phase approach was used to identify data, generate initial codes, search for themes, review, define and name them, and report. To verify the themes, the Galaxy.ai thematic analysis generator was used as an AI-assisted tool, while Grammarly assisted with the final editing of the text.

The study received ethical clearance, and participants were informed about the study's aims, voluntary participation and that their anonymity would be maintained. To ensure anonymity, participants were numbered as p1 to p197 for reporting findings.

Findings and Discussion

This section presents the findings from the thematic analysis of student responses and discusses them in relation to the AI-TPACK framework and relevant literature. Two overarching themes with their respective sub-themes emerged, as shown in Figure 2 below.
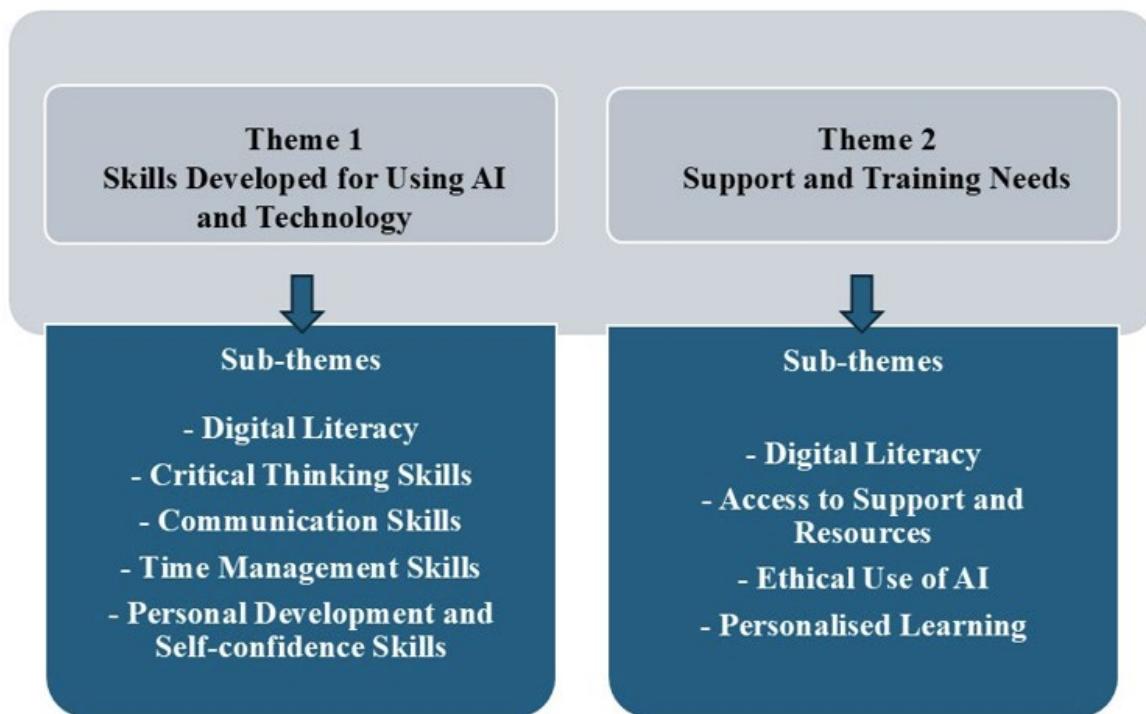
Figure 2: Themes and sub-themes.

Theme 1: Skills Developed for Using AI and Technology

This theme encompasses the range of technology-related skills student teachers perceived to have developed. These skills align with key dimensions of the AI-TPACK framework, emphasising the integration of technological, pedagogical and content knowledge in preparing teachers for AI-enhanced teaching (Ning et al., 2024). The sub-themes were aligned with the AI-TPACK dimensions, showing how students' knowledge and competencies reflect intersections of pedagogy, content and AI-enabled technologies.

Digital literacy

Students highlighted their proficiency in typing, navigating online platforms and using tools such as Microsoft Word, Excel and PowerPoint. These skills are needed for successful studying at an ODL institution. A student mentioned, "I am now able to type my own assignments using Microsoft Word Word, which was not the case at the beginning of my studies" (p36), while others referred to the use of digital tools and navigation of the online environment, by stating, for example, "I am now more comfortable navigating various online platforms and tools" (p42). This aligns with research from Zhang et al. (2024), arguing that digital literacy is a prerequisite for AI integration and underpins effective engagement in ODL contexts. More advanced literacy skills were also mentioned, such as the development and adaptation of online materials. As an example, a student mentioned that skills (in line with technology and pedagogical knowledge of the AI-TPACK framework) were gained "to generate custom learning materials, such as quizzes, flashcards, and even entire lessons online" (p186).

Critical thinking skills

The online environment made students aware that not all information created by AI was credible, and their exposure helped them to critically evaluate information. For example, a student indicated, "I analyse the context and relevance [of AI-generated information] to ensure it is real and aligns with my learning objectives" (p42), while another stated, "I've learned how to evaluate the information provided by AI tools and use my own judgement" (p20). These examples confirm that students learned how to evaluate and interpret information critically, which aligns with Ng et al.'s (2021) claim that AI literacy must include evaluative competencies. Others shared that they used AI tools for several tasks, but not for others. For example, one student shared, "I do not use AI when working on assignments, but instead opt to use it for academic content when I am studying". This comment highlights the necessity of critical thinking in using AI and online information, ensuring that students do not accept or use information blindly.

Communication skills

Students reported improved communication with digital tools as well as with peers in virtual environments, highlighting the importance of skills development for effective communication and collaboration in a digital world. Students reported that they have learned how to effectively communicate with AI to obtain useful information. In this regard, a student stated, "I've learned how to communicate with AI tools effectively" (146), while another noted, "I have learned how to participate in online classes" (p121). These statements align well with the pedagogical content knowledge aspect of the AI-TPACK framework, which facilitates meaningful learning interactions.

Time management skills

Several indicated that using technology saved them time and assisted in managing their time. A student indicated, "I have improved my time management skills by using technology to set reminders, create schedules, and organise tasks" (p195), while another stated:

> Technology has strengthened my ability to grasp new information in a short period of time. For example, there was a time when I was writing an assignment in which I was expected to create a lesson plan. The AI helped me in terms of structuring the lesson plan.

AI assistance with lesson planning aligns with all the aspects of the AI-TPACK framework and is supported by previous research (e.g., van den Berg & du Plessis, 2023).

Personal development and self-confidence skills

In this sub-theme, students referred to their development as students in online learning, which contributed to greater self-confidence in their academic abilities and personal growth in general. In this process, they learned resilience through their experience with AI and technology. For example, a student indicated, "I have developed the love that everything can happen online, and I can learn a lot through AI and technology" (p95). Problem-solving was also evident, as one student stated, "The AI tools increased my ability to think creatively on how to solve challenges related to my schoolwork" (p172).

The above sub-themes reveal a comprehensive understanding of several skills that students studying teacher education have developed through their online learning experiences. The sub-themes are interconnected and showcase a holistic approach to education in the digital age, emphasising the importance of digital literacy, critical thinking, communication, time management and personal development and confidence building as crucial skills these ODL students have developed.

Theme 2: Support and Training Needs

The study revealed skills students have developed as well as a clear need for further support and training. Responses to three related questions highlight sub-themes that align with professional development priorities in the literature (e.g., Hazari, 2024; Mutawa & Sruthi, 2023).

Digital literacy

Many students emphasised the need for more training in basic digital tools, such as the use of Microsoft Word, Excel and PowerPoint, and Internet navigation. This finding shows the uneven distribution of technological knowledge, often exacerbated by the digital divide (Ahmed, 2024). Students also expressed the need for practical, hands-on training and workshops that cover a range of AI tools and technologies. For example, a student mentioned, "workshops that elaborate on and explain how to use different technology tools" (p45) and the need for "comprehensive AI and technology workshops, hands-on workshops that cover a wide range of tools, from AI-powered writing assistants like ChatGPT and Grammarly, to research tools such as Mendeley and Zotero and other educational platforms" (p48).

Access to support and resources

Access to reliable devices and Internet connectivity emerged as a significant concern, noting the importance of having access to laptops and reliable Internet as a prerequisite for online teaching and learning. This highlights a systematic barrier to achieving equity and accessibility in AI-enhanced education (Ahmed, 2024). Access to technology cannot be taken for granted, and not all students have regular access. For example, a student stated, "The only support to help me integrate technology is to get my own laptop" (p87). More resources that students needed were online instructional videos and guides tailored to specific academic subjects (p42, p80, p86).

Students also requested increased support from instructors and peers, emphasising the need for guidance, including on using AI effectively (p20, p195) and the benefits of collaborative learning through study groups (p123).

Ethical use of AI

There was a significant concern regarding the ethical use of AI in education, with calls for training on how to use AI responsibly and avoid plagiarism. For example, a student stated that they should be guided on how to "identify where it could be incorrect and how to get the correct use of AI without plagiarising" (p50), and "Students need to be taught how to use these things in a responsible way" (p53). This echoes Bibi's (2024) concern that ethical AI must be an explicit part of teacher training, equipping teachers to model responsible practices.

Personalised learning

Students suggested the creation of adaptive resources and personalised support, such as AI-powered learning tools responding to individual needs. This call resonates with the AI-TPACK goal of using AI not just as a technical tool, but as a pedagogically meaningful and ethically grounded enhancer for content delivery and student engagement. As an example, a student expressed a need for "access to online resources or tutorials specifically tailored to my field" (p42). Integration of AI tools for a specific curriculum to personalise teaching strategies to learners' needs was further mentioned as a need for a more personalised teaching and learning approach (p138, p195). This confirms research by Jung (2024) on AI's potential for personalised learning and demonstrates how AI supports student-centred learning.

The analysis of student needs reveals essential areas for support and training to effectively integrate technology and AI in education. These findings suggest that students lacked knowledge and skills, indicating gaps in AI-TPACK development, especially in the domains of AI technological knowledge and AI pedagogical knowledge. Key focuses include training in digital literacy and computer skills, ethical use of AI, personalised teaching approaches and diverse resources and support.

Conclusion and Implications

This study explored the technology and AI skills student teachers developed in a specific ODL context, as well as the training and support structures they require for meaningful AI integration in their academic and professional development. Supported by the AI-TPACK framework, the findings offer valuable insights into skills gained as well as gaps in teacher preparation for AI-enhanced education. Students reported growth in core competencies such as digital literacy, critical thinking,

communication, time management and personal growth. At the same time, significant challenges persist, such as unequal access to technology, insufficient training in the use of AI tools and a lack of hands-on training in basic digital literacy and guidance on the ethical use of AI, as well as AI tools for personalised learning. These findings imply a crucial paradox: although AI has huge potential to democratise education and personalise learning, its benefits cannot be realised equitably unless institutions address structural and pedagogical barriers. The persistence of the digital divide, together with gaps in AI literacy, risks widening educational inequalities, particularly for students in rural and underresourced areas. For these reasons, the findings highlight the urgent need for digital and AI literacies as core outcomes in teacher education programmes. Furthermore, clear institutional frameworks on academic integrity, transparency and responsible use of AI are critical. This will ensure that AI supports learning without undermining fairness and trust.

This research was limited to a single ODL institution and a specific group of student teachers, and the findings cannot be generalised to other contexts. However, it provides a valuable understanding of the skills development and training needs for AI integration in ODL teacher education. The study suggests follow-up research in similar and different contexts, using different student groups and research methods such as student interviews. Such findings will deepen the insights gained from this study. Furthermore, future research should investigate how AI-supported strategies translate into actual classroom practice.

Finally, the integration of AI in ODL teacher education involves more than just technical upgrades. It requires the establishment of support systems, clear frameworks and guidelines, targeted training and ethical strategies. Institutions should prioritise AI and digital literacies in teacher education curricula, supported by hands-on training, opportunities for peer collaboration and adaptive learning experiences. This comprehensive approach will empower future teachers to prepare their learners for success in an AI-driven world.

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Leveraging AI-Driven Chatbots to Enhance First-Year Student Support: The USP SEM ZERO-GPT Initiative

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Abstract

In partnership with the Commonwealth of Learning, the University of the South Pacific (USP) launched Semester Zero in January 2022 to support first-year students with foundational skills in literacy, numeracy and digital literacy. A key innovation introduced in January 2024 was the USP Semester Zero GPT (USP SEM ZERO-GPT), a customised AI-powered chatbot integrated into both the Moodle platform and a stand-alone web interface. Designed to offer real-time, 24/7 assistance, the chatbot addresses course-related queries, Moodle navigation issues and content from the 600+ page USP Handbook and Calendar. By 2025, the chatbot system evolved to incorporate OpenAI's GPT-4o model, resulting in a significant improvement in answer accuracy — from 74.4% in 2024 to 96.9% in 2025. Analysis of 134 messages across 67 unique learner queries revealed that 75% were in scope, covering topics like course enrolment, assessment, certification and academic regulations. Notably, 42.9% of these focused on course enquiry, and over 11% sought guidance from the USP Handbook. Although primarily reactive, the system is increasingly perceived as a learning companion, supporting both academic and institutional navigation. Despite its strengths, the chatbot faces limitations. It struggles with sensitive, nuanced issues requiring human judgement and is less effective in regions with limited digital connectivity. The data also reflect growing demand for personalised and predictive features, such as subject-specific guidance, practice in multiple-choice questions and help with writing assignments or code — capabilities currently under development. Furthermore, learner feedback highlights the need for a multilingual interface, voice support and greater context-awareness in follow-up interactions. This paper presents a critical evaluation of the chatbot's deployment in a Global South tertiary context. Drawing from mixed-methods data — including system analytics, user feedback and content analysis — we explore how AI can extend, but not replace, traditional learner support systems. The planned 2025 integration of a ticketing system for human follow-up indicates an evolving hybrid model. Ultimately, the USP SEM ZERO-GPT initiative showcases how tailored AI solutions can enhance access, inclusion and engagement in higher education, while also surfacing new pedagogical and ethical questions.

Keywords: AI in education, GPT-4o, learner support, digital literacy, Moodle, Semester Zero, Global South

Introduction

The rapid digital transformation in education, accelerated by the Covid-19 pandemic, has emphasised the need for scalable, inclusive, and innovative support systems for learners. In the Pacific Islands, where geographic dispersion and varying levels of Internet connectivity pose unique

challenges, institutions like the University of the South Pacific (USP) are reimagining support models to meet student needs.

Semester Zero, initiated in January 2022 by USP with support from the Commonwealth of Learning, was designed as a free, online preparatory course aimed at easing the transition of new students into higher education. Targeting digital literacy, academic writing and numeracy skills, Semester Zero became a crucial platform to equip learners with the competencies needed for university-level study (Chand & Goundar, 2024).

The programme addresses the pressing needs of students entering a higher education environment, many of whom may not have been adequately prepared through secondary schooling, particularly in underresourced regions. Semester Zero aims to bridge this gap by delivering online orientation modules accessible across the 12 member countries of USP, including remote and island-based learners. This model aligns with broader educational goals across the Pacific for equitable access, gender inclusivity and quality assurance.

In 2024, USP introduced USP Semester Zero GPT (USP SEM ZERO-GPT), an AI-powered chatbot developed on OpenAI's GPT architecture and integrated into the Moodle learning platform (Chand & Goundar, 2024). This chatbot aimed to provide real-time, 24/7 academic and technical support to students. As part of USP's broader digital learning strategy, this innovation represents a major step towards reimagining learner support through artificial intelligence.

Theoretical Framework

This study is grounded in the theoretical framework of learner support in open and distance learning (ODL), which emphasises the provision of academic, administrative, and emotional support to learners in non-traditional settings (Tait, 2000). Tait argued that effective learner support is a fundamental component of student retention and success in distance education. AI-powered tools such as USP SEM ZERO-GPT can be interpreted as a new medium for delivering this support at scale, especially in contexts where access to physical support systems is limited or fragmented.

The chatbot also aligns with Vygotsky's (1978) socio-cultural theory, wherein tools (like AI systems) mediate learning and development. In this context, the chatbot functions as a mediating artefact within the learner's zone of proximal development, scaffolding learners through challenges that would be insurmountable alone. The chatbot's ability to provide timely, contextualised support simulates the presence of a more knowledgeable other, an essential component in Vygotsky's theory, thus promoting deeper engagement with learning content.

Another relevant framework is constructivist learning theory, which emphasises learner autonomy, interaction and the active construction of knowledge (Holmes, 2019). From this perspective, USP SEM ZERO-GPT serves not merely as a passive information delivery system but also as a dialogic partner, engaging learners in a process of meaning-making. Through iterative questioning and feedback, the chatbot encourages students to reflect on their learning needs and access resources accordingly, supporting self-regulated learning behaviours.

The study also draws on principles from universal design for learning (UDL; CAST, 2024), which promotes the creation of flexible learning environments that accommodate individual learning differences. The chatbot's asynchronous, always-available design allows students to access help at their convenience, regardless of geographic location or time zone. This design feature aligns closely with the UDL principle of providing multiple means of engagement and representation.

Furthermore, the integration of AI in education intersects with frameworks of learning for sustainable development, particularly in promoting inclusive, equitable and lifelong learning opportunities (UNESCO, 2017). The initiative not only enhances learning for traditionally underserved communities but also supports the broader aim of building resilient, adaptable learning systems in the Global South. As educational institutions in the region strive to bridge digital divides and enhance student retention, AI tools like USP SEM ZERO-GPT offer potential pathways for scalable and personalised support.

Finally, this framework acknowledges the role of critical pedagogy in examining the ethical implications of technology in education. The deployment of AI must be critically assessed to ensure it does not reinforce existing inequalities or marginalise voices. Ensuring cultural relevance, data privacy and equitable access must remain central to AI-enabled learning systems, especially in post-colonial and resource-limited settings.

Literature Review

Chatbots are increasingly being adopted in educational settings to enhance student support and engagement, especially in online and blended learning environments. Their capacity to deliver instant, round-the-clock assistance makes them valuable tools for addressing the logistical and academic queries of students, particularly those entering higher education for the first time.

Okonkwo and Ade-Ibijola (2021) conducted a systematic review of chatbot applications in education, highlighting their growing use in both teaching and service delivery contexts. They distinguish between teaching-oriented chatbots, which focus on instructional content, and service-oriented chatbots, which provide administrative and academic support. The USP SEM ZERO-GPT exemplifies a hybrid approach by integrating support for Moodle navigation, course guidance and institutional policies.

Yin et al. (2020) explored the use of chatbots in micro-learning environments and found that students supported by conversational AI demonstrated higher motivation and academic performance than those without access to such tools. Similarly, Zhang et al. (2023) noted that chatbot-assisted learning could enhance learner autonomy and personalised interaction, leading to more meaningful educational experiences. The USP SEM ZERO-GPT aligns with these findings by enabling students to resolve their questions independently and gain confidence navigating digital systems.

Pérez et al. (2020) emphasised the pedagogical potential of chatbots to offer adaptive, responsive support in real time. Their review underlines the importance of aligning chatbot capabilities with institutional goals and learner needs. This is particularly pertinent in the case of USP, where the

chatbot was embedded within the broader Semester Zero programme — a course designed to equip learners with foundational skills for university success.

However, several studies have cautioned against overreliance on chatbot technology. Molnár and Szűts (2018) noted that although chatbots can simulate human interaction, they lack the affective dimension necessary for handling emotional or complex student concerns. This reinforces the need for human-AI hybrid models, particularly in support systems involving first-year students who may experience anxiety or confusion.

Bii et al. (2018) explored teacher attitudes towards chatbot use and found that although many educators appreciated the efficiency gains, they expressed concern about the loss of personal connection and the pedagogical implications of automating student interactions. The USP chatbot team acknowledged this concern by ensuring a ticketing and referral system was in place for cases beyond the chatbot's scope.

In recent years, the ethical use of AI in education has become a focal point in research and policymaking. Floridi et al. (2018) proposed five core principles — beneficence, non-maleficence, autonomy, justice and explicability — which serve as ethical cornerstones for AI integration. Jobin et al. (2019) conducted a global comparative analysis and found notable gaps in transparency, inclusivity and enforcement across AI policies. These ethical considerations are particularly relevant in the Global South, where marginalised communities may be disproportionately affected by opaque algorithmic decisions. In response, the USP chatbot initiative adopted explicit content moderation protocols, anonymised usage data and a tiered referral system for sensitive queries.

The literature also supports the role of chatbots in promoting inclusivity and access in diverse learning environments. According to UNESCO (2017), digital tools that promote equitable, inclusive education are key to achieving the goals of education for sustainable development. The deployment of the USP SEM ZERO-GPT across the Pacific Islands, where access to physical campuses is limited, demonstrates how chatbots can democratise access to essential academic support.

From a design perspective, Yetişensoy and Karaduman (2024) have argued for ethical AI deployment in educational institutions, emphasising transparency, data protection and cultural sensitivity. In this context, the USP chatbot team curated content aligned with institutional policies and embedded localised responses relevant to USP's diverse, multilingual learner population.

In sum, the literature reveals both opportunities and tensions in the adoption of chatbot technologies in education. Although the benefits in accessibility, autonomy and efficiency are well documented, these must be balanced with attention to pedagogical integrity, inclusivity and the emotional needs of learners. The USP SEM ZERO-GPT case contributes to this evolving discourse by illustrating how a contextualised, hybrid chatbot model can enhance learner support in the Global South.

Research Design and Methods

This study adopted a mixed-methods approach, combining quantitative data from usage analytics with qualitative data from learner feedback. The chatbot interaction data were collected between January and March 2025 during the roll-out of the updated GPT-4o model. A total of 67 unique queries were analysed, encompassing 134 messages.

The analytics focused on:

- thematic classification of questions (course-related, platform-related, institutional)
- accuracy of responses (correct, partial, incorrect)
- usage modality (web-based chat interface vs. Moodle plugin)

Additionally, open-ended learner feedback was sourced from embedded chatbot interactions and end-of-course surveys. Comments were coded thematically to identify patterns in user experience and satisfaction.

Triangulation with internal documents, including the Semester Zero 2025 Learner Support Report, strengthened the reliability of findings. The integration of multiple data sources ensures a more comprehensive evaluation of the AI tool's impact.

Findings and Discussion

Usage Trends

Learners interacted with the system through both the Moodle-integrated chatbot and a web-based interface. Notably, 66% of all queries were made using the web interface, likely due to its flexibility and ease of use outside the Moodle environment. The remaining 34% came from within the Moodle learning platform, where the chatbot was embedded in the Semester Zero course page. This dual-access model improved reach and usability, allowing students to seek support whether they were actively engaged in coursework or exploring the USP digital ecosystem.

A total of 134 messages across 67 unique learner queries were recorded during the January–March 2025 period. These were categorised based on content focus: 41.8% of questions were directly related to course content (such as course enrolment, assessments and grading), 11.9% focused on the USP Handbook and another 11.9% were broader institutional queries (including contact details, programme structures and support services). Notably, 25.4% of the interactions fell into the "other" category — these included off-topic requests, greetings and tasks beyond the chatbot's intended scope, such as coding help or essay writing.

The thematic focus of these questions reflects strong engagement with the course content and a clear interest in institutional clarity. For example, learners posed questions such as "What is the grading system for Semester Zero?" and "I need help with course registration for BSE". These insights suggest that the chatbot not only aided course completion but also supported wider academic orientation.

Demographic analysis of 67 users revealed that 58% identified as female and 42% as male. Approximately 67% were aged between 17 and 20, while 21% were part-time or mature learners aged above 25. Regionally, users came from all 12 USP member countries, with the highest traffic from Fiji (45%), Samoa (15%) and Tonga (13%). These data, gathered through anonymous analytics and opt-in feedback, provide a clearer picture of the chatbot's reach and support equitable design iteration as shown in Table 1:

Table 1: Demographic profile of chatbot users *(n = 67)*

Category	Demographic	Percentage (%)	Insights
Gender	Female	58%	Majority of users identified as female.
	Male	42%	Represents a balanced participation rate.
Age	17–20 years	67%	Predominantly youth users, likely undergraduate students.
	25 years and above	21%	Part-time or mature learners with diverse study commitments.
Regional distribution	Fiji	45%	Highest user engagement across all member countries.
	Samoa	15%	Second-highest participation.
	Tonga	13%	Notable representation among Pacific Island learners.
	Other USP Member Countries	27%	Users spread across remaining nine countries, indicating regional inclusivity.

Accuracy and Improvement

The chatbot's performance improved markedly with the 2025 upgrade to GPT-4o. Accuracy levels rose from 74.4% in the 2024 offering to 96.9% in 2025. Of all responses, 89.1% were fully accurate, 7.8% were partially correct (providing relevant but incomplete responses) and only 3.1% were deemed incorrect as shown in Table 2:

Table 2: Comparative performance of chatbot models (2024 vs 2025)

Year (model)	Accuracy level (%)	Fully accurate responses (%)	Partially correct responses (%)	Incorrect responses (%)
2024 (pre-GPT-4o)	74.4%	–	–	–
2025 (GPT-4o upgrade)	96.9%	89.1%	7.8%	3.1%

This improvement is attributed to two main factors: first, the integration of updated course and institutional content into the chatbot's training data; and second, the enhanced contextual reasoning abilities of the GPT-4o model. For instance, learners who asked, "How do I know if I've completed the Semester Zero course?" received clear, step-by-step instructions based on course tracking metrics available on Moodle. In contrast, the 2024 version often gave generic or partially helpful answers.

However, a small portion of queries remained challenging, particularly when questions were vague, multifaceted or required access to information outside the chatbot's scope (e.g., "Can you write me

a report on climate change?"). These challenges suggest the need for more advanced natural language processing and better mechanisms for clarifying ambiguous inputs.

Learner Feedback

Learner feedback collected from chatbot interactions and Semester Zero surveys was generally positive. Respondents described the chatbot as "very helpful," "easy to use" and "available when I needed it". In the 2025 survey, 73% of respondents reported being satisfied or very satisfied with the chatbot's assistance, while only 9% expressed dissatisfaction. Respondents described the chatbot as, "a lifesaver when I got stuck at night," and "the first place I go to before emailing a lecturer". Another learner shared, "It feels like someone is there, even if it's not a real person". These quotes affirm the chatbot's role as a perceived companion and not just an information source.

Several themes emerged from the feedback:

- Accessibility: Learners appreciated being able to receive instant help at any time, particularly during evenings and weekends.
- Clarity: The chatbot's responses were often praised for being straightforward and easy to follow.
- Autonomy: Students felt empowered to troubleshoot problems on their own, reducing the need to contact human support staff.

Suggestions for improvement included:

- adding voice input and multilingual support
- increasing the system's ability to remember and respond to follow-up questions in context
- providing support for multiple-choice questions, quizzes and basic programming exercises

These insights underscore the potential of the chatbot to become more than a static information source. With further development, it could evolve into a dynamic, personalised learning companion.

Equity and Limitations

Although the chatbot improved access to information, it also surfaced ongoing equity challenges. Students in areas with limited or unstable Internet access experienced delays or were unable to use the chatbot consistently. Given that the chatbot is a text-based, online-only tool, it remains inaccessible to learners with connectivity issues or low digital literacy. This digital divide remains a significant barrier to fully inclusive learning support.

Furthermore, although the chatbot performed well on factual and procedural queries, it lacked the capacity to address sensitive or context-specific issues. For example, students asking for help with academic misconduct appeals or mental health concerns were redirected to human staff, indicating that AI cannot replace the empathetic and ethical nuance required in such cases.

These findings align with literature stressing that AI tools should complement — not replace — human interaction in educational settings (Moore & Tsay, 2024; Stöhr et al., 2024). They highlight the need for hybrid support models that integrate chatbots with human advisors, counsellors and academic staff.

To address ethical concerns, the chatbot anonymises data logs, provides privacy disclaimers and refers personal issues to human staff. However, language inclusivity remains a challenge — currently, English is the only supported interface. Plans are underway to offer basic Fijian and Hindi support using speech-to-text APIs and dialect-sensitive scripts.

Implications for Staff Roles and Institutional Design

The chatbot's adoption has implications for the roles of academic and support staff. On one hand, it reduces the volume of repetitive inquiries handled by human staff, thereby allowing them to focus on higher-order tasks. On the other, it introduces a need for new institutional competencies: chatbot monitoring, prompt engineering, training updates and ethical oversight.

Staff also played a crucial role in selecting and curating content for the chatbot, including structuring responses to align with USP policies. Institutional buy-in and interdepartmental co-ordination were critical to ensuring that the chatbot offered accurate and standardised information across faculties and services.

In this context, chatbot deployment is not merely a technological intervention but a shift in the institutional approach to learner support. It demands a rethinking of workflows, responsibilities and the professional development of educational staff.

In summary, the findings confirm that the USP SEM ZERO-GPT chatbot enhances student engagement, improves operational efficiency and supports scalable delivery of foundational learner support. Yet, the initiative also underscores the necessity for thoughtful implementation, ongoing evaluation and a balance between automation and human interaction to sustain educational quality and inclusivity.

Implications for Learning for Sustainable Development

The USP SEM ZERO-GPT project contributes to multiple Sustainable Development Goals (SDGs) from the United Nations (2015), particularly:

- SDG4: Ensure inclusive and equitable quality education
- SDG9: Build resilient infrastructure, promote inclusive innovation
- SDG10: Reduce inequalities

By integrating artificial intelligence into educational frameworks, the project supports the development of equitable relationships within society and advances the broader objectives of the SDGs (Unterhalter & Howell, 2020).

The chatbot's role in expanding access, especially in a region marked by infrastructural disparity, supports the core principles of learning for sustainable development (UNESCO, 2017). Its deployment addresses the digital skills gap by helping learners become familiar with online learning environments and digital communication tools.

More importantly, the project promotes scalable, sustainable models of learner support that can be adapted to different regional contexts across the Global South. The flexible nature of AI tools makes them especially useful in blended and online learning modalities, which are increasingly adopted for climate-resilient and disaster-ready education systems.

However, sustainability must also account for ethical use, continuous refinement, and human-AI collaboration. AI cannot replace the nuanced care provided by educators and counsellors. Instead, it should be viewed as an enabler of human-centred education.

The initiative now also aligns with UNESCO's (2021) Recommendation on the Ethics of Artificial Intelligence, particularly in ensuring human oversight, transparency and non-discrimination. As multilingual modules are piloted and regional staff are trained in chatbot prompt engineering, the initiative is actively evolving towards ethical, equitable and culturally grounded AI deployment.

Conclusion

The USP SEM ZERO-GPT initiative represents a pioneering approach to learner support in higher education, particularly in the Pacific region and other resource-constrained contexts. By integrating AI into the Semester Zero programme, USP has not only enhanced student access to timely academic support but also aligned its practices with the broader goals of learning for sustainable development (UNESCO, 2017). The chatbot has successfully bridged gaps in orientation, academic guidance and institutional awareness, all while accommodating the needs of a geographically dispersed student body.

This case study reveals that although AI-powered systems can significantly improve engagement and operational efficiency, they are most effective when embedded within a holistic, learner-centred support strategy. The deployment of GPT-4o technology, integration with Moodle and continuous improvement based on learner feedback demonstrate a commitment to iterative innovation. The reported increase in response accuracy and learner satisfaction underscores the value of context-specific AI solutions in higher education.

However, the study also highlights persistent challenges. These include the digital divide across USP campuses, limitations in addressing emotionally sensitive issues and the need for greater adaptability and language inclusivity in chatbot design. It is evident that AI tools, while powerful, must be used to augment — not replace — human interaction, particularly in areas requiring empathy, judgement or cultural sensitivity.

For practitioners, this initiative offers a blueprint for implementing AI-driven learner support that is scalable, inclusive, and contextually grounded. The chatbot's success is attributed not merely to its technological sophistication but to its alignment with educational values such as equity,

accessibility and learner empowerment. Institutions considering similar tools should invest not only in infrastructure but also in ethical oversight, staff training and learner co-design.

In conclusion, the USP SEM ZERO-GPT initiative provides compelling evidence that AI can contribute meaningfully to sustainable, resilient and learner-centred education systems. As digital technologies continue to reshape the educational landscape, thoughtful integration of AI — with a focus on equity and sustainability — can enhance student success, institutional capacity and the broader mission of higher education in the Global South and beyond. Future developments will include adaptive learning paths, longitudinal tracking of learner outcomes and AI-human co-design workshops. By embedding iterative evaluation, the USP SEM ZERO-GPT model aspires to evolve into a global benchmark for equitable, ethical and student-centred AI in tertiary education.

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The Use of Artificial Intelligence in Teacher Education Students' Assessment Practices in Open Distance E-learning

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Abstract

This qualitative study explored the use of artificial intelligence (AI) in assessment by teacher education students in open-distance e-learning. The substitution, augmentation, modification and redefinition model supported this study. The study, conducted within an interpretivist paradigm, identified standard practices, perceived benefits and challenges that students face when using AI. Data were collected using an online questionnaire sent to students through a Microsoft Forms email link. Bachelor of Education students registered in three phases (intermediate, senior and further education and training) participated in sharing their lived experiences using AI technological tools. Thematic analysis was utilised to analyse the data. Findings reveal that although technology and AI tools enhance efficiency and benefit academic performance, overreliance, ethical use and authenticity of their assessments remain challenging. The broad implication of these findings is that students should be guided in using AI in line with the recommended guidelines based on the findings. or designed by institutions to their benefit. The reliance on AI should not overcome its critical context, and digital literacy training should be embedded in teacher education programmes to optimise the ethical use of technology and create institutional policies on the ethical use of AI tools for educational success.

Keywords: artificial intelligence (AI), assessment, teacher education, open and distance e-learning (ODeL)

Introduction

Twenty-first-century education is characterised by the rapid development of technology and the Fourth Industrial Revolution. One of the most important tasks of any higher education institution is to educate and prepare students using the most contemporary, up-to-date and innovative teaching and learning strategies and tools (Mudau et al., 2022). Open and distance e-learning (ODeL) benefits from using technological tools in teaching and learning, where the student-centred approach to learning uses these systems to bridge the distance, time, financial, social, academic and communication gaps between institution practitioners and students, learning content and fellow students (Pretorius et al., 2021). Within the field of technology powered by artificial intelligence (AI), the academic community can interact and engage with the students in the teaching and learning process. Our everyday lives are profoundly impacted by AI, which is gradually changing how we think, act and communicate (Chen et al., 2020). AI can be defined as machines that can perform human tasks through their thinking (Dörfler, 2022). The rapid advancement of AI technologies is not only changing how we interact with technology and live our lives but it has also significantly impacted the field of education, radically changing the nature of classroom instruction (Mhlanga, 2023; Zhang & Aslan, 2021). AI has the potential to revolutionise the field of education,

including teacher education; however, to produce digitally savvy learners, teacher education fields of study should be prepared by teachers who embrace technology and its tools (Adipat et al., 2021).

In South Africa, teacher education programmes prepare teachers to teach in various phases, including foundation, intermediate, senior, and further education and training. Therefore, higher education institutions should equip these potential teachers with 21st-century skills such as digital literacy. Langreo (2023, p. 22) has concurred that it is crucial for schools of education to act promptly to ensure that prospective teachers possess a foundational understanding of AI, know how to utilise it effectively for instruction, and can integrate AI literacy into every subject. As well as exposing teacher education students to the newest technology and teaching them how to use it, it is important to stress that for pre-service teachers to graduate as competent educators in the technologically advanced 21st century, they must have the relevant knowledge and skills to integrate it into their teaching and use it accordingly (Dy & Sumayao, 2023). Subasman (2024) has suggested that teacher educators must model instructional methods that help future teachers understand that technology-based instruction is no longer an option; it is a requirement. Only then shall we have realistic hope for making student-centric technology a reality (Gosh, 2024). AI can assist in improving teaching skills, identifying knowledge gaps and providing feedback on areas for improvement. AI-powered tools could be crucial in equipping teacher education students with the knowledge they need during assessments. Research has emphasised the potential of AI technologies to streamline assessment processes, improve personalised feedback and enhance scalability and efficiency (Jamal, 2023). However, criticisms and concerns highlight important issues of failings in equity, privacy and the need for human oversight (Bozkurt et al., 2023), for example, in maintaining the integrity and validity of assessments.

As a result of these practices, coupled with the assertion that today's pre-service teachers are presumed to be digitally savvy because they have grown up with the convenience of using technology (Habibi et al., 2022), we found them eligible to give their perspective on AI learning within the context of teacher education programmes. It is, therefore, against this background that this research study seeks to answer the following question: "How do teacher education students use AI for assessments in ODeL?" This study explored the use of AI by teacher education students during assessments. By examining their practices, challenges and benefits, the study aimed to provide insights into optimising AI use in teacher education programmes to empower students with skills.

Theoretical Framework

The substitution, augmentation, modification and redefinition model, created in 2006 by Puentedura while working with the Maine Learning Technologies Initiative (Puentedura, 2006), is the framework supporting this study. Technology directly replaces conventional tools at the substitution level without causing functional change, whereas augmentation adds new functionality to these instruments. Redefinition and modification need a substantial amount of work. This model assists teachers in using technology to improve and transform learning experiences (Tunjera & Chigona, 2020). In this study, the substitution, augmentation, modification and redefinition model assists in categorising and assessing learning and assessment activities. This theoretical framing guides the interpretation of how AI integration in assessment moves from basic substitution to

transformative redefinition, aligning with technology-enhanced learning theories and assessment theory in teacher education.

At the substitution level, AI tools replace conventional techniques like citation generators and automatic grammar checkers. Augmentation of these technologies improves functionality by providing features like content refining or real-time feedback, which raises the calibre and productivity of students' work. Significant task redesign is possible during the modification stage, when AI makes it possible to use interactive and collaborative assessments, including AI-powered simulations or adaptive learning tools that customise feedback to each user's needs. AI enables the development of novel assessments at the redefinition level, such as creating lesson plans that incorporate AI or assessment responses of a high standard.

Literature Review

Assessment in ODeL

Assessment is a broad term that encompasses observing, gathering, recording and interpreting information to answer questions and inform legal and instructional decisions about students (Cohen & Spenciner, 2003). Assessment is thus a crucial part of teacher education that gathers, examines and interprets information to inform student development (Gikandi et al., 2011). Recently, the focus has shifted to incorporating AI into educational assessment. Thanks to AI-driven evaluation tools, teachers can modify assignments to fit each student's needs and learning styles, which presents previously unheard-of possibilities for individualised learning (Luckin et al., 2016). However, there are serious ethical issues with the use of AI in assessment. Diverse student perspectives exist about AI and online assessments. Online assessments are popular because they are convenient and flexible, but some are concerned about their privacy, dependability, technical difficulties, biases, and potential effects on degree reputations (Amrane-Cooper et al., 2023). Similarly, students have shown diverse reactions to using AI, with some recognising its potential to enhance learning.

In contrast, others have raised concerns about data privacy, ethical issues, and the fear of diminishing the human element in education (Khine, 2024, Chapter 6). In addition, implementing AI implies the risk of dehumanising the learning experience (Williamson & Eynon, 2020). Moreover, the role of educators in interpreting AI-generated insights highlights the importance of aligning technological tools with educational principles (Selwyn, 2019). As AI continues to evolve, its impact on formative and summative assessments warrants further exploration to ensure that it enhances, rather than undermines, the holistic development of learners. For example, students can use ChatGPT to complete their assignments, but this is often done without a thorough understanding of the content. The software can take instructions from the user to complete the task, just like a human being (Tripathi, 2018).

Teacher Education

Teacher education is defined as the practice, strategies and policies that prepare teachers with the professional knowledge, teaching skills, evaluation techniques and ethical orientations needed to

effectively perform their teaching activities to contribute to the development of society (Oyekan, 2000). ODeL enables students and educators who are separated by distance to communicate using contemporary technologies in both synchronous and asynchronous modes (Alfonso, 2012). Teacher education in South Africa usually occurs in the early childhood, foundation, intermediate, senior and further education phases (Department of Basic Education, 2010). Thus, teacher education encompasses both fundamental and foundational teacher education, oriented towards pre-service teachers, and continuous teacher education, oriented towards in-service teachers who receive professional development training. Most teachers now recognise the importance of technology in teaching and learning activities. As such, teacher education programmes integrate technology within the classroom or via online courses, such as social media, blogs, web conferences and discussion forums. Including AI in teacher training will equip educators with enhanced teaching and problem-solving skills (Kim, 2024). However, several issues, including the school culture, the availability of resources, and teachers' attitudes, expertise and abilities, make integrating technology into courses difficult (Farjon et al., 2019). Technology in the classroom is becoming essential in the educational system, and governments are implementing policies to encourage its usage despite these obstacles (Butler et al., 2018). Therefore, teacher education plays a critical role in developing teachers' knowledge and skills related to the use of technology in the classroom. Cadwell (2018) stated that technologies might offer several benefits within teacher education, but it is also necessary to emphasise the importance of preparing pre-service teachers to integrate technologies into education. A complex world presents new conditions that may require pre- and in-service teachers to deliver instruction using technology. Moreover, regarding the use of technology in teacher education, Carrier and Nye (2017) highlighted how professional development in technology can empower educators, as it enhances their teaching and supports students' learning experiences (Nazaretsky et al., 2022).

AI in Education

Baker and Smith (2019, p. 10) defined AI as, "Computers that perform cognitive tasks, usually associated with human minds, particularly learning and problem-solving". Technology integration in teacher education has evolved, enabling students to access resources, collaborate and engage in self-directed learning. It also helps teachers to develop activities and materials that better suit the needs of students and more effectively engage them (Menabò et al., 2021). AI tools like Grammarly, Turnitin and ChatGPT are becoming staples for students, supporting tasks like grammar checking, idea generation and plagiarism detection (Agadzhanova, 2024). Although these tools boost productivity, they also need a nuanced understanding of ethical and practical applications. Despite the improved problem-solving capabilities offered by AI, human-AI collaboration lacks the ethics and creativity inherent in human intelligence (Agadzhanova, 2024). Human beings remain a primary element of all information and communications technologies (Duggal, 2021).

Challenges in Using Technology and AI in Education

Like other countries in the Global South, South Africa faces difficulties in utilising AI technology, including a lack of infrastructure, unreliable Internet connectivity, restricted access to digital devices and insufficient technological support (Mhlanga, 2023). The successful use of AI in education is hampered by accessibility, affordability and digital literacy (van den Berg, 2024). Since many student teachers lack the digital literacy necessary to effectively utilise AI-driven platforms,

the digital divide presents a difficulty in teacher education and exacerbates existing educational disparities (van Deursen & Helsper, 2021). Similarly, cultural resistance to technological adoption and scepticism about the relevance of AI in local teaching contexts pose additional hurdles (Kimenyi, 2021). Furthermore, ethical issues, such as plagiarism and the potential misuse of AI tools, complicate the integration of these tools into educational settings. Ethical issues, such as data privacy and the possible misuse of AI systems, are still insufficiently addressed in these contexts, prompting concerns about whether institutions adequately address these issues (van Deursen & Helsper, 2021). Additionally, in other parts of the world, particularly in developing countries, financial constraints often result in inadequate funding for acquiring and maintaining advanced educational technologies (Bali & Liu, 2018). As a result, these issues negatively impact the effective implementation of AI tools in teacher education institutions.

To fully leverage AI technology in teacher education, developing countries should ensure equitable access to technology, invest in training initiatives and create AI solutions designed to meet their distinct educational needs. AI can facilitate personalised learning by offering teachers various tools and resources to help them create personalised learning experiences for their students. AI can potentially enrich students' assessment experience (Qadir, 2022).

Methods

Using a qualitative approach, this study aimed to understand how teacher education students utilise AI for assessments in ODeL. The selection of the interpretivist paradigm was influenced by the philosophical foundation that guided this study, which was inherently focused on comprehending the world through participants' lived experiences (Creswell & Poth, 2018; Flick, 2018, Chapter 1; Lim, 2024).

Participants

As Creswell and Poth (2018) have emphasised the importance of specifying the sample frame for research, the study focused on education students enrolled at a South African ODeL public university. The research employed a non-random, purposive sampling technique to identify the College of Education student cohort, specifically those registered for the Bachelor of Education degree in three phases: intermediate, senior and further education and training. The sample size of 197 respondents was determined by voluntary participation from the total population of 11,600 contacted students, reflecting a typical response rate for large-scale online surveys in ODeL contexts. The research participants, male and female students from first to fourth year, were informed about the research and its potential educational implications.

Data Collection

The sampled Bachelor of Education students from the College of Education were asked to complete an open-ended questionnaire to gain a deeper understanding of their perspectives and experiences with AI tools. The questionnaire elicited detailed and authentic data based on participants' perceptions, experiences and beliefs about using AI tools. Students received the questionnaires via an email link to Microsoft Forms and were requested to complete the open-ended questions. The

students were informed about the study, including that participation was voluntary, and they were assured of anonymity. For this reason, participants are referred to as P1, P2 and so forth in the Data Analysis section to maintain their confidentiality and protect their identities. A total of 1,970 students received the link to the survey questionnaire. Students were given one month to respond, and a follow-up reminder was sent after two weeks. However, only 197 students completed the questionnaire and returned it via the Microsoft Forms link provided.

Data Analysis

The questionnaires were transcribed, and the qualitative data were analysed using thematic analysis, which, according to Chaka (2023), entails searching for themes in the narrative data regarding the phenomenon under investigation. Thematic analysis can be inductive or deductive; this study, using inductive analysis, followed Braun and Clarke's (2022) step-by-step analysis procedure to allow themes, concepts and patterns to emerge directly from the data. These steps included becoming familiar with the data, generating initial codes, searching for themes, reviewing, defining and writing up the data (Braun & Clarke, 2022). Based on the above steps, themes were developed iteratively and revised constantly. A specialist professor in AI teacher education acted as an independent reviewer to code the data, ensuring inter-rater reliability and validity (Downing, 2003). As part of the data analysis process, I compared the codes, removed what was irrelevant reached a consensus and finalised the themes. Reliability was enhanced through independent coding by a second researcher, who is a professor in teacher education, followed by consensus meetings to resolve any discrepancies in theme identification.

Trustworthiness of the Study

Trustworthiness considers believability based on coherence, insight and instrument utility. Confirmability was employed to meet the criterion of trustworthiness in using the qualitative research design (Creswell & Creswell, 2018). To enhance the study's credibility, peer debriefing, research methods and conclusions were reviewed with several peers who were not part of the study (Creswell & Creswell, 2018). Additionally, member checking was employed, where participants were asked to provide feedback on the data, interpretation and conclusions to help ascertain the study's credibility (Creswell & Creswell, 2018). Member checking provided an opportunity for the participants to review and validate the accuracy of the collected data.

Ethical Considerations

Ethical clearance was received from the Research Ethics Committee of the College of Education at the Open Distance eLearning University in South Africa. Participants were informed that their involvement in the study was voluntary and that they had the right to withdraw at any time (Creswell& Creswell, 2018). Informed consent was obtained from the participants before the study began (Creswell & Poth, 2018). Additionally, they were assured that confidentiality would be maintained and that the information in the survey questionnaire would be kept confidential (Creswell & Poth, 2018).

Presentation of Findings

In South Africa, prospective primary and secondary school teachers are trained at a university's College of Education or Faculty of Education. In this regard, the research site for this study is an ODeL institution with a College of Education that offers a Bachelor of Education degree. The training and certificates earned prepared the student to move directly into teaching at various levels of education. All participants were enrolled in the Bachelor of Education, the undergraduate education programme, in the years 2021–2023 at the time of the research. Due to the diversity of sampled student teachers (first- to fourth-year level of study), it is evident how student teachers utilise AI in their assessment tasks. The participants. information is provided below in Table 1.

Table 1: Biographical information

Participants	Categories	Total
Gender	Male	56
	Female	141
Age	18–23 years	95
	24–38 years	70
	39–54 years	32
Qualification	1st year level Bachelor of Education	92
	2nd year level Bachelor of Education	54
	3rd year level Bachelor of Education	27
	4th year level Bachelor of Education	24

The findings are presented based on two major themes that emerged from the data analysis. These themes highlight the practices, challenges and benefits of using AI during assessments.

Themes

The participants shared their views and insights on the role of AI in their assessment practices within ODeL. For this paper, two themes emerged: enhancing assessment through AI tools and the challenges experienced when using AI tools.

Theme 1: Enhancing assessment through AI tools

Most participants reported using AI technology and tools when working on their assignments. The various tools assisted them in grasping the learning material, feeling more confident about their understanding, and writing their assignments. These advantages included a deeper topic comprehension and increased self-assurance in their submissions:

> Skills acquired in writing correctly and improving spelling to avoid typing errors … I find that constructive. (P3)

> I feel confident with my assignments … I put them on Grammarly to check for grammatical errors. (P5)

> By bettering my English is improving as I write my assignment answers using ChatGPT and Grammarly. (P4)

> AI assistive tools help to structure my assignments. (P1)

I feel confident with my assignments as I get assurance that I submit work of better quality after spelling checks by Grammarly. (P12)

Turnitin has provided the report of my work confirming issues of plagiarism. (P10)

ChatGPT helped me boost my knowledge and skills and helped me answer the questions. (P11)

Assignment instruction requires that I put my work into Turnitin before submission, and a report is generated to check my work. (P12)

I am not an English first language speaker, but Grammarly always assists me in correcting my grammar flow of ideas. (P8)

Most students echoed that using AI tools like ChatGPT enables them to generate ideas on how to approach an assignment question, which in turn ignites their critical thinking:

I was clueless about what was expected in my assignment question, but ChatGPT's suggested answers helped me think out of the box to answer the question. (P10)

ChatGPT helps me to up my level of thinking as I get to know how to respond to a question based on its responses. (P9)

Introduction to various AI tools enhances their digital skills, giving student teachers confidence. They can work independently, tapping into multiple AI resources, ultimately developing self-directed learning and improving their critical thinking.

Theme 2: Challenges experienced when using AI tools
The previous theme outlined the benefits students experience when using AI tools; however, with benefits, there are also challenges. These challenges included technical challenges in using AI, overreliance on AI tools, ethical concerns in using AI tools and the authenticity of assessments by students using AI.

Sub-theme 1: Overreliance on AI tools
This sub-theme revealed the challenge of overreliance on AI tools, depending too much on AI when completing their assignments. Participants reported that they sometimes depend on AI-generated responses, which downplayed their capabilities of analysing and solving problems critically when completing their assessments:

I sometimes take answers as they are, especially when I am late for submission, and I do not apply my mind. (P5)

I do not stress about the assignment because ChatGPT will give me the necessary answers. (P7)

Relying on AI hindered the development of crucial skills such as critical and analytical thinking, creativity, and contextual application of knowledge as reported by other participants:

Sometimes, I don't bother to think about knowing … AI assists with answers. (P8)

I trust these tools so much that I do not bother thinking more critically. (P5)

I do not know if learning is taking place because I rely so much on AI when solving problems in my assignment. (P3)

I just ask AI, and it does the work for me. (P 7)

In line with the context, most students agreed that overreliance on AI impacted their context application:

AI does not comprehend the actual South African context, but I still trust the responses I get. (P7)

Another participant stated: AI makes me lose some South African context and relevance. (P8)

I do not do much research and rely on AI context. (P12)

This theme highlighted the challenge of overreliance on AI, with participants sharing that their creativity and critical thinking are hindered when relying solely on AI tools to complete their assessments. As noted in the literature, AI cannot replace human intelligence. In these instances, students must apply their critical thinking and problem-solving skills to complete their assessments without relying solely on AI.

Sub-theme 2: Ethical Concerns in the use of AI tools

Ethical concerns emerged as a recurring theme, particularly regarding the lack of awareness and guidance on ethical boundaries. Most student teachers reported that AI technologies should be assistive, not autonomous. We believe that humans remain accountable for all decisions and actions, even when assisted by AI. All AI-generated material must be carefully reviewed, approved, edited, and overseen by a human author. During the completion of the questionnaire, the students shared the following comments:

We do not get guidance on how to use AI, which affects our usage. (P10)

AI is complicated as I do not know about the policy on AI. (P11)

I try not to use it because it might land me in trouble. (P13)

This sub-theme examined student teachers' ethical concerns with using AI technology, concerns about using it without guidelines and how to navigate such challenges. It highlights strategies like seeking institutional guidance, discussing responsible AI use and advocating for transparent policies.

Sub-theme 3: Authenticity of assessments using AI by students

This sub-theme addresses concerns regarding the authenticity and reliability of information provided by AI tools in academic assessments. Although AI is a valuable resource, student teachers have expressed challenges regarding its ability to provide accurate, context-specific content.

The following quotes illustrate a key issue raised by participants:

> As AI is not human, it is not easy to convey the exact information or results you need. (P4)
>
> It can sometimes give incorrect answers and information. (P4)

Additionally, some student teachers reported receiving answers irrelevant to their context, which could hinder the accuracy of their work:

> Sometimes, it gives me answers that are not relevant to my context. (P10)

On the other hand, some students admitted to taking AI-generated answers at face value without questioning their validity:

> I just take all answers as they are because I trust their intelligence. (P7)

This sub-theme highlighted the challenges between the convenience and potential drawbacks of relying on AI during academic assessments, emphasising the importance of critical thinking when utilising AI-generated content.

Discussion

The study provided insights into using AI in a teacher education programme during the completion of assessments. According to Qadir (2022), AI has the potential to enhance the educational experience. However, the findings of this study revealed both benefits and challenges. Many student teachers understand the concept of AI and are conversant with its use. AI technologies, such as Grammarly, Turnitin, Copilot, and ChatGPT, can assist student teachers in enhancing their confidence, improving their academic writing skills, and increasing their assessment quality. AI-driven assessment tools offer opportunities for personalised learning (Luckin et al., 2016), thereby building the student-teacher's confidence.

However, it is equally important to remember that using AI for assessment raises some ethical concerns, such as data privacy and the potential dehumanisation of the learning process (Williamson & Eynon, 2020). This study also revealed challenges such as overreliance on AI, ethical concerns and issues of authenticity of AI-generated content in the assessment questions. Van Deursen and Helsper (2021) highlighted the ethical concern that has the potential to misappropriate the use of AI systems: most students do not adhere to plagiarism guidelines; they rely on AI tools without demonstrating their own knowledge when answering questions or assessing what is required in the assessment. These findings suggest that although ODeL can provide flexibility and access to education, teacher education programmes should also emphasise the development of digital literacy training, ethical understanding and the responsible use of technology. Beyond the specific institutional setting, these findings offer lessons for other higher education contexts and can inform policy on AI use in teacher education globally, particularly in ODeL systems in the Global South.

Conclusion

The study aimed to explore the use of AI in student teachers' assessment practices in open-distance e-learning. Although AI can potentially improve the quality of teacher education by providing opportunities that foster student teachers' skills and facilitate personalised learning, it raises concerns about biases, authenticity and the reliability of specific contexts and content knowledge. To optimise AI use, teacher education programmes must focus on digital literacy training, and the moral and efficient application of AI tools should be integrated into teacher education programmes. Such programmes should foster critical thinking, encourage self-directed learning and develop an understanding of the ethical limits of AI in education. Student teachers should be responsible for using AI tools, which could be developed through digital literacy training modules.

Furthermore, policies that define appropriate AI use in assessment tasks should be developed and shared with students to remind them of their critical adherence. These policies will promote academic honesty by ensuring students are aware of their obligations and the limitations of AI tools. Although AI technologies can enhance learning effectiveness, overreliance can weaken critical thinking and creative abilities. As AI tools become increasingly accessible, students must use them responsibly and ethically in their academic work.

Based on the findings, this study recommends the following guidelines for students when using AI:

- Ensure that the assessment aligns with AI ethical standards like fairness.
- AI roles should be communicated clearly to students.
- Implement AI detector tools to check plagiarism.
- Ongoing training should be encouraged for lecturers and students to interpret AI-generated information.
- Design assessments are inclusive and accessible to students with diverse learning needs.

This study has several limitations, including the low response rate of students to the questionnaires that was sent to them. Furthermore, only students registered for the Bachelor of Education were sampled. To promote ethical use and deepen the application of AI in teacher education, further research is needed on the long-term effects of AI tool use on teaching and learning practices.

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Gender and Disability-related Influences on Teachers' Access to Technology-Mediated Professional Learning in Tanzania

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Abstract

The teacher professional development learning management system (LMS) developed by the government of Tanzania is a promising nationwide innovation aimed at developing teachers' pedagogical skills and subject knowledge by offering materials that support community of learning sessions. Our longitudinal study of the implementation takes an intersectional theoretical lens to analyse experiences and insights from 226 teachers, 31 school-level leaders and 31 local and national government stakeholders. The aim was to identify the underlying systemic and context-specific issues around marginalisation of female teachers and teachers with disabilities or chronic illness, including the intersecting social norms and technological gaps that may limit their access and use of the LMS. Methods involved participatory, gender-specific and disability-aware focus group discussions (including separate group sessions with teachers with disabilities or chronic illnesses), stakeholder interviews at all levels and observations of community of learning sessions involving all available primary school teachers in 12 rural settings across four regions. Schools were selected based on the presence of women and teachers with disabilities as well as varied levels of technology access and connectivity. Although the LMS dashboard does not capture data on teachers' disabilities, it disaggregates logins by gender, and those figures were reviewed during our analysis. We not only report on barriers and key intersectionalities emerging, such as those related to gender and technology, disability and technology, and rurality and technology access, but also share agentic actions taken at the school level. We offer detailed recommendations for possible ways forward by stakeholders across the system to increase inclusive, equitable access to teacher learning. The resulting insights and practical recommendations have relevance for many forms of technology-mediated teacher learning, particularly in increasing access for women and teachers with disabilities or chronic illnesses, and especially in low-resource rural areas.

Keywords: gender, rural, teacher professional development, disability, chronic illness, educational technology

Introduction

Teacher professional development (TPD) programmes have typically been one-size-fits-all rather than considering the diverse needs of different teacher groups. Although the unique issues for remote schools are increasingly recognised (e.g., Hennessy et al., 2022; Power, 2019), focus on female teachers' experiences or teachers with chronic illnesses and disabilities in TPD within low- and middle-income countries is relatively rare (Mitchell et al., 2024; TPD@Scale Coalition for the Global South, 2025). This study addresses these under-researched areas in the context of teacher

participation in a government-led, technology-supported teacher continuous PD (*Mafunzo Endelevu ya Walimu Kazini* or MEWAKA in Kiswahili) initiative being rolled out across Tanzania to develop the pedagogical and content knowledge and skills of primary school teachers. Teachers meet in regular (weekly) peer-facilitated school-based communitiy of learning sessions (CoLs), and TPD materials are hosted on a learning management system (LMS).

We report on the second phase of a longitudinal project[1] researching the at-scale implementation of MEWAKA in rural primary schools. The research addresses key evidence gaps, producing detailed recommendations for maximising equitable participation and sustaining an effective roll-out. Phase 1 findings (Koomar et al., 2023), highlighting the needs of teachers with disabilities (TWD), female teachers' lower engagement and accessibility issues in low-connectivity areas, were explored in more depth in Phase 2, reported here (and in two policy briefs: Chachage, Swai, et al., 2025; Swai et al., 2024). Phase 2 is part of the global Empowering Teachers Initiative[2] programme, comprising 10 country projects examining how different adaptations and innovations in TPD can be implemented at scale to empower all teachers to develop their practice (Crawfurd et al., 2022).

The research questions (RQs) framing this paper were as follows:

- RQ1: How adequately does MEWAKA support the diverse needs and equitable participation of female teachers and teachers with disabilities or chronic illnesses?
- RQ2: What are the success factors and barriers across the MEWAKA ecosystem supporting inclusion of all teachers in technology-mediated professional learning?
- RQ3: What impacts do any intersectionalities with regard to gender, disability and technology access have on access to TPD?

Theoretical Framework

Our situational analysis applied an equity and social inclusion lens to examine the adaptations enabling inclusive TPD, plus the systemic and normative barriers, power imbalances and stigma experienced by marginalised groups of teachers (Ntseane, 2011). The factors of relevance and focus in our research context included gender identity, disability and rural technology access (McAleavy et al., 2018) and the intersectionality (Crenshaw, 1991) between them. Intersectionality theory examines "the dynamics of difference and sameness" (Cho et al., 2013, p. 787). This perspective enabled us to explore where and why teachers' experiences of TPD are similar and how challenges may be compounded for certain groups of teachers (e.g., female teachers or TWD). Intersectionality is a useful framework through which to examine TPD programmes because it highlights "individuals' and groups' multiple positionality at micro (individual) and macro (sociostructural) levels" (Atewologun, 2018, p. 2), recognising that members sharing one group identity may have different experiences (Office of the Assistant Secretary for Planning and Evaluation, 2022). For example, individual accommodations are needed for TWD, while sociostructural factors can obstruct support.

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[1] https://edtechhub.org/evidence/edtech-hub-research-portfolio/impact-of-tech-supported-tpd-model-on-learning-tanzania/

[2] https://eti.tpdatscalecoalition.org/

Gender and TPD

Although it is widely recognised that gender roles and expectations significantly shape girls' and boys' education (Unterhalter, 2019; International Development Research Centre, 2024; UNESCO, 2019), and numerous programmes and research address teachers' management of, and attitudes towards, girls' and boys' learning, there is relatively little consideration of how gender affects teachers' own experiences of TPD in low- and middle-income countries. The digital gender divide is known to shape female teachers' attitudes towards using technology (United States Agency for International Development, 2020; Webb et al., 2020); this is likely to constrain effective technology use for TPD. In Tanzania, as in other parts of Sub-Saharan Africa, the distribution of male and female teachers varies by location, with fewer female teachers in remote, rural schools (Molina & Martin, 2015; Mulkeen & Chen, 2008). Male teachers are likely to have slightly less access to cluster- and district-level TPD; in some programmes, men in remote rural schools also receive less coaching from ward and school quality assurance officers because their schools received fewer visits (United States Agency for International Development, 2023). However, female teachers traditionally have caring responsibilities that affect their participation in TPD. Socialist feminist scholarship (Mbilinyi & Shechambo, 2009; Stromquist, 1989) has long analysed the interconnections of patriarchy, economics and colonialism, which contribute to women accepting uneven domestic duties, and recent analyses have highlighted the burden placed on Tanzanian women, who must juggle paid and unpaid work (Zambelli et al., 2017). Tao's (2019, p. 911) ethnographic work in Tanzanian schools has demonstrated how the "unequal division of labour that assigned women childcare and domestic duties severely constrained their capacity to respond to" career development opportunities. Thus, many female teachers (rural and urban) face compounded inequities concerning technology and TPD.

Teachers with Disabilities and TPD

A literature review by Neca et al. (2022) showed that despite the widespread focus on learners with disabilities, TWD are vastly underrepresented in both the research literature and the teaching profession; they remain invisible even amongst minoritised teachers. In Singal et al.'s (2024) comprehensive global review, it was found that of 87 studies focusing on TWD working in mainstream educational settings, approximately half were conducted in the United States of America. Additionally, teachers with certain types of disabilities, especially learning difficulties like dyslexia, tended to be overrepresented. Many countries do not hold detailed, accurate data concerning numbers and types of disabilities, and provisions that should be made for TWD are also missing from international declarations and most national policy documents, as flagged in the 2024 Global Report on Teachers (UNESCO & International Task Force on Teachers for Education 2030, 2024). Inequities remain largely unrecognised (Singal et al., 2024). Yet, TWD themselves and others recognise their role as "agents of change" (Glazzard & Dale, 2015, p. 179), shaping inclusive classrooms through their pedagogies based on empowerment, empathy, justice, interdependence and respect for difference (Anderson, 2006; Singal & Ware, 2021). They also offer powerful role models for learners with and without disabilities, challenging societal stigma around disability and the widespread deficit perspective (Singal et al., 2024).

Even less attention is paid in the literature to equitable access to professional learning by TWD (Neca et al., 2022), particularly in LMICs (and technology-supported TPD for TWD: Hennessy et al., 2022). One exception, a study by Wormnaes and Sellaeg (2013), found that visually impaired Ugandan teachers paired with sighted teachers participated less in TPD discussions of audio-described educational video material. Likewise, we postulated that significant and long-term effects of chronic illness on teachers' professional identity (one rare auto-ethnographic study was carried out by Jones, 2020), could affect participation in TPD (although data on numbers affected are unavailable). We thus included a focus on existing support systems and structures for teachers with chronic illness as well as disability.

The overarching aim was to identify the systemic and context-specific issues around marginalisation of female teachers and TWD, including the known intersectionalities between disability and gender (Singal et al., 2023) and between each of these dimensions with digital technology access in rural locations. In particular, female teachers often have less access to technology and thus more limited technological skills (Laurillard et al., 2018; Webb et al., 2020). TWD in the Global South may find available technology devices and platforms unsuitable. Additionally, female TWD reportedly received less support from school leaders than male TWD (Singal et al., 2024), which could also impact the resources they can access.

Design and Methods

Design

The project consisted of iterative cycles of design-based implementation research, a contextually responsive methodology aimed at developing system capacity (Penuel et al., 2011). The mixed-methods study reported here used a survey followed by predominantly qualitative, participatory data collection methods (Robinson-Pant & Jere, 2025), exploring teachers' equitable participation, and schools' and individuals' agency to locally adapt the programme. It specifically explored the needs and challenges faced by women and TWD or chronic illnesses.

Samples and Data Collection Methods

Two school-level data collection rounds were conducted in (the same) 12 rural primary school settings (including one Teacher Resource Centre [TRC]) across four regions of Tanzania (Figure 1), near the beginning and end of the 2024 school year. The three schools in each region located in the same district were selected for logistical reasons. Regions were chosen for varied provision: two regions where large-scale donor TPD initiatives were also taking place, one with a smaller-scale non-profit foundation TPD initiative and a fourth region without other large-scale TPD initiatives.

The schools were chosen for availability of female teachers and TWD, plus varied technology access and connectivity. Within sites, we involved all available teachers in the schools and TRC; samples overlapped between rounds but some variation ensued owing to teacher availability during data collection.
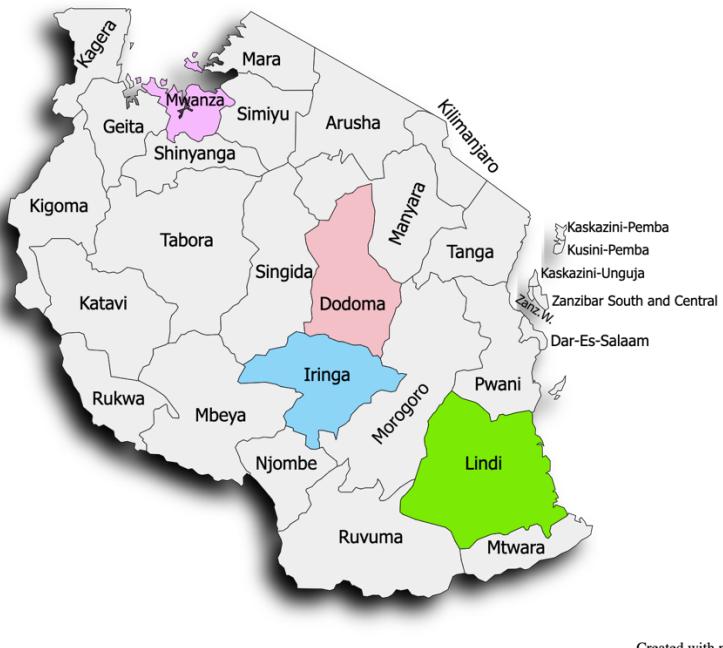
Created with paintmaps.com

Figure 1: Map of Tanzania showing participating regions.

Source: EdTech Hub

Methods included 22 teacher focus group discussions, six small group interviews with TWD or chronic illnesses and 31 discussions with school TPD leadership: headteachers, academic teachers and peer facilitators. Observations included 24 CoLs and 22 classroom lessons. Additionally, individual interviews were held with stakeholders across all management levels:

- ward educational officers (n =12, of whom two were also TRC co-ordinators)
- district special needs education officers (n = 4)
- district school quality assurance officers (n =4)
- regional education officers (administrators and managers: n = 3) and regional academic officers (subordinate: n = 4)
- other donor and non-governmental organisations TPD providers (n = 6), national MEWAKA co-ordinators and administrators (n = 5)

In Round 1, a teacher survey (n =125) was additionally conducted which included items concerning critical illness and self-reported diagnosed and undiagnosed disabilities through asking about everyday functioning difficulties, adapting the Washington Group on Disability Statistics' (2022) Short Set on Functioning. (Research data are openly available at https://osf.io/juv4b/, and all instruments have been openly published in both English and Swahili: Chachage, Hennessy, et al., 2025.) Figure 2 summarises the (potentially overlapping) samples of TWD or chronic illness identified from the survey and focus groups.

The data collection included a strong focus throughout on inclusivity, especially the gender dynamics of engagement in CoLs plus the provisions and accommodations that are, or could be, made for TWD at school and system levels. Focus groups and individual interviews involved

participatory activities such as stakeholder mapping, prioritising recommendations via card sorts, small-group discussion and group categorising of teacher practices (Robinson-Pant & Jere, 2025).
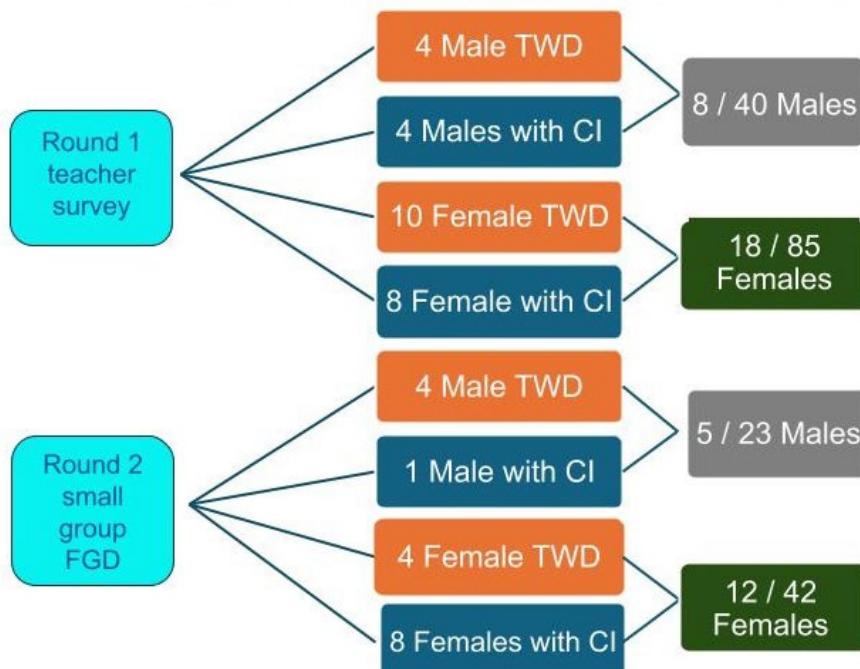
Figure 2: Teachers self-identifying with disability or illness, by gender.

Note. FGD = focus group discussion; TWD = teaches with disabilities; CI = chronic illness.

We strove to be as respectful and inclusive as possible in our research processes, including adhering to an ethic of care, being mindful of power dynamics (Juarez & Brown, 2008) and using culturally relevant methods (Mertens, 2007). Before data collection, we trained researchers in gender-responsive and disability-aware facilitation methods (Singal, 2010) and ensured that attentiveness to, and respectful discussion of, teacher needs and accommodations were part of initial training and the full-team debrief after Round 1 (Hennessy, 2024). All relevant tools were piloted with teachers with visual and hearing impairment, and teams liaised with headteachers before visiting each school regarding any appropriate accommodations. We prepared a Braille version (bilingual with Swahili text) of printed cards for use (by all present) in participatory activities. During visits, we also adjusted our body positioning and speaking volume for hearing-impaired teachers. For teachers with vision impairment, flipchart activities were orally described and consent forms and survey items were read aloud. Teachers with mobility issues were not asked to move around the room to engage with manila flipchart sheets on the wall; the group came to their seats and wrote on the sheet on the table surface.

Additional measures were implemented during Round 2 to avoid using extractive research processes and seeking further insights from participants, by discussing Round 1 findings with participants. Participants expressed feeling heard, respected and valued, appreciating the chance to hear the findings, react to them, offer their own feedback on the recommendations and contribute to shaping the research direction. Teachers were also separated into single-sex groups for the focus group activity on the findings concerning gender and equitable engagement in TPD. In addition, the

small-group interviews comprising teachers who identified themselves as having a disability or chronic illness, offered participants a protected space to share their lived experiences and explore pertinent and personal issues. In both cases, we aimed to help teachers feel comfortable to speak openly about any barriers to equity and to learn from their specific perspectives on whether or how they were or could be better supported to engage in TPD.

Data analysis

Methods included thematic analysis using Atlas.ti (http://atlas.ti/) for interview and focus group data, and descriptive statistics for observation data collected through mWater (https://www.mwater.co/), including constant comparison between data sources (Glaser & Strauss, 1967), with reliability checks and triangulation between data types. All analyses were sensitive to — and disaggregated — gender and inclusion of teachers with diverse needs.

Stakeholder workshops

Findings and recommendations were shared with participants and a range of government and other stakeholders through participatory workshops after each data collection round (Cornwall & Jewkes, 1995). The workshops offered:

- a mechanism for actively involving and sharing back to those who did and did not participate in the research
- member checking, allowing attendees who did participate to add insights, questions or raise issues that we may have missed or misrepresented
- an opportunity for attendees to feedback, discuss and prioritise the recommendations, including identifying key roles and action points

Limitations

The sample of 12 schools is inevitably not representative of the country, although sampling strategies ensuring variation in schools' technology access and teacher characteristics, and spanning four regions, partly mitigated. The reluctance of TWD to disclose their disabilities and researcher sensitivity in not soliciting these during CoL observations meant that some quantitative data could not be fully accurate. Implementation delays and some misalignment with original MEWAKA plans, especially low usage rates for the specialised CoL module materials, significantly restricted examination of adaptations to diverse needs in both materials and CoLs. However, we successfully captured different stakeholders' lived experiences as the programme emerged.

Findings

The key equity-related findings are summarised below. Interestingly, they map directly onto the three specific Round 1 findings which resonated most with research participants when asked in Round 2:

- challenges for all teachers owing to rurality: access to technology in CoLs and wider TPD

- compounding gender factors, including social roles, digital skills and equitable participation in CoLs
- compounding the needs of TWD and chronic illnesses.

Round 2 probed deeper and added nuance to the Round 1 findings.

Rural Technology Access

Most schools and teachers were unaware of and not using the TIE CoL modules available on the LMS in their CoLs, and LMS data confirmed this applied nationwide (of approximately 200,000 primary teachers, 9925 logged in over the preceding six months). Common technical obstacles included connectivity, lack of suitable devices, lack of technology skills, data costs, unsustained funding for password reset messaging and LMS technical support and maintenance. However, teachers reported that, where used, the modules added value to their weekly CoLs, which mainly featured teachers' own materials and experiences.

Inclusion of TWD

A few teachers (*n* = 3 in our sample) have physical disabilities that affect their engagement with MEWAKA (including through disability-related fatigue) but they can usually engage well if the CoL spaces are suited to their mobility and seating needs. All except one CoL used a room layout conducive for all teachers to participate and interact (e.g., chairs rearranged into groups, horseshoe or circle, not rows). No steps hindered access, although the one wheelchair user mentioned that space for manoeuvring is a common problem in TPD workshops generally. Vision or hearing impairments have a stronger impact on teachers' engagement; most TPD materials are inaccessible due to a lack of accommodations or assistive technologies. Teachers particularly mentioned lack of access to screen readers. However, TWD (mainly physical, visual or hearing impairment) are usually supported by their colleagues in ways that enable them to engage in activities during CoLs. This local support is at the individual teacher and school (or TRC) level and is not institutionalised. Peers read materials aloud, acted as scribes, used sign language or adjusted seating to facilitate lip-reading.

A discrepancy between headteacher reports and survey self-reports regarding the number of TWD (11 versus 14) was explained by teachers reporting that disabilities were hidden (mentioning "silent disability") to avoid labelling and stigma. TWD or chronic illnesses do encounter significant stigma from peers and educational leaders; examples included TWD reporting that they are not selected for external opportunities (e.g., attending training workshops, invigilating examinations). Language used by many participants also reflects a deficit view of disabilities, for example:

> The challenge, I feel sometimes, is that stigma is something that happens. There are words others will say that are a little discouraging, For example, you hear them saying "this guy doesn't listen". (Male teacher with hearing impairment)

TWD do not have a voice. For example, a TRC CoL meeting about inclusive education for those with disabilities involved teachers from three wards, yet no teacher with a disability was present.

Transport allowances are not provided for those with physical disabilities, posing a further barrier. (Further details about experiences of disabled teachers will be presented in a forthcoming paper by Hennessy et al., in preparation.)

Disability and Technology Intersectionality

Although schools and TRCs made local adaptations to accommodate the needs of TWD, allowing them to engage in TPD, TWD also reported being less likely to have accessible technology devices, and screen readers in particular. This limits their ability and confidence to use the LMS or access other materials, resources and teacher communities online: "The visual challenge reduces my motivation to be very motivated in CoL activities because I can't see anything".

Impact of Chronic Illness

Teachers with severe chronic illnesses may miss work and CoLs more than those with disabilities. Often, there are no mechanisms for teachers to catch up or make up sessions. Although TWD volunteered to join our separate discussions, not all teachers with chronic illnesses did. Illness may again (perhaps more so) remain undisclosed so as not to lose opportunities through discrimination and stigmatisation.:

> There are people who maybe don't want their challenge to be known; maybe they think that normally it could be seen as something embarrassing. (Male teacher with chronic illness)

Although national stakeholders identified the need to fill an existing gap in guidance and systemic support for TWD, it is unclear if teachers with chronic illnesses would be included as they did not really feature much in the discourse or policies (at any system level).

Gender Inequities Affecting Teachers' Engagement in MEWAKA

Gender and access to CoLs
Female teachers' caring responsibilities outside school can mean they find it harder to attend CoLs (no men reported this); these include mothers and teachers with seriously ill or disabled family members (Hewawitharana et al., 2023). Patriarchal attitudes and inequity within schools mean female teachers are more likely than male teachers to be given social responsibilities such as welcoming guests, overseeing refreshments within schools or supervising students during CoLs, which takes them away from TPD. In one school, the only female teacher did not attend the CoL owing to "office duties". Women are also less likely to hold TPD leadership roles: although 2/3 of primary school teachers in the qualitative sample were women and 1/3 men, the ratio of peer facilitators, head teachers, ward educational officers and district educational officers is reversed — 2/3 are men and 1/3 are women.

Gendered engagement in CoLs
National data are scarce. In our sample schools, participation was proportionate in relation to the genders of those present in 2/3 of observed CoLs (in both rounds). In the remaining 1/3 of CoLs,

female teachers engaged less in three schools and males less in one. However, the average number of contributions (speech turns) for men (1.21, *n* =155) was higher than for women (0.95, *n* = 215). The participation analysis also considered the nature of contributions, such as asking a question, sharing an idea, strategy or challenge, presenting on behalf of a group or secretarial tasks. Men averaged more substantive contributions (1.0) than women (0.93).

Gender and technology
National LMS usage data show three times as many men are accessing it, a dramatic difference (despite more teachers being female). Round 1 findings showed that overall, female teachers engage less meaningfully in CoLs or TPD involving technology. Several structural and systemic barriers to women teachers' use of technology emerged during further exploration in Round 2. For example:

- Teachers and TPD teams explained that women's social roles and caring responsibilities mean less time to "play around" with technology and less inclination to buy technology or Internet bundles. This contributes to women having lower technology fluency compared to men. Two female teachers shared their experiences:

  You find that women have not prioritized [use of technology] due to the responsibilities we have, which are related to our gender - unlike fathers. Fathers have a lot of time. They can use technology. (Teacher 1)
  While you are busy cooking, he is sitting in the living room, browsing the Internet. (Teacher 2)

- Participants highlighted gendered attitudes, particularly women's "lack of confidence" and lower levels of interest in technology. Some participants noted, and corroborated by our observation data, that women were less likely to engage when the CoL topic was technology focused (e.g., learning a new software or app).
- In one school, it was asserted that female teachers "isolated themselves" during a session, without recognising the structural factors that may have influenced their choice to sit separately.
- In another school, however, women teachers with degrees had higher digital literacy and comfort levels than male teachers at their school (gender-education-technology intersectionality).

Systemic issues contributing to gender dynamics in the use of technology were also noted. Education officers and teachers commented that when opportunities for technology-related training arise, teachers who have confidence in using technology, often men, are selected, thus reinforcing the gender gap. This has implications for asking teachers to volunteer as information and communication technology (ICT) champions, a known successful strategy in upskilling and supporting peers. On a wider level, the proportion of women in school, ward and district leadership positions is inverse to the number of women teachers. Social dynamics not only affect women's engagement with technology, but may also reduce women's representation and voice in educational and TPD leadership.

Conclusions and Recommendations

Conclusions

Findings from our study of the MEWAKA implementation reveal a series of intersecting equity issues affecting participation. Although some mitigating factors and strategies are in place, especially local informal support for TWD, there is a pressing need to address these issues in order to provide TPD that is inclusive, empowering and accessible for all teachers, given the rich diversity of their needs. This includes tackling systemic, structural and normative barriers to participation (Ntseane, 2011; Singal et al., 2024), in particular through gender-responsive and disability-aware strategies.

Our findings and recommendations may offer some insights for inclusion and intersectionality in education implementation in other Global South contexts. In particular, they have relevance for those interested in using technology to increase access to professional learning for female teachers and TWD. Our relatively small sample means that data on intersectionalities are limited but they highlight some areas for further research.

Recommendations

- TPD policies should embed gender- and disability-responsive provisions, supported by monitoring systems that capture disaggregated data to identify and address inequities in opportunities and participation, within schools and at external events.
- Access to technology must be improved by providing affordable devices, subsidised data and assistive technologies, alongside targeted digital literacy training and ongoing support (e.g., by district ICT officers and school-based ICT champions) to build confidence and skills among women and teachers with disabilities.
- Systemic and normative barriers require attention through promoting women's leadership in TPD at all education system levels (school, ward, district, region or national), assigning social tasks equitably between men and women in school, addressing stigma against teachers with disabilities and ensuring flexible scheduling and CoL catch-up to accommodate caregiving responsibilities, disability-related fatigue and chronic illness.
- CoLs should formalise inclusive practices, institutionalising peer-support mechanisms and monitoring both the frequency and quality of participation to ensure equitable engagement for all teachers.
- Capacity building and evidence generation are essential; as such, training education leaders in equity-responsive facilitation, partnering with non-governmental organisations and development partners, and expanding disaggregated data collection could help scale inclusive practices and sustain progress.

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Skills Development through Lifelong Open Education
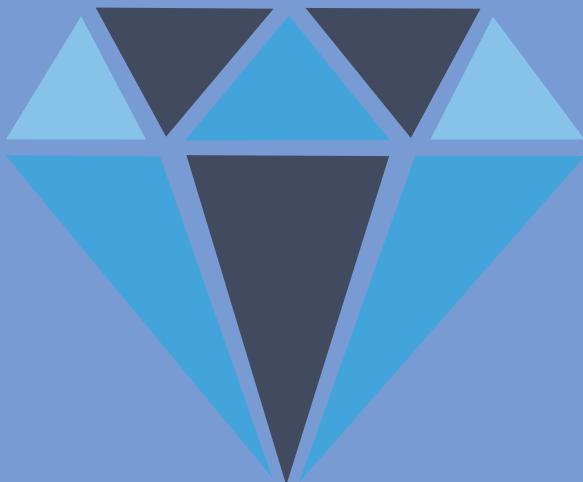
The Vocational Training Development Institute: An Investigation into the Utilisation of Digital Learning Strategies in TVET to Facilitate Accessibility, Flexibility, Engagement and Skills Development

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Abstract

Technical vocational education and training (TVET) is central to human capital development and is increasingly recognised as essential for economic growth, poverty reduction, and sustainable development. Industry 4.0 and 5.0 developments further amplify TVET's strategic importance in preparing learners for the future of work. This study focused on the "what" of learning, by examining the Vocational Training Development Institute's effectiveness in advancing digital learning strategies that promote access, flexibility, engagement and skills development. Using a qualitative case study approach, data were collected through a focus group discussion with staff and an analysis of institutional documents. Findings show that the Vocational Training Development Institute employs a structured digital learning framework supported by dedicated units, integrated platforms and inclusive delivery modes such as online, blended and synchronous learning. These strategies have improved student engagement and access, especially for remote, employed and disabled learners. However, barriers such as limited access to devices, Internet connectivity and digital tools have negatively impacted skills development for some students. Key recommendations include investing in simulation and assistive technologies, aligning digital learning practices with policy, improving digital literacy training, clearly communicating digital readiness requirements and conducting strategic assessments prior to technology adoption. These actions are necessary to support inclusive, equitable and future-ready digital learning in TVET.

Keywords: Technical vocational education and training (TVET), Industry 4.0 and 5.0, human capital development, skills for the future of work, digital learning strategies, access, flexibility, student engagement, skills development

Introduction

Technical Vocational Education and Training and Digital Learning

Technical vocational education and training (TVET) is recognised globally as the cornerstone of human capital development, economic resilience and inclusive growth by various organisations: the International Labour Organization [ILO] (Lange et al., 2020); UNESCO, 2016); World Bank, 2019). Yet, many countries continue to grapple with issues such as poor public perception, limited funding, inadequate infrastructure and a shortage of educators with expertise in competency-based education (King, 2012; Vaz, 2012). These challenges are amplified by rapid technological change, particularly those associated with Industry 4.0 and the emerging Industry 5.0. These industrial

revolutions are driven by automation, artificial intelligence (AI) and digital transformation, all of which demand a rethinking of how education systems develop and deliver skills (Schwab, 2016).

Digital learning has emerged as a key response strategy, not only for increasing workforce readiness but also for promoting access, equity and flexibility in education. Digital learning strategies refer to planned and purposeful integration of digital technologies, tools and pedagogies to deliver, enhance or extend teaching and learning (European Commission, 2020). These strategies support personalised, learner-centred experiences and help address longstanding barriers to participation, such as distance, cost and time. They also align with the principles outlined in the frameworks of UNESCO's Institute for Information Technologies in Education (Duggan, 2020), OECD (2023) and the Commonwealth of Learning (Mishra, 2023), which advocate for digital transformation in education.

The Vocational Training Development Institute

Jamaica, like many developing countries, has pursued a national agenda of education reform with a strong emphasis on expanding TVET. Key policy documents, including Vision 2030 Jamaica (Planning Institute of Jamaica, 2010) and the National TVET Policy (Ministry of Education, 2014) aim to increase access to workforce-aligned education. The Vocational Training Development Institute (VTDI) plays a strategic role within this policy landscape. Established in 1970 as a joint venture between the United Nations Development Programme, the ILO and the Government of Jamaica, the objective was to combat unemployment and unskilled labour in Jamaica and the wider English-speaking Caribbean (VTDI, 2020a). The VTDI transitioned from the Human Employment and Resource Training/National Service Training Agency Trust in 2023 and currently operates as a public higher education institution under the Ministry of Education and Youth.

The VTDI is a TVET institution that advances competency-based education and training at the certificate, diploma, associate bachelor's and postgraduate levels. The institution's Digital Education Unit (DEU) supported by the ICT Services Department, facilitates the advancement of digital learning strategies. The unit provides critical support in the development, delivery and assessment of web-enhanced, online and blended courses; instructional design; and the use of learning technologies. A more detailed description of the VTDI and the DEU are provided in Appendixes A and B, respectively.

Statement of the Problem

Access to quality TVET remains unequal globally, particularly for women, youth, individuals with disabilities and those in rural or low-income communities. According to UNESCO's Global Education Monitoring Report 2020: Inclusion and Education: All Means All (Global Education Monitoring Report Team, 2020), 258 million learners were out of school, often due to intersecting disadvantages such as gender, ethnicity and disability. In Jamaica, enrolment rates at the upper secondary and tertiary levels are lower than in comparable countries, and the education system lags in digital transformation (Jamaica Education Transformation Commission, 2021; Task Force on Educational Reform Jamaica, 2004).

Although the VTDI had begun offering programmes online prior to Covid-19, the pandemic accelerated the need for digital delivery. During this period, enrolment and certification declined due to disruptions in face-to-face instruction and practical components (VTDI, 2019, 2020a). The institution pivoted by strengthening its digital learning strategies and transitioned to remote and flexible modalities. Currently, all VTDI programmes and short courses incorporate online technologies or flexible delivery. However, there is limited empirical research on the effectiveness of these digital strategies. Such evaluation is critical to understanding how digital strategies influence access, flexibility, engagement and skills development and how they will support the institution's efforts to align with national education goals and global TVET priorities.

Purpose and Significance of the Study

This study explored the digital learning strategies employed by VTDI to promote equitable, flexible access to TVET and their impact on student engagement and skills development. Using document analysis and focus group discussions, it provides insights into VTDI's digital transformation. The research fills a gap in the Jamaican TVET literature and informs institutional policy, evidence-based decision-making and national goals related to education and workforce development. It also contributes to the broader understanding of digital learning implementation in TVET institutions, particularly within small island developing states.

Research Questions

1. What are the key digital learning strategies used to facilitate access and flexibility at the VTDI?
2. What has been the impact of digital learning strategies employed by the VTDI on student engagement and skills development?

Literature Review

Digital Learning Strategies

As technological change accelerates, TVET institutions must deliver relevant, demand-driven skills while ensuring inclusive, flexible and accessible learning. TVET serves non-traditional learners, including working adults, rural populations and those with limited prior access to education. Therefore, digital strategies are essential to expanding TVET participation and improving reach (OECD, 2023; Subrahmanyan, 2022).

To accommodate diverse learners, institutions have adopted various pedagogical models. These include technology-supported, online and blended learning (Johnson et al., 2022). Blended learning is especially well suited to TVET, where theoretical instruction can occur online, while hands-on practice takes place in physical workshops (Hashim & Hamidon, 2022). Hyflex, an emerging model, enables learners to switch between online and in-person formats (Johnson et al., 2022). Flexible models are critical for rural learners and underserved groups and improve access for women, adults and persons with disabilities (International Centre for Technical and Vocational Education and Training, 2025; OECD, 2023).

Innovative pedagogies enhance learning flexibility and engagement. Flipped learning allows students to first explore content independently, then engage in collaborative problem-solving in class (Wulansari et al., 2023). Micro-learning, which delivers focused content in short bursts, benefits time-constrained learners (Mostrady et al., 2024). Game-based and gamified learning boost motivation and interaction (Ratinho & Martins, 2023; Schindler et al., 2017).

Digital learning depends on a robust technological infrastructure. Learning management system (LMS) platforms like Moodle and Canvas facilitate structured content delivery, assessment and communication (Kasabova et al., 2023). Videoconferencing tools such as Zoom and Microsoft Teams enable real-time collaboration using features like breakout rooms and screen sharing to enhance participation (Schindler et al., 2017). Interactive tools like Kahoot! and Padlet further promote gamified and collaborative learning (OECD, 2023).

Immersive technologies deepen practical skills development. Simulation, virtual reality and augmented reality enable learners to gain spatial and procedural knowledge in safe, virtual environments (Abdul Hamid et al., 2024). These are critical in technical fields like welding and healthcare, where practice can be costly or risky (ILO, 2021). AI further personalises learning by adapting content to learner performance, identifying skill gaps and supporting differentiated instruction (OECD, 2023). Additionally, learning analytics allows institutions to monitor engagement and intervene early when learners struggle (Bergdahl et al., 2024). Open educational resources offer cost-effective, adaptable content aligned to labour market needs (International Centre for Technical and Vocational Education and Training, 2018).

Impact on Student Engagement

Digital technologies positively influence student engagement along four dimensions: behavioural, cognitive, emotional and social (Bajaj, 2024; Bergdahl et al., 2024; Hu & Xiao, 2025; Metu, 2024; Schindler et al., 2017). For instance, Schindler et al. reviewed 60 studies and found that digital games and gamification enhanced students' motivation, deep learning and values, while videoconferencing improved interaction. However, the digital divide remains a major barrier. Many learners, especially those from low-income or rural backgrounds, lack devices, stable Internet and digital literacy (European Commission, 2020; OECD, 2023). This restricts participation in synchronous classes, collaborative activities, and access to online resources (Duggan, 2020). Akpen et al. (2024), in a review of 18 studies, found that although online learning had a positive effect on performance, it negatively impacted engagement due to poor digital skills and limited device or Internet access.

Impact on Skills Development

Digital learning influences the development of technical and soft skills necessary for the workforce. Virtual simulators have been found to have a positive learning effect on students in welding (Karstensen & Lier, 2020) and textiles (UNESCO, 2023) These tools enabled safe, repeated practice and helped students master precision tasks typically taught in physical workshops. Similarly, Razak et al. (2022) highlighted gains in digital design skills, including computer-aided design, digital

fabrication and software use for engineering and graphics tasks, through LMS-integrated multimedia training.

Nevertheless, without access to simulations, online labs or relevant digital tools, many students struggle to develop practical skills central to TVET and risk falling behind (Akpen et al., 2024). Additionally, Subrahmanyam (2022) noted that students with low digital literacy often struggle with basic online tasks such as navigating platforms and engaging in virtual collaboration, thereby limiting overall skills acquisition.

Digital Learning Readiness

Digital readiness is a crucial determinant of success in digital learning. A strategic combination of pedagogy, technology and support systems is essential to promote engagement and skills development. However, persistent challenges, including inadequate infrastructure, untrained faculty or students and unclear policies, can undermine effectiveness (Means et al., 2013). The OECD (2023) has stressed that well-designed governance structures and quality assurance mechanisms are key to ensuring sustainability and continuous improvement in digital learning.

Methods

Study Design

This study adopted a qualitative case study design to examine the digital learning strategies employed at the VTDI and their impact on student engagement and skills development. This approach is appropriate for examining the VTDI as a bounded system shaped by formal strategies and lived experiences and for investigating context-dependent phenomena that are not easily quantified (Creswell, 2013; Merriam & Tisdell, 2016; Yin, 2018).

Sampling Strategies

Purposive sampling was used to identify focus group participants and institutional documents ensuring that data sources were relevant, information rich and aligned with the study's objectives (Frahm & Cianca, 2021). Focus group participants were selected based on their direct involvement in digital learning strategies at the VTDI, which enabled us to gain insight from individuals who had knowledge, expertise or professional judgement in the area of focus (Merriam & Tisdell, 2016; Ritchie & Lewis, 2003). A total of 19 staff members participated: 14 from the Academics Department and five from the Administrative Department.

Eligible documents were official VTDI records approved or in draft between 2020 and 2025 and related to digital learning. Selection was guided by principles of authenticity, credibility, representativeness and meaning (Flick, 2023). A total of 18 documents were selected, including policies, procedures, operational frameworks and reports.

Data Collection

Data were collected using a focus group discussion and document analysis to support methodological triangulation and strengthen trustworthiness (Merriam & Tisdell, 2016). The focus group explored staff perspectives and experiences related to digital learning strategies (Ritchie & Lewis, 2003). Participants were invited via institutional email, provided informed consent and attended a face-to-face session guided by a semi-structured script. The session was recorded using Microsoft Teams. Documents were retrieved from the VTDI's internal repository, departmental SharePoint folders and administrative offices.

Data Analysis

The focus group recording was transcribed using HappyScribe and we validated the transcript independently to ensure accuracy and reduce bias. The transcripts were analysed thematically using Clarke and Braun's (2013) six-phase coding framework (familiarisation, generation of codes, combination of codes into themes, review of themes, determination of the significance of themes and report of findings). ATLAS.ti was used to support the analysis. Document analysis followed elements of Bowen's (2009) systematic procedure.

Study approval was granted by VTDI's leadership. Participation was voluntary and informed consent was obtained. Pseudonyms were used to maintain anonymity and confidentiality (Creswell, 2013; Merriam & Tisdell, 2016; Yin, 2018). Each participant was assigned the pseudonym "Participant" plus a number based on the order of speaking in the transcript. We stored all data securely and upheld integrity in data analysis and reporting. OpenAI's ChatGPT4 was used to refine the language and word count of the paper; all outputs were reviewed, edited and verified by us.

Findings and Discussion

Research Question 1: What are the key digital learning strategies used to facilitate access and flexibility at the VTDI?

The findings are organised under two themes: digital pedagogy and flexible delivery and institutional infrastructure and strategic support.

Digital pedagogy and flexible delivery
Findings show that flexible delivery at the VTDI is implemented primarily through blended and online learning modes using both synchronous and asynchronous methods. Alongside Moodle and Microsoft Teams, lecturers use tools such as YouTube, Padlet, Kahoot! and Nearpod to facilitate interactivity. Social media platforms like TikTok, Facebook and YouTube are used to demonstrate practical tasks, and video submissions have replaced some in-person assessments. Participant 7 noted, "We ask students to create a video to demonstrate their competence ... some persons, for example, are in MoBay and cannot make it to Kingston".

Flexibility also extends to institutional practices. When students encounter registration barriers, some lecturers permit them to attend classes and submit assignments via Microsoft Teams before full access to Moodle is granted. Participant 8 recommended institutionalising such practices: "Because we give students time to complete registration, complete payment, you can't shut them

out at the beginning … the proposal that came was to give all students access to Moodle until they regularise". Although these actions promote access, participants highlighted the need for policy reform to formally accommodate such measures.

Concerns were raised about the extent to which digital tools support higher order learning. Participant 10 expressed that too often, learning activities remain at lower cognitive levels: "We're not harnessing the true potential of the technology … Many of our questions are pitched at the lower level of Bloom's taxonomy". Some participants, however, disagreed with the preceding as a widespread practice. For example, Participant 10 countered, "it's not across the board. There are many of us who do incorporate the higher order skills — the synthesising, the analysing, the evaluating".

Institutional infrastructure and strategic support
Participants acknowledged investments in core digital infrastructure, including Moodle, Microsoft Teams, improved Wi-Fi and technical support services. They also highlighted accommodations for online students with disabilities. However, they identified key gaps, particularly the need for simulations, VR, assistive technologies and the use of AI to enhance access for students learning practical skills online. Participant 3 noted, "There are some actual experiences that students may not have ready access to at their fingertips, that simulation technologies can give them". Participant 5 explained, "What a lab does is create an avenue for simulation where there is a possibility of high-risk/health hazard … It's easier to manage in terms of using the technology… it is cost-effective".

Participants also highlighted the need to enhance cultural relevance and peer learning by providing a collaborative platform to store and share student-generated content. Participant 8 stated, "When these videos are created, they're created to be marked … Do we have a platform that these videos are uploaded to so that future students, current students, staff, can look at them and learn?"

Capacity building was identified as a priority. Participants called for more structured training in digital literacy and the use of platforms like Moodle and Microsoft Teams for both lecturers and students. Participant 11 said, "There needs to be a short course … a tutorial that exposes students to the various platforms that we use here, and it is mandatory for them to do".

Participants highlighted the need to communicate digital readiness requirements before enrolment. These include device specifications and bandwidth expectations, especially for resource-intensive programmes. Participant 11 said, "what are certain requirements that we as an institution have for our students? The specs of their laptop … What are the different things that they need to have?" Participants further emphasised the need for strategic assessment before adopting new technologies as new adoptions sometimes disrupt or are incompatible with existing institutional systems.

The focus group findings align with VTDI's formal digital learning documents, which describe an established digital learning ecosystem. This includes technologies and platforms that support teaching and learning; the DEU for guidance and technical support; the ICT Services Department for network, software infrastructure and technical support; the Academic Department for teaching and learning; and academic and non-academic support services provided by other departments — all supported by a governance framework that guides the operation of digital learning. This system

enables access for marginalised students, including those with disabilities, those in rural areas and those facing financial hardship, through blended and online learning using synchronous and asynchronous methods (VTDI, 2020b, 2020c, 2022).

However, gaps persist. Some resource needs identified by participants already exist or are addressed through institutional documents that are in draft or approved. For example, a self-paced digital literacy course and Moodle orientation course for students already exist (VTDI, 2025a). Additionally, technical requirements for digital learning are available via the DEU website and have been updated in the draft Student Orientation Handbook (VTDI, 2025a). This lack of awareness is indicative of communication and access issues. Resources that guide digital learning not only need to be developed and approved but stakeholders need to be informed and have ready access to them if they are expected to employ them. The DEU is preparing to launch its communications hub, an internal website for all things digital learning (VTDI, 2024b).

The accommodation of students with disabilities in the digital space reflects VTDI's assessment policy (VTDI, 2024a) and Programme Development Policy (VTDI, 2024c), aligned with inclusive education principles supported by global frameworks (ILO, 2021; Miller, 1999; United Nations, 2015; International Centre for Technical and Vocational Education and Training, 2025). Accommodations are currently made on an as-needed basis. Nevertheless, further investment is required to enhance inclusion. Participants highlighted the need for collaborative platforms to store culturally relevant, student-generated content. Such e-learning environments foster engagement and knowledge construction through shared interactions and critical thinking (Mohammed et al., 2020).

The findings also reveal inconsistencies in policy implementation. Some lecturers allow unregistered students access to synchronous sessions and assignment submission via Microsoft Teams, creating tension among stakeholders. Similar challenges in policy-practice alignment have been noted in other jurisdictions, prompting the development of structured policy frameworks (Boeskens & Meyer, 2025). Recognising the need for policy to be informed by practice, the institution is in the process of formalising flexible access while ensuring fee collection before final assessment.

Another critical gap lies in the absence of key digital tools, such as simulations, virtual labs and assistive technologies. These tools are essential for supporting TVET skills development and inclusive learning (Abdul Hamid et al., 2024; ILO, 2021; OECD, 2023). Abdul Hamid et al. have underscored the value of immersive tools in developing spatial and procedural knowledge in technical domains.

Further, strategic technology adoption is another area of weakness. Strategic technology assessments ensure new tools align with organisational goals and existing infrastructure and should, therefore, be conducted prior to adoption of new technologies (Kumar et al., 2019; Volberda et al., 2021). Finally, the need for additional capacity building to strengthen digital skills including effective digital learning pedagogy, is evident. Whitelock et al. (2024) have noted that sustained digital skills development is crucial for educational relevance and institutional resilience.

Research Question 2: What has been the impact of digital learning strategies employed by the VTDI on student engagement and skills development?

Two themes emerged: technology-driven engagement and flexible participation and unequal access and digital readiness affecting skills development.

Technology-driven engagement and flexible participation
Participants reported that VTDI's digital learning strategies positively impacted student engagement. The integration of interactive platforms, such as Moodle and Microsoft Teams, alongside flexible delivery formats, enabled increased participation, particularly among students in remote areas, those overseas and working professionals. Students increasingly expect digital integration and are motivated by the convenience of asynchronous learning and online assessments. Participant 2 noted, "The learning style of students is changing. They are now driven by technology. If we don't become technologically savvy and show how technology is integrated into learning, we will find ourselves losing that kind of attention". As a result, strategies like online exams and video-based assessments were used to enhance engagement by enabling students to demonstrate skills at a distance.

Unequal access and digital readiness affecting skills development
Although digital strategies have increased access and exposure to essential digital tools, participants also highlighted equity concerns that impact skills development. Many students lack access to appropriate devices, software or stable Internet connections. In reference to use of Safe Exam Browser to facilitate online testing via Moodle, Participant 10 noted, "Many students … don't have laptops, so a lot of them are using their cell phones, and that software is not compatible with Android". Similarly, Participant 13 highlighted, "Some courses require high-spec computers … without those or sufficient bandwidth, it becomes a challenge". These challenges are compounded in rural areas with poor infrastructure. Participant 6 shared that after Hurricane Beryl in 2024, "I had students who were living in Mavis Bank … there was hardly any access to Internet and so that impacted their ability to complete the programme". Although students are gaining digital skills such as LMS navigation, virtual collaboration and content creation, these gains are unequally experienced. Participants called for targeted institutional strategies to bridge the digital divide and ensure that all students can develop relevant skills for the workforce.

The findings support existing literature, affirming that flexible digital environments enhance student engagement by increasing motivation, autonomy and satisfaction (Bajaj, 2024; OECD, 2023). Strategies such as video-based assessment, use of LMSs and the integration of communication platforms have enhanced the accessibility and immediacy of learning. This is especially beneficial for students constrained by time and distance (OECD, 2023). However, the digital divide continues to hinder equitable skills development. Students without adequate devices, Internet or digital literacy are at a disadvantage. This aligns with concerns raised by the Jamaica Education Transformation Commission (2021), the ILO (2021) and International Centre for Technical and Vocational Education and Training (2025), who have emphasised that students in low-income or rural settings are often excluded from fully benefiting from digital education. Blundell et al. (2016) and Mpungose (2020) have also stressed that online learning readiness remains a challenge in developing countries. Mpungose has recommended providing campus-based and remote access to computers and Wi-Fi to help mitigate this issue.

Moreover, the findings indicate that although exposure to digital tools has increased, the lack of simulation labs and virtual environments hampers the development of hands-on skills which are essential to TVET. Abdul Hamid et al. (2024) has argued that immersive technologies play an important role in TVET. Without these supports, the transformative potential of digital learning for skills development may remain unfulfilled.

Conclusion

This qualitative study examined the VTDI's digital learning strategies and their impact on access, flexibility, student engagement and skills development. The findings highlight a well-established digital learning structure, supported by the DEU, ICT Services Department and integrated systems such as the Integrated Student Information Management System (iSIMS), Moodle and Microsoft Teams. Delivery modes include face-to-face, online and blended learning, with policies and procedures in place to support inclusive practices.

Digital strategies have improved engagement by increasing flexibility and accessibility, benefiting rural, overseas, employed students and those with disabilities. However, without systematic support for institutional, faculty and student readiness, these strategies risk reinforcing existing inequalities. Challenges such as limited device access, insufficient Internet bandwidth and the absence of virtual simulation tools hinder full participation and development of practical and soft skills.

To address identified challenges and maximise the impact of digital learning, several recommendations are proposed: (1) develop a collaborative platform for culturally relevant, student-generated content; (2) align practice with policy through effective monitoring mechanisms; (3) acquire simulation, virtual and assistive technologies; (4) strengthen communication of digital readiness requirements; (5) conduct strategic assessments before adopting new technologies; (6) deliver ongoing mandatory and optional digital skills training for staff and students; (7) implement a laptop loan or grant scheme; and (8) provide students with remote access to specialised software via institutional licensing.

This study has implications for policy and practice regionally and nationally; and particularly at the VTDI in relation to monitoring and evaluation of digital learning strategies to ensure intended outcomes and impact. Additionally, the study will contribute to the growing body of knowledge on digital learning. However, the study was limited to staff perspectives at a single institution. Future research should include student voices and evaluate the long-term impact of digital learning strategies on employability and TVET outcomes.

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Appendix A

Background Information – VTDI

As is documented in the institution's *Annual Report 2020* (2020a), VTDI was established in 1970 as a joint venture between the United Nations Development Programme, ILO and the Government of Jamaica. The objective was to combat the two-fold problem of unemployment and unskilled labour in Jamaica and the wider English-speaking Caribbean. The Government of Jamaica assumed full responsibility for the Institution on 1 January 1976.

Since 1976, the VTDI has operated under the ambit of the Government of Jamica through the Ministry of Labour and the Ministry of Education. In 1992, the institution was transferred to the Human Employment and Resource Training (HEART) Trust, National Training Agency (NTA) (now HEART/National Service Training Agency [NSTA]) Trust. In 2018, a directive was given by the Prime Minister of Jamaica, the Most Honourable Andrew Holness, that the VTDI was to be reassigned to the Ministry of Education. In keeping with the directive, the VTDI transitioned to the Ministry of Education as a public higher education institution on 2 August 2023.

Consistent with its strategic focus, VTDI's mission is to produce highly competent technical vocational educators and professionals for the 21st century and beyond. Consequently, the VTDI has a mandate to offer TVET programmes that contribute to the Government of Jamaica's strategic thrust towards workforce development and economic competitiveness, particularly in relation to the development of human capital, and being responsive to labour market needs. Therefore, the institution strategically positions its programmes to ensure they are accessible, affordable and flexible. The niche areas for the VTDI emphasise training for:

- TVET teachers for the education system and TVET trainers for industry and business organisations
- existing and aspiring professionals and industry experts — skills development and upgrading (skills include information and communication technologies, construction, plumbing, electrical)
- customised training and micro-credentials for the TVET system and national and regional workforce

Guided by the constructivist educational philosophy and competency-based education and training principles, the VTDI seeks to ensure students are competent and adequately prepared for employment upon successful completion of their programmes of study. Experiential learning opportunities provided through practicum engagements (e.g., industrial attachment) ensure an appropriate balance and integration of theory and practice.

In advancing access to programme offerings, the VTDI includes as one of its core strategic priorities, distance, online and flexible learning strategies. This is to ensure core operations include strategies and plans to recruit students from the width and breadth of Jamaica, as well as the wider Caribbean region, including those from vulnerable communities and those who may have financial challenges. Digital and flexible learning strategies utilised by the VTDI to deliver programmes include face-to-

face, fully online or blended (mix of face-to-face and online). The foregoing strategies are also grounded in key institutional policies such as the *Programme Development Policy and Procedural Manual* (VTDI, 2024c), assessment policy (VTDI, 2025b), prior learning recognition policy (VTDI, 2023) and a pre-college programme (VTDI, 2024d) that seeks to facilitate multiple pathways for programme access.

Standard Programme Offerings

Programmes	Minimum Entry Requirement	Programme Duration	Delivery Modality
School of Education & Business			
Post-Graduate Diploma in Education & Training Programme learning outcomes include: • Design and facilitate effective learning experiences for adolescents and adults. • Use effective and innovative approaches, strategies and instructional methodologies in different teaching/training contexts. • Develop appropriate instructional materials to support teaching/training intervention(s) in educational institutions/organizations. • Utilize current instructional technology to enhance the teaching/training and learning experience. • Apply the principles that underpin educational philosophies to enrich learning experiences. Specializations: • General Science (including persons trained in Allied Health Care, Heating, Ventillation & Air Conditioning, Construction, Food Preparation, Renewable Energy) • Business Education (including persons trained in Entrepreneurship) • Information Communication Technology (including persons trained in Digital Animation) • Workforce Development (including persons trained in Law, Divinity, Counselling)	A bachelor's degree in an area related to business, science, ICT or workforce development	18 months (part time)	Fully online (part time)
Post Graduate Diploma in Career Counselling Programme learning outcomes include: • Conduct interventions for individuals and groups through the application of appropriate career counselling theories.	A bachelor's degree from an accredited institution	16 months	Fully online (part time)

Programmes	Minimum Entry Requirement	Programme Duration	Delivery Modality
• Utilize career assessment tools to inform the career decision-making process. • Create career development programmes for identified populations. • Evaluate research to inform career development practice. • Analyze labour market information, and relevant economic and social issues to effectively participate in career counselling relationships.			
Post Graduate Diploma in Learning Technologies Programme learning outcomes include: • Adapt to the changing roles and functions of a 21st century classroom facilitator. • Discover different types of models and best practices in the use of learning technologies that will meet the diverse needs of the students. • Develop digital instructional and assessment resources to support face to face and online learning. (e.g. videos). • Manage a virtual learning platform (e.g. utilizing scripting and security). • Utilize assistive technologies to support students with special needs.	A bachelor's degree in teaching/instruction from an accredited institution **Or** A bachelor's degree from an accredited institution with teaching/training experience **Or** National Vocational Qualification of Jamaica (NVQJ) Level 5 in TVET Instructor Training	15 months	Fully online (part time)
Bachelor of Science in Career Development Programme learning outcomes include: • Apply career development theories to career related client issues. • Demonstrate the competencies required to function as effective career development professionals in different sectors of society. • Use labour market information to guide clients as they make career related choices. • Apply career development interventions such as programme planning and implementation to facilitate problem solving in learning institutions, communities, and other organizations that may be experiencing challenges with the career development processes.	Five CSEC or GCE O'Level subjects, including Mathematics & English A **Or** Mature entry qualification/non-traditional entry requirement	4 years	Blended (part time)
Bachelor of Education in Applied Technology Specialisation Areas: • Construction Technology • Electrical Technology • Beauty Services • Automotive Technology	Five CSEC or GCE O'Level subjects, including Mathematics & English A Or	4 years	Blended (full time – 8 semesters) (part time – 12 semesters)

Programmes	Minimum Entry Requirement	Programme Duration	Delivery Modality
Programme learning outcomes include: • Demonstrate high levels of competency and proficiency in area of specialization. • Exhibit advanced TVET facilitation skills in area of specialization. • Use current instructional technology to design, deliver and assess teaching/training. • Communicate clearly in a variety of forms, to meet the standards of the profession. • Utilize research in guiding solutions for the teaching and learning process and enhancing professional development.	NVQJ Level III in relevant skill area plus Mathematics, English and 2 other subjects (CSEC/equivalent) **Or** Mature entry qualification/non-traditional entry requirement		
School of Applied Science, Engineering & Technology			
Bachelor of Science in Information & Communication Technology (Advanced Placement) Programme learning outcomes include: • Demonstrate the competencies required to function effectively as ICT professionals. • Adapt new technologies and methods to create solutions. • Apply research and evaluation skills to advance technological innovation and improvements. • Develop ICT products to advance technological innovation and improvements. • Apply good analytical, design, and implementation skills required to formulate and solve technology-based problems. • Analyse various implementation approaches to distributed domains. • Design cloud-based services that fulfil the requirements of distributed virtualization.	VTDI ICT Diploma/Associate Degree in Information and Communication Technology **Or** Holders of a Diploma or an Associate Degree in ICT from an approved/ accredited institution	2 years	Blended (full time & part time)
Associate of Science Degree in Information Communication Technology Programme learning outcomes include: • Demonstrate the competencies required to function effectively as ICT Technologists. • Adapt to new technologies and methods. • Apply research and evaluation skills to advance technological innovation and improvements. • Develop ICT products to advance technological innovation and improvements.	Five CSEC or GCE O'Level subjects, including Mathematics, English & Information Technology **Or** Mature entry qualification/non-traditional entry requirement	2 years	Blended (full time) & part time)

Programmes	Minimum Entry Requirement	Programme Duration	Delivery Modality
• Design enterprise applications.			
Associate of Science Degree in Animation Programme learning outcomes include: • Demonstrate high levels of technical skills and creativity to function effectively in the global animation industry. • Develop animated products to advance innovation and improvements in the global animation industry. • Demonstrate highly specialized technical skills in their area of specialization to meet the high expectations that the global animation industry requires.	Minimum of Five CSEC or GCE O'Level subjects, inclusive of Mathematics, English A and Information Technology or Visual Arts **Or** NCTVET Level 2 qualifications in related Animation area plus Mathematics and English Language **Or** CAPE IT Digital Animation (including CSEC or GCE O'Level Mathematics) **Or** Mature entry qualification/non-traditional entry requirement (inclusive of work experience in Visual Arts)	24 mmonths	Blended (full time)
Associate of Science Degree in Events Planning and Management Programme learning outcomes include: • Demonstrate competence in planning, organizing, coordinating and executing events • Manage various programme elements to create seamless memorable events • Use current and emerging technologies to effectively plan, organize and execute events • Manage event risks, including legal, financial, and occupational health and safety risks.	Five CSEC or GCE O'Level subjects, including Mathematics, English A **Or** Mature entry qualification/non-traditional entry requirement	2 years	Blended (part time)
• Associate of Science Degree in Logistics & Supply Chain Management • Programme learning outcomes include: • Demonstrate the competencies required to function effectively in the Logistics Industry. • Apply research and evaluation skills to advance technological innovation and improvements.	Minimum of five CXCs/or equivalent, (inclusive of Mathematics, English Language) **Or** NVQJ Level 2 in relevant skill area and four (4) CXC/CSEC	32 months	Blended (part time)

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Programmes	Minimum Entry Requirement	Programme Duration	Delivery Modality
• Apply management techniques to organize and execute a successful project. • Analyse the creation of new value in the supply chain for customers, society, and the environment.	inclusive of Mathematics and English. **Or** NVQJ Level 3 in relevant skill area and three (3) CXC/CSEC inclusive of Mathematics and English. **Or** Candidates may be eligible for admission into this programme if they satisfy the requirements to be accepted via mature entry.		
Associate of Science Degree in Draughting & Building Technology Programme learning outcomes include: • Provide technical advice and services in accordance with the needs of the client. • Prepare detailed drawings of architectural designs and plans for buildings, structures, plumbing, finishing and landscaping, according to specifications. • Ensure that safe and satisfactory standards of development are sustained with regard to building regulations. • Demonstrate a critical understanding of organizations within the construction sector, their management and the changing external environment in which they operate.	Minimum of five CXCs/or equivalent, (inclusive of Mathematics, English Language) Or NVQJ Level II in relevant skill area plus Mathematics, English A and 1 other subject Or Mature entry qualification/non-traditional entry requirement	2 years (full time) 3 years (part time)	Blended (full time) & part time)
Associate of Science Degree in Entrepreneurship (upgraded from the original Level 3 progamme) Programme learning outcomes include: • Develop a market-ready, financially viable product. • Apply management techniques to improve an actual business operation. • Design a winning business plan for monitoring and funding their business. • Conduct market research for effective strategic planning.	Minimum of five CXC/CSEC subjects inclusive of Mathematics and English Language, or the equivalent. **Or** NVQJ Level 2 in relevant skill area, plus four CXC/CSEC inclusive of Mathematics and English Language, or the equivalent.	1 year and 1 semester (full time) 2 years (part time)	Blended (full time) & part time)

Programmes	Minimum Entry Requirement	Programme Duration	Delivery Modality
	Or NVQJ Level 3 in relevant skill area and three (3) CXC/CSEC inclusive of Mathematics and English **Or** Mature entry qualification/non-traditional entry requirement		
CISCO Certified Network Associate	Basic skills in the use of English Language and Computer Literacy	1 year (part time)	Blended (part time)
CISCO Certificate in CCNP Routing and Switching	CISCO Certified Network Associate	1 year (part time)	Blended (part time)
Pre-College Programme *(For applicants who need additional subjects to matriculate into VTDI's standard programmes)*	At least one CSEC or GCE O'Level subject **Or** NVQJ Level II in relevant skill area	1 year	Blended (part time)
School of Professional Studies			

Short Programmes:
- NVQ-J Level 4 in Assessment (Assessor Training)
- Post Graduate Certificate in TVET Leadership

On-demand Short Courses include:
- Introduction to Competency-Based Education and Training
- Prior Learning & Assessment
- Andragogical Principles and CBET [Competency-Based Education and Training] Lesson Planning
- Internal Verification
- Item Writing
- Train the Trainer
- NVQJ Level 4 in Assessment (Assessor Training)
- Internal & External Quality Assurance of Assessment
- Item Writing
- Supervisory Management
- Project Management
- Introduction to Human Resource Management
- Customer Engagement and Service Excellence

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Appendix B

Role, Function and Procedures of the DEU

Overview

Digital education at the VTDI is spearheaded by the DEU, which is branded as the "face" of technological innovation (flexibility, accessibility, convenience, excellence). The unit uses a variety of strategies to provide pedagogical, technological, technical and other support to our stakeholders and is responsible for the promotion of online, distance and flexible education and training across all sites. The unit assists all three schools to respond to labour market demands for training in new and emerging TVET areas.

The unit is staffed by a director, an instructional designer, a graphic artist and two technical assistants. The digital learning infrastructure of the VTDI is dually maintained by the DEU in conjunction with the ICT Services Department.

Digital Learning Landscape at the VTDI

Student management at the VTDI is centred around the Integrated Student Information Management System (iSIMS, the institution's Student Management System. This system manages student application, registration, payment, access to online course resources, timetabling (course, lecturer and student scheduling) and student grades and feedback.

Access to Moodle 4.2 is also facilitated for students and staff through iSIMS authentication. Moodle is the LMS of the VTDI and, as such, is used to facilitate all online assessment (VTDI, 2024a), such as the uploading of assignments and the facilitation of online quizzes. The Safe Exam Browser is used in collaboration with Moodle to strengthen assessment validity. This is also in keeping with the recently piloted paperless examination framework (VTDI, 2025c), which allows for previously paper-based exams to be completed in the computer lab on campus.

Digital tools and platforms like Articulate 360, H5P and Moodle resources and activities (Book, Quiz, Assignment, Discussion Forum) are employed to make the platform more engaging. Student grades are also captured on Moodle with facilities for lecturers to give feedback through the rubric and other avenues. iSIMS allows grades to be transferred from Moodle to iSIMS directly. Synchronous facilitation at the VTDI was, for several years, delivered using Cisco Webex. Since VTDI's separation from HEART/NSTA Trust, the VTDI switched from Cisco Webex to Microsoft Teams as the official synchronous facilitation platform of the Institution.

The institution uses other digital learning tools and strategies to facilitate student engagement. Virtual and physical labs are a key part of our facilitation process as a TVET organisation. Our CISCO Certified Network Associate courses are currently the main proponents of virtual labs, with tools such as Packet Tracer, Modeling Labs, NetAcad Virtual Labs, and Skills for All – Interactive Labs. Although this is the case, we continue to explore options to widen the institution's offering in this area. In terms of physical labs, the institution has six computer labs (two of which are dedicated to animation), an electrical lab and a green room for photography and animation.

In addition to these options, emerging AI-powered tools for facilitation, learning resource development and infrastructure strengthening are being examined and employed by the VTDI. These tools include Canva, Turnitin (with AI detection), ChatGPT, Microsoft 365 Copilot, Moodle AI plug-ins, Safe Exam Browser with AI proctoring plug-ins and AI tools to support research, such as HappyScribe and ATLAS.ti.

Professional development for faculty is ongoing at the VTDI. Institutional initiatives such as the annual Institutional Development and Planning Period provide wide-ranging development offerings for all staff. There are more tailored tools for faculty development, such as pre-semester orientation, workshops, online (self-paced) courses, pedagogical support and cross-functional engagement. Self-paced courses are employed to provide resources to faculty and students to assist in navigating the online learning environment.

Self-paced courses available to faculty include:

- Starting the Semester with Moodle — an orientation into course and user scheduling as it relates to iSIMS and Moodle
- Orientation to the six-phase lesson planning and facilitation model, namely Bridge-in, Outcomes, Pre-assessment, Participatory Learning, Post-assessment, and Summary
- Safe Exam Browser Faculty Orientation — provides training and insight into how to access, set up and facilitate assessment on Moodle using the Safe Exam Browser

Student offerings include:

- Introduction to Moodle Student Workshop — an introduction to Moodle as employed by the VTDI
- Safe Exam Browser Student Orientation — provides training and insight into how to access and complete assessment on Moodle using the Safe Exam Browser
- Microsoft Digital Literacy — an introduction into and exploration of basic ICT concepts

Other initiatives in place to support student learning include attempts to bridge the digital divide, such as allowing students to attend online classes or assessment on campus using the labs. Designing Moodle courses with downloadable resources is also a strategy to support offline access. Assistive initiatives are also in place to support learners with disabilities. One such example is the configuration of the Safe Exam Browser to allow the NVDA (NonVisual Desktop Access) software to be used for accessing assessments on Moodle. Online libraries and other similar support are also available to students via the library.

In addition, there is a wide range of synchronous and asynchronous facilitation strategies used to support digital learning. These include:

- E-portfolio — used to collect and curate developed resources for assessment or exposition
- Blended learning — combining face-to-face with online instruction
- Fully online learning — asynchronous and synchronous courses offered via Moodle or Teams

- Web enhanced — asynchronous resources made available for otherwise face-to-face or synchronous courses
- Simulation-based learning — virtual resources to mimic real-world activities
- Gamification — using game elements (points, levels) to increase engagement and motivation
- Flipped classroom — content is reviewed outside of class to facilitate active learning during sessions
- Virtual labs — digital labs for subjects like CISCO Certified Network Associate, electronics or information technology when physical resources are limited
- Micro-learning — short, focused learning modules delivered digitally for skill reinforcement
- Use of YouTube for instruction — as supplemental tools for demonstrations and tutorials, and as a means of collecting and sharing institutionally developed material
- Collaborative tools (e.g., Microsoft Teams) — supporting group work and feedback for faculty, staff and students

Digital and online learning is very dynamic and grows more so every day. In this state of Industry 4.0 and 5.0, it is critical that the institution leverages every resource to fully equip learners. The VTDI continues to make strides in its effort to employ strategies in TVET to facilitate accessibility, flexibility, engagement and skills development.

Implementing Blended Delivery in TEVET: Insights from a Preparatory (PBDT) Course in Zambia

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Abstract

Blended learning is increasingly recognised as a strategic approach to enhance access, flexibility and learner engagement in technical and vocational education and training, particularly within competency-based training systems. However, blended delivery initiatives in the Zambian context have been limited, despite policy-level commitments at various levels of stakeholder engagements. This paper examines a course known as the PBDT, which was designed and implemented with blended learning at a college in Zambia. Theoretically, this study is grounded on three complementary theories surrounding blended learning. These are social-constructivist learning theory, competency-based education and the technology-organisation-environment model to provide a deeper understanding of blended learning. The study design and methodology employed a qualitative approach. Semi-structured interviews, observations, focus group discussions and in-depth content analysis of training reports, participant feedback rich descriptions of institutional reflections formed key techniques for inputs. The study highlights both the benefits and systemic challenges experienced during implementation. Benefits included flexibility in teaching approaches and improved confidence in digital tools, while constraints centred on infrastructural limitations, uneven digital skills and gaps in policy clarity. The study advances understanding of institutional readiness and stakeholder engagement in blended learning delivery. Results underscore the need for clear national standards, sustained capacity building and leadership engagement. Findings emphasise that management and ministry-level support were pivotal in achieving a 79% course completion rate. The study concludes with policy and practice implications and recommendations to strengthen Zambia's digital transition in technical education, vocational and entrepreneurship training.

Keywords: blended learning, technical education, vocational and entrepreneurship training (TEVET), competency-based training (CBT), digital pedagogy, institutional readiness, professional development, policy implementation, Zambia

Introduction

Background, Definitions and Contexts

The definition of blended learning is not conclusive in literature although researchers have acknowledged that the phenomenon is reshaping education globally. It may be understood as a mode of teaching that combines face-to-face and online delivery for improved flexibility and learner engagement. Within competency-based training (CBT), blended delivery enhances mastery, continuous assessment and personalised learning (Blaschke, 2012; Singh et al., 2021). Yet, technical and vocational education and training (TVET) systems in Africa face contextual barriers such as low

digital literacy, weak infrastructure and insufficient institutional support (Dixit, 2023). Zambia's technical education, vocational and entrepreneurship training (TEVET) system is a cornerstone of the nation's economic development. By providing individuals with the technical skills and entrepreneurial knowledge necessary for various industries, TEVET plays a critical role in creating a skilled workforce. While globally referred to as TVET, Zambia's system uniquely incorporates entrepreneurship training, introduced under the 1996 TEVET policy to foster self-employment among graduates (Ministry of Science, Technology and Vocational Training, 1996). This system, regulated by the Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA) under the Ministry of Technology and Science, spans a diverse range of institutions and programmes across fields such as agriculture, engineering and information technology. As of 1 July 2024, there were 451 TEVETA-registered institutions in Zambia, with public institutions making up 29 of this total (TEVETA, 2024).

In Zambia, debates around blended learning have intensified with the implementation of the Preparing for Blended Delivery in TVET (PBDT) course, supported by the Commonwealth of Learning (COL) and hosted by the Technical and Vocational Teachers' College (TVTC). Although national policies emphasise digital transformation (Ministry of Technology and Science, 2025; Zambia National Education Coalition, 2023), little evidence exists on how such strategies are enacted in practice in TEVET institutions and other affected industries. This study addresses this gap by analysing the PBDT course as an empirical case of blended delivery adoption in Zambia.

Zambian Context

The *Electronic Government Act, 2021* (Government of the Republic of Zambia, 2022), the *National Digital Transformation Strategy* (Ministry of Technology and Science, 2023) and *National Artificial Intelligence Strategy 2024-2026* (Ministry of Technology and Science, 2025) are among the measures that Zambia has implemented to support its goals (Ministry of Technology and Science, 2024; TEVETA, 2019). Together with COL, TEVETA has created an open distance and flexible learning accreditation tool and piloted a digital learning management system (COL, 2025). Nonetheless, there are still gaps, including inadequate instructor preparation, unequal infrastructure and differences between rural and urban institutions (Mutale & Chileshe, 2020). As a result, the PBDT course offers crucial proof regarding the application of blended delivery, demonstrating the impact of ministry support and institutional leadership on results.

Policy and Institutional Framework in Zambia

The Zambian Government, through the Ministry of Technology and Science and TEVETA, has prioritised the integration of information and communications technology (ICT) in education and training. The 2007 national policy on ICT in education (Ministry of Communications and Transport (2006) and the TVET policy (Ministry of Higher Education, 2020) underscore the importance of digital learning as a tool for improving access and relevance. These policy frameworks have laid the foundation for blended learning implementation across public and private TVET institutions. Institutional efforts, such as the development of learning management systems, the establishment of digital resource centres and partnerships with private ICT providers, demonstrate progress towards operationalising blended learning.

Although Zambia's education and technology policy frameworks articulate a digital transformation agenda for TVET, empirical studies capturing implementation realities remain scarce. Most literature emphasises theoretical benefits of blended learning or pilot projects in high-resource settings, with little focus on the lived experiences of educators in resource-constrained environments. The lack of clear national standards for blended CBT delivery has resulted in fragmented adoption and unclear expectations (Hastings & Rasmussen, 2017). Without a proper plan or capability, institutional stakeholders are left to manage the digital transformation, which raises the possibility of sub-par instruction and skill mismatches (Ahmad & Rosnan, 2024). This research illustrates how blended learning is viewed, implemented and challenged in practice by looking at the PBDT course and highlighting educator and institutional experiences.

Pertinent questions that needed to be answered were as follows:

1.   What is blended learning in TEVET?
2.   How is blended learning viewed in a practical course (PBDT) in a Zambian context?
3.   What are the benefits and challenges of blended learning within the Zambian context?

The rest of the paper is organised as follows: The Literature review section provides a review of related works on blended learning in TVET including pertinent issues regarding theoretical and practical implementation. This is followed by the Methodology section, describing how the case study has been undertaken in one of the TEVET centres, TVTC. The Findings and Discussion section includes discussion of the challenges and benefits, whereas the Recommendations section provides recommendations and outlines some implementation aspects, followed by the Conclusion section.

Literature Review

Theoretical Foundations of Blended Learning

The foundations of blended learning are supported by several educational and technological theories. Social constructivism, as advanced by Vygotsky (1978), views learning as a socially mediated process in which knowledge is built through interaction, dialogue and shared activity. This perspective aligns well with blended environments that combine online engagement with face-to-face collaboration. Connectivism offers a complementary lens. Siemens (2005), along with Chen and Chan (2024), has argued that learning in digital settings depends on the ability to access and navigate networks of information, people and technological tools. This is particularly important in TVET, where digital platforms support both knowledge development and professional practice.
Experiential learning theory (Kolb, 1984) also resonates with the practical nature of TVET programmes. Blended learning creates opportunities for learners to explore theoretical content online and then apply it through practical tasks in workshops and laboratories, reinforcing both understanding and skill acquisition. The community of inquiry framework (Garrison et al., 2000) further strengthens the conceptual grounding of blended delivery. It explains how teaching presence, social presence and cognitive presence can be balanced across physical and digital spaces to support meaningful learning. Taken together, these theories illustrate how blended approaches

in TEVET combine interaction, technology, experience and structured facilitation to enhance learning outcomes.

This study drew on three complementary theoretical frameworks that together shape the understanding of blended learning in this context:

1. Social constructivism, informed by Vygotsky's (1978) work, emphasises that learning develops through interaction among learners, instructors and the wider environment. This perspective aligns with blended delivery, where engagement occurs across both digital and physical spaces.
2. The competency-based education framework, as discussed by Schilling and Koetting (2010), reinforces the need for demonstrable skills, clear performance standards and alignment with industry expectations. Blended models support this by allowing theoretical content to be delivered online while practical competencies are developed through hands-on activities.
3. The technology–organisation–environment model (Tornatzky & Fleischer, 1990) provides a lens for examining how institutions adopt innovations. It enables analysis of the technological infrastructure, organisational readiness and external pressures that influence the uptake of blended learning at TVTC.

Viewed together, these frameworks offer a coherent foundation for analysing how blended learning is understood, implemented and sustained within the institution.

Practical Adoption and Implementation

Blended delivery has been implemented unevenly across TEVET institutions in the region. Studies in Southern Africa show that implementation outcomes are shaped by infrastructure, lecturer competence and institutional leadership (Hashim & Hamidon, 2022; Magasu et al., 2022). However, many colleges experience challenges integrating practical components into online environments. Research demonstrates that practical and workshop-based programmes struggle with simulation gaps, limited access to devices and poor connectivity, which affect both learners and instructors (Hassan et al., 2021; Okinda et al., 2023).

However, adoption remains uneven due to disparities in digital infrastructure, staff competencies, and student access to technology (Mutale & Chileshe, 2020). Many rural institutions still rely heavily on face-to-face instruction because of limited internet connectivity and inadequate ICT facilities. The Covid-19 pandemic accelerated digital transformation by compelling institutions to explore online and blended learning modalities, though many did so without sufficient preparation or technical support.

At the institutional level, TEVET colleges in Zambia show varying degrees of readiness. For example, case studies from Evelyn Hone College and Northern Technical College highlight recurring constraints such as unreliable Internet, inadequate learning management system support structures and low staff confidence in digital pedagogies (Mutale & Chileshe, 2020). These findings show that while blended learning is expanding, institutionalisation remains uneven.

Benefits and Challenges in Implementation

Blended learning has become a transformative force in TVET globally over the past two decades. As economies digitise and labour markets evolve, TVET systems worldwide have increasingly adopted hybrid instructional models that combine online theory and in-person practical training. Smith et al. (2023b) have identified blended learning as a critical response to shifting skill demands in the global knowledge economy, while Castro-Rodriguez (2021) has highlighted its role in preparing learners with the digital competencies required across industries.

Across high-income countries, blended learning has been embraced as part of broader digital transformation strategies. According to Chen et al. (2021), countries such as Singapore and Finland embed blended pedagogies into national CBT frameworks, enabling flexible, modular and workplace-aligned learning pathways. These innovations are facilitated by strong infrastructure, robust digital ecosystems and sustained investment in instructor capacity.

Despite the many benefits of blended learning in TEVET, there are still some limitations that make it unattainable in certain regions and nations, including Zambia (Aravind, 2024; Dixit, 2023; Domingo, 2024). Educators have also reported challenges adapting assessment methods to blended formats, especially in competency-based programmes (Aravind, 2024; Dixit, 2023). This challenge is consistent with regional findings showing that institutions lack clear assessment frameworks for blended competency-based education, which results in inconsistencies in grading and feedback (Curry & Docherty, 2017; Singh et al., 2021).

These challenges mirror wider evidence across Sub-Saharan Africa showing that the sustainability of blended learning is undermined by connectivity limitations, inconsistent institutional investment and insufficient lecturer preparedness (Hashim & Hamidon, 2022; Magasu et al., 2022).

International and African View

Studies conducted worldwide emphasise blended learning as a means of improving employability, learner autonomy and ongoing assessment (Blaschke, 2012; Singh et al., 2021). Blended models are recognised by UNESCO (2023) and the OECD (Centre for Educational Research and Innovation, 2021) as instruments for flexibility and equity, particularly in competency-based systems. Nonetheless, coherence of policy, leadership and infrastructure are necessary for integration (Anderson, 2010; Dixit, 2023) especially in blended learning contexts.

Research from South Asia and Europe has demonstrated that blended apprenticeships boost employability by matching training to labour market demands (Wark & Ally, 2020). Furthermore, blended learning has expanded participation in vocational education. Studies by Chen et al. (2021) and Smith et al. (2023) have shown that hybrid delivery removes geographic and scheduling constraints, enabling the following outcomes:

- adult learners to reskill or upskill
- apprentices to combine workplace learning with online theory
- rural and remote populations to access training previously unavailable.

This trend mirrors Zambia's experience, where blended learning methods have increased access for working learners and those in remote areas. Yet, there is still more that is required to allow other areas to be reached.

African contexts reveal both potential and barriers of blended learning. In Ghana, teachers appreciate blended learning but lack training and resources (Antwi-Boampong, 2021). In Zimbabwe, Chinengundu et al. (2022) noted blended learning became the "new normal" after the pandemic, requiring strong planning. Nigerian studies have reported digital divides and low lecturer competence as barriers (Hassan et al., 2021). Donor-supported programmes dominate across Africa, raising sustainability concerns (Bonde, 2024). Furthermore, professional standards and training programmes are emerging (Okinda et al., 2023). Sustainability depends on embedding blended learning into institutional and national systems (Magasu et al., 2022). In Zambian TEVET, few institutions are undertaking in-depth case studies on blended learning.

Research Gaps

The review identified several gaps:

1. Insufficient research on vocational instructor training institutions, despite their central role in shaping national training quality
2. Limited studies integrating pedagogy, curriculum, assessment and resource factors into a unified analytical framework
3. Sparse empirical evidence on how TEVET instructors in Zambia conceptualise and enact blended learning approaches
4. Little research examining qualitative analysis in TEVET institutional studies.

This study addressed these gaps by conducting a rich, multi-source case study informed by an integrated conceptual framework.

Methodology

This study applied a qualitative case study design that emulated a social-constructive paradigm for free engagement among various stakeholders in the TVTC context, to examine institutional processes, educator experiences and contextual factors influencing the PBDT roll-out. Case study design is widely used to investigate complex, real-life interventions within their specific contexts (Yin, 2018). The case setting is TVTC in Luanshya District in the Copperbelt Region of Zambia. Permission was obtained prior to undertaking the study.

Data Sources

Primary data included official training reports submitted to COL, feedback forms completed by 28 participants, institutional reflection notes and departmental reports. These documents contained structured reflections, participants activity logs and institutional progress summaries which enabled triangulation. One of us was a participant in the study.

Secondary sources included two COL publications on blended TVET, namely Digital and Professional Teacher Competency Standards for Blended TVET (Smith et al., 2023a) and Teacher Skills Required for Blended TVET: Analysis and Guidelines (Smith et al., 2023b) and TEVETA strategic documents (TEVETA, 2021) for triangulation.

Search Strategy

A complementary desktop review was conducted to contextualise findings, using databases such as Semantic Scholar and policy repositories. Keywords included "blended learning", "TVET", "TEVET", "Zambia", "digital pedagogy" and "competency-based training", limited to 2018–2025 for TEVET-related information.

Data Preparation and Management

Audio recordings were transcribed verbatim. Transcripts were reviewed for accuracy and anonymised before import into NVivo version 14. A structured file-naming convention was used to maintain order. Data were organised into folders for the semi-structured interviews, focus group discussions, observations, documents and memos. Cases were created for each participant and linked to attributes including role, gender, programme area and years of experience.

Data Analysis Using NVivo

Themes were derived inductively from the data and cross-checked against the conceptual framework to enhance analytical rigour. Codes were created around three domains: benefits of blended delivery, challenges of implementation and institutional responses. NVivo (computer-assisted qualitative data analysis software) was used for coding, ensuring systematic categorisation as described.

Analysis followed an inductive–deductive thematic approach (Creswell & Poth, 2018), supported by NVivo. First-cycle open coding involved close reading of transcripts and generating initial codes, including descriptive and in-vivo codes. A provisional coding framework informed by literature on blended learning and its related issues, including benefits, challenges and industry-linked training, was used to guide but not restrict coding.

In the second cycle, codes were refined, merged or expanded to form hierarchical categories representing emerging patterns. Memos were maintained to document analytic decisions, code definitions and reflections. NVivo tools, particularly text search, word frequency and coding queries, were used to identify relationships within and across data sources. Matrix coding queries enabled comparison of themes by participant attributes such as role or contribution in blended learning. Observations and documents were triangulated against semi-structured interview data to confirm consistency or identify discrepancies.

Trustworthiness

Trustworthiness was informed by the works of Lincoln and Guba (1985). Credibility was enhanced through data triangulation, member checking of summary findings and peer debriefing obtained from the participating instructors. Dependability was strengthened through an audit trail consisting of transcripts, codebook, NVivo logs, memos and reflective notes. Thick descriptions about blended learning support transferability by enabling readers to assess contextual relevance. Confirmability was ensured through reflexive journaling and maintaining clear links between interpretations and verbatim data extracts.

Quality Assurance and Trustworthiness

- Triangulation: Data from training reports, feedback forms and reflection notes were cross-verified.
- Peer review: Findings were validated with COL facilitators and TVTC staff.
- Reflexivity: We (researchers) reflected on biases to ensure interpretations stayed close to participant voices, which is a feature of social constructionism.

Ethical Considerations

Data were drawn from anonymised institutional documents and aggregated feedback. All identifying information was removed, and institutional consent was obtained before deeper engagement.

Findings and Discussion

Perceived Benefits of Blended Learning

The PBDT course revealed several tangible benefits for educators and learners. Participants consistently reported increased flexibility in lesson planning, greater capacity for learner-centered approaches and improved confidence in using Moodle for digital delivery. Educators highlighted how online forums created opportunities for typically quiet students to engage more actively in discussions, thereby broadening classroom participation. These reflections align with scholarship that has underscored the role of blended learning in fostering learner autonomy, personalised learning pathways and opportunities for continuous assessment (Blaschke, 2012; Singh et al., 2021).

The course also contributed to professional growth by equipping educators with digital pedagogical skills transferable to other aspects of their teaching practice. This aligns with Chinengundu et al.'s (2022) argument that blended approaches build digital literacy alongside technical competencies and with Hashim and Hamidon's (2022) evidence linking blended models to enhanced employability outcomes.

Challenges in Implementation

Implementation challenges proved significant. Unstable Internet connectivity and limited ICT resources constrained teaching and learning activities, particularly in rural contexts. Uneven digital

literacy levels among educators compounded these barriers, leaving some participants struggling with core tasks such as content uploading and assessment design. Participants also reported unclear policy frameworks governing assessment in blended environments, which created uncertainty in aligning online modules with practical components of CBT programmes.

Practical subjects such as Automotive Systems and Electrical Installation were especially difficult to digitise, as the lack of virtual simulations restricted how effectively hands-on elements could be translated into online formats. These findings resonate with broader African research that has emphasised systemic infrastructure deficits and insufficient training as enduring obstacles to blended learning adoption (Bonde, 2024; Hassan et al., 2021). The inequities were more acute for learners with disabilities, echoing Magasu et al.'s (2022) call for inclusive digital measures to ensure equitable access.

Institutional Reflections

Institutional responses at TVTC revealed that leadership support was a decisive factor in enabling a high completion rate of 79%. Senior management not only participated in the training but also instituted practical support mechanisms: convening follow-up meetings, monitoring progress regularly and adjusting workloads to allow participants sufficient time to complete course requirements. This leadership engagement created accountability, reduced attrition risks and encouraged persistence among lagging participants.

Beyond completion rates, TVTC embedded blended learning in long-term planning by drafting internal frameworks for digital content review, establishing peer mentoring structures and approving new institutional policies such as the blended learning policy and the open distance and flexible learning policy in 2023. These actions demonstrate how institutional leadership can translate external training into sustainable practices, reinforcing the view that management engagement is a key enabler of blended learning adoption in resource-constrained environments.

Implications for TEVET Policy and Practice

The PBDT case underscores that successful blended delivery requires systemic preparedness that integrates infrastructure, professional development and leadership. Evidence shows that management participation and ministry support were as influential as technology and pedagogy in driving completion rates. This suggests that national frameworks must explicitly acknowledge leadership oversight as a core dimension of blended delivery.

For TEVETA and the Ministry of Technology and Science, this entails developing coherent national standards that specify roles for institutional leaders in monitoring, mentoring, and resource allocation. Policy coherence is equally critical: blended delivery cannot succeed if ICT and TEVET policies remain fragmented or lack enforcement mechanisms.

Equity considerations must also be foregrounded. Rural institutions and learners with disabilities continue to face disproportionate barriers, and unless targeted interventions are made through equipment distribution, connectivity subsidies and inclusive pedagogy, the digital divide will

persist. Blended delivery should therefore be framed not simply as an instructional innovation but as a tool for equity and inclusion in Zambia's skills ecosystem.

Recommendations

Strengthened policy and regulation are necessary. The Ministry of Technology and Science and TEVETA should establish clear national standards for blended learning within CBT systems. These must define expectations for curriculum design, assessment practices, delivery modes and quality assurance.

Blended learning should be embedded into institutional staff development policies. Regular professional development, structured peer mentoring, and communities of practice can ensure sustained skills growth.

Investments must focus on reliable Internet connectivity, modern ICT equipment and accessible platforms, especially for underserved rural colleges. Dedicated budget lines for digital infrastructure should be institutionalised.

Institutional leaders must actively champion blended learning. This includes integrating blended learning into departmental work plans, establishing staff appraisal systems, performance contracts, thereby normalising digital pedagogy within institutional cultures.

A national monitoring, evaluation and learning framework should be developed to track progress, identify best practices and guide course corrections. Evidence from TVTC's PBDT experience can serve as a reference model for other institutions.

TVET institutions should establish networks of practice, with TVTC positioned as a hub for onboarding, exchange and peer mentorship. This would institutionalise knowledge sharing and build sector-wide capacity. Leadership support must be formally recognised as a success factor for blended delivery.

National frameworks should require institutional leaders to participate in training, adjust workloads and monitor staff engagement. The 79% PBDT completion rate provides empirical evidence that leadership involvement directly enhances outcomes.

Conclusion

The PBDT course demonstrates that blended learning is both feasible and effective in Zambia's TEVET sector when supported by leadership, coherent policy and adequate infrastructure. A completion rate of 79%, achieved despite power and connectivity challenges illustrates the potential of blended delivery as a sustainable model for CBT.

The study also highlights that institutional leadership and ministry-level engagement are not peripheral, but central enablers of blended learning adoption. Co-ordinated action by regulators, institutions and development partners will be necessary to ensure sustainability and inclusiveness.

Ultimately, blended learning should be understood not as a temporary solution to disruptions but as a long-term strategy for strengthening skills development in Zambia. By embedding leadership, equity and policy coherence into the digital transformation agenda, TVET institutions can position themselves as drivers of innovation, inclusion and workforce readiness in the 21st-century economy.

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Engaging NEET Youths through Vocational Education: A Case of the Open School of Bangladesh Open University

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Abstract

This study examined the challenges of engaging youth aged 15–19 and not in education, employment or training (NEET) using open and distance learning at the Open School of Bangladesh Open University (OS-BOU). Implemented in collaboration with the Department of Youth Development under the Ministry of Youth and Sports, the initiative is part of the World Bank-funded Economic Acceleration and Resilience for NEET project, targeting 100,000 NEETs. OS-BOU faces multifaceted challenges in developing courses of studies of the Secondary School Certificate Vocational programme: Grades 9–10 through open schooling leveraging digital technologies such as open educational resources-based texts and audiovisual materials, and both virtual and face-to-face contacts. A case study method was used, focusing on 30 developers — 10 each for vocational texts, videos and contact sessions — to explore challenges in material development and learner support. The findings reveal varying challenges across the four themes of curriculum development, instructional media production, learner support engagement, and gendered barriers and social perceptions, highlighting the need for targeted interventions to improve course delivery and student engagement. The study contributes to understanding the dynamics of student engagement in open and distance learning settings and offers recommendations for OS-BOU to strengthen pedagogical strategies and support systems tailored to vocational education programmes.

Keywords: vocational education, NEET, Bangladesh Open University

Introduction

Youth unemployment is a persistent challenge in Bangladesh, especially among the not in education, employment or training (NEET) population aged 15–19, who remain disengaged from the formal economy. The Government of Bangladesh, with support from international development partners, has initiated several interventions to address this issue. Among them, the Economic Acceleration and Resilience for NEET (EARN) project, funded by the World Bank (2023), aims to provide vocational education to 100,000 NEET youths, particularly women in rural areas, through open and distance learning (ODL) mechanisms. Bangladesh Open University (BOU), through its Open School (OS-BOU), plays a critical role in this initiative by offering the Secondary School Certificate Vocational (SSC-Voc) programme for Grades 9–10 (OS-BOU, 2025). The initiative incorporates a blend of open educational resources (OER), video-based learning and interactive face-to-face and virtual contacts, facilitated by the Department of Youth Development under the Ministry of Youth and Sports. However, the deployment of this model has surfaced several operational and pedagogical challenges, including content development, technology integration and learner support. Given the complexities of engaging NEET learners — many of whom lack foundational

education, digital literacy or motivation — it is imperative to examine the effectiveness and limitations of the existing approaches to ensure inclusive and sustainable learning outcomes (Khurram, 2023). This study investigated how OS-BOU engages NEET youths through the SSC-Voc programme. It applied a qualitative case study method involving 30 curriculum developers engaged in curriculum, video and contact session design. This paper aimed to uncover specific challenges and propose targeted improvements in curriculum design and student support. Through this inquiry, the study contributes to the broader dialogue on vocational education within ODL frameworks, with implications for scaling similar interventions across other marginalised learner populations (World Bank & UNESCO, 2023).

Objectives

This paper aimed to achieve the following objectives:

1. Explore the challenges faced in developing SSC-Voc course of studies at OS-BOU for NEET youth.
2. Examine the effectiveness of student support services (face-to-face and virtual) provided through the OS-BOU platform.
3. Analyse the role of ODL-based vocational education in promoting engagement among NEET learners, particularly young women in rural areas.
4. Recommend strategies for improving course delivery, learner engagement and support systems based on the findings from (1) to (3).

Literature Review

The global dialogue on NEET youth emphasises their vulnerability to economic and social exclusion for various reasons. According to the International Labour Organization (2020), the global NEET rate stands at around 22%, with significant regional variations. In Bangladesh, the NEET rate is estimated at 28.3%, with a disproportionate representation of rural women (World Bank, 2023). Addressing this demographic requires inclusive, flexible and accessible education solutions — conditions well aligned with the philosophy of ODL. ODL offers potential for scalable vocational education, particularly in low-resource settings. As Holmberg (2005) and Moore and Kearsley (2012) have suggested, the flexibility of ODL can accommodate diverse learner needs. In addition, this is very cost-effective and appropriate of target clientele. Vocational training through ODL is gaining traction globally, as seen in the initiatives by the Commonwealth of Learning, the Indira Gandhi National Open University, and the Open University in the United Kingdom. Furthermore, the National Institute of Open Schooling has been performing well in offering vocational education to school dropouts through the open schooling system. These models leverage blended learning approaches that combine printed materials, multimedia content and online interactivity (Berge, 2005). In the South Asian context, Indira Gandhi National Open University's vocational programmes demonstrate how ODL can reach marginalised learners, including women and rural youth (Distance Learning Institute, 2024; Kishore, 2013).

Despite its potential, ODL faces limitations when deployed for NEET learners. A key challenge is learner motivation, as most NEET youths have disengaged from formal learning due to socio-

economic barriers. Moreover, digital divides — especially in rural Bangladesh — limit access to online materials. Siddiquee and Islam (2020) have noted that rural households have less reliable Internet access, a significant impediment to fully virtual modes. Another challenge lies in content design. NEET learners require simplified, context-relevant curricula with hands-on skills and practical examples (Department of Youth Development, 2024b). Traditional ODL texts may not suit this demographic, necessitating new strategies such as co-creation with youth mentors and digital storytelling. The SSC-Voc programme of OS-BOU integrates theoretical learning with practical training across trades such as electrical work, tailoring and mobile servicing. The programme utilises a three-pronged content delivery method — printed OER texts, instructional videos and tutor-led support sessions — either face-to-face or via digital platforms such as Zoom or Google Classroom.

Learner support is a critical success factor in ODL, as emphasised by Simpson (2013) and Tait (2000). In the OS-BOU context, support includes tutor-guided workshops, peer learning clusters and SMS-based reminders through WhatsApp or Messenger. However, the quality and consistency of these services vary by region, often depending on the local Department of Youth Development centre's capacity. Training tutors for vocational mentoring is another gap — many are generalists lacking industry-specific knowledge. For young women, gender norms, household responsibilities and safety concerns often restrict participation in face-to-face sessions (Koli & Huda, 2023). Programmes like EARN have introduced localised learning hubs to address these barriers, but scaling remains a challenge. Literature suggests that vocational programmes must incorporate psychosocial support and career counselling for women to increase retention and completion (Marin, 2018).). Finally, literature supports the feasibility of engaging NEET youth through ODL but emphasises the need for tailored content, strong learner support and hybrid delivery methods. The present study adds empirical insights into these dynamics, focusing on the OS-BOU's SSC-Voc programme under the EARN project.

Methods

This research adopted a qualitative case study methodology to investigate the challenges and strategies involved in engaging NEET youth through the SSC-Voc programme at OS-BOU. The case study approach is appropriate for in-depth exploration of complex educational interventions within real-life contexts (Yin, 2014). Purposive sampling was used to select 30 respondents directly involved in the EARN project at OS-BOU. The participants were grouped into three categories: 10 experts in vocational curriculum development, 10 video production specialists and 10 facilitators (tutors) of contact sessions. The selection ensured representation from multiple trade disciplines, including electrical, tailoring and information and communication technology-based skills. Primary data were collected using semi-structured interviews conducted both in-person and via phone over a three-week period. Each session lasted approximately 20–30 minutes and was recorded with participant consent. Interview questions focused on perceived challenges in content development, learner engagement, technological barriers and support mechanisms. Additionally, document analysis of OS-BOU project plans, monitoring reports and vocational learner feedback summaries was carried out to triangulate interview data. This included reviewing internal training manuals, OER text samples and online content usage logs. Thematic analysis was employed to analyse the data, using NVivo version 14 for coding and categorisation. Four themes emerged from the thematic

analysis: (a) curriculum development, (b) instructional media production, (c) learner support strategies, and (d) gendered barriers and social perceptions. A most important sub-theme, vocational text development under the theme of curriculum development, has been skipped because the OS-run SSC-Voc programme uses the vocational text previously developed by the Bangladesh Technical Education Board, which has the same progamme under regular mode through its affiliated technical schools and colleges. Cross-comparison between the four themes helped identify overlaps and distinct challenges. All participants provided informed consent and were assured of confidentiality. Data were anonymised during transcription and stored securely. This methodology allows for a rich, context-specific understanding of the pedagogical and operational factors influencing the vocational education of NEET youth through ODL, thereby informing policy and practice for future scale-up.

Analysis and Discussion

This section presents the findings from the qualitative case study of OS-BOU's SSC-Voc programme under the EARN project. The analysis is organised into four key themes: (a) curriculum development challenges, (b) instructional media production, (c) learner support and engagement and (d) gendered barriers and social perceptions. Each theme is discussed with supporting evidence from participant interviews and relevant literature. Although developing self-learning texts is a core element in ODL programmes, it was not selected as a separate theme in this case study for the following reasons:

- The EARN project follows a time-bound implementation schedule. Given the urgency to roll out skill training for 100,000 NEET youth, the project prioritised curriculum alignment and media production over the development of new textbooks.
- The Bangladesh Technical Education Board has already developed textbooks and competency-based modules for over 50 vocational trades. These resources are adapted and reused with minor modifications for the SSC-Voc programme under the EARN project.
- The programme emphasises multimedia-based learning and blended delivery models, reducing the reliance on traditional printed textbooks (Bangladesh Technical Education Board, 2023; Department of Youth Development, 2024a).

Curriculum Development Challenges

A primary challenge identified by curriculum developers is the need to design content that is both pedagogically sound and accessible to NEET learners, many of whom have limited prior educational attainment. Developers reported difficulties in simplifying complex vocational concepts without compromising the integrity of the subject matter. Participant 3 noted, "We had to balance technical accuracy with simplicity. Many learners have minimal formal education, so we had to ensure the content was understandable without diluting essential skill". It is necessary to mention that NEETs are mainly dropout learners who are, normally, of limited basics. This aligns with findings from Boru (2022) and McGrath and Yamada (2023), who have emphasised the importance of contextualising vocational curricula to meet the needs of marginalised learners. Participant 5 stated, "One of the biggest problems was deciding which vocational courses would actually benefit learners in different regions. What works in a coastal area may not be useful in the northern

districts. We lacked proper data on local demand and employment trends". This aligns with the study by Schuster and Margarian (2021), which found that the allocation of abilities and the weighting of preferences under varying labor market conditions have distinct welfare implications at the individual, regional and broader economic levels.

Additionally, developers highlighted the lack of standardised guidelines for curriculum development in the ODL context, leading to inconsistencies across modules. Participant 7 stated, "We faced a lot of questions about how this SSC (Vocational) programme compares to the regular SSC. Many stakeholders still don't see it as equal, which affects recognition and acceptance, especially when learners try to move on to higher education or jobs". The absence of a cohesive framework for curriculum development in ODL settings has been previously documented. Polikoff (2021) has argued that without clear guidelines, curriculum development can become fragmented, ultimately affecting the overall quality of education delivered. Furthermore, Polikoff has also identified three major barriers to effective standards implementation: poor curriculum materials, inadequate teacher support and highly decentralised educational structures.

Instructional Media Production

The production of instructional media, including videos and audio materials, faced several logistical and technical challenges. Media producers cited limited resources, such as updated equipment and insufficient technical staff, which hindered the timely creation of high-quality content. Participant 15, a media producer stated, "We often had to work with outdated equipment, and there was a shortage of skilled personnel to handle post-production, which delayed the release of materials". This aligns with the BOU Vice Chancellor's comment during the inaugural speech of the Digital Content Development for BOU event held on May 21–24, 2025, stating that "BOU Media needs to be well-trained staff and modern equipment for quality instructional media production for the Radio-TV chunk which is regained from the Information Ministry" (BOU, 2025).

Moreover, the lack of training for media producers in educational content creation was evident. Many producers lacked experience in developing instructional materials tailored for ODL environments, leading to content that was not fully aligned with pedagogical objectives. This issue reflects broader challenges in the ODL sector in Bangladesh. Participant 6 stated, "Writing scripts for vocational topics was especially difficult. It is not like general subjects — we had to show step-by-step skills, tools and processes in simple language, which needed both technical understanding and teaching insight. Most of us didn't have that training, so capacity building is really necessary". The lack of trained personnel in ODL institutions hampers the effective delivery of distance education, particularly in technical and vocational subjects (Bano, 2022).

Learner Support and Engagement

Effective learner support is crucial in ODL settings to mitigate feelings of isolation and to foster engagement. However, facilitators reported challenges in providing consistent and responsive support to NEET learners. One facilitator (Participant 23) remarked, "Many learners are from remote areas with limited Internet access. Providing timely support through digital platforms is often not feasible". The digital divide remains a significant barrier in Bangladesh. Islam and Islam (2023) noted that only rural households have less reliable Internet access, limiting the effectiveness

of online learner support mechanisms. Furthermore, facilitators expressed concerns about the lack of training in counselling and mentorship, which are essential for supporting NEET learners who may face various socio-economic challenges. Participant 24 stated, "We're often the only point of contact for these learners, but we haven't been trained in how to handle their emotional or personal issues. Some students just stop responding, and we don't know how to re-engage them". Participant 29 stated, "Even when learners manage to reach out, our responses are delayed because we're juggling too many responsibilities. Without proper systems and training, it's hard to provide the kind of support they really need". The need for comprehensive training programmes for facilitators is critical to enhance their capacity to support learners effectively.

Gendered Barriers and Social Perceptions

Gender disparities emerged as a significant theme, with female learners facing additional challenges in accessing vocational education. Cultural norms and safety concerns often restrict women's participation in face-to-face sessions. A female facilitator (Participant 22)) shared, "Some families are hesitant to allow their daughters to attend workshops, fearing for their safety or questioning the value of vocational training for women". This observation is consistent with national data indicating that 61.71% of educated females in Bangladesh are classified as NEET, compared to 18.59% of males (Ahmed, 2024). Early marriage and societal expectations further limit women's opportunities for education and employment. Addressing these gendered barriers requires targeted interventions, including community awareness programmes and the development of female-friendly training environments. Participant 1 shared, "In some rural areas, even if the training centre is nearby, parents won't allow their daughters to attend unless it's women only and perceived as safe. The fear of harassment is a real deterrent". Participant 25 shared, "We saw several bright female learners drop out just before the practical sessions began. When we followed up, many said their families didn't approve of them working with male trainers or traveling alone". Participant 19 shared, "There's still a mindset in many communities that vocational training is only for boys. Girls are expected to focus on household responsibilities or get married early, which makes it hard to keep them enrolled". Initiatives like Bangladesh Rehabilitation Assistance Committee's Skills Training for Advancing Resources programme have demonstrated success in increasing female participation in vocational training through community engagement and tailored support (The Financial Express, 2021).

Synthesis and Recommendations

The thematic analysis reveals interconnected challenges in curriculum development, instructional media production, learner support, and gender inclusivity within the OS-BOU SSC-Voc programme. To address these issues, the following recommendations are proposed:

- Establish clear frameworks for curriculum development in ODL settings to ensure consistency and quality across modules.
- Upgrade technical facilities and provide specialised training for media producers to enhance the quality and timeliness of instructional materials.
- Implement comprehensive training programmes for facilitators, focusing on counselling, mentorship and the use of digital tools to support learners effectively.

- Design and implement community outreach programmes to challenge societal norms and encourage female participation in vocational education. Develop safe and accessible training environments for women.

By implementing these recommendations, OS-BOU can strengthen its capacity to engage NEET youth through vocational education, contributing to broader national efforts to reduce youth unemployment and promote socio-economic development.

Conclusion

This study highlights the opportunities and challenges of engaging NEET youth through the SSC-Vocational programme of OS-BOU under the EARN project. The findings reveal that although ODL offers a flexible and scalable model, its success depends on context-sensitive curriculum design, quality instructional media, robust learner support and gender-responsive strategies. Developers faced difficulties simplifying content for learners with limited education, while media teams struggled with outdated infrastructure and limited technical skills — issues also noted in broader South Asian ODL contexts (Kara, 2020). Learner support remains uneven, particularly in rural areas with low Internet access (Islam & Islam, 2023), and facilitators require better training in mentoring and counselling. Gendered barriers significantly limit female participation, echoing national trends of female NEET rates (Ahmed, 2024). Community outreach and safe, localised training environments are essential for inclusive access (Koli & Huda, 2023; Marin, 2018). To maximise impact, OS-BOU must implement clearer curricular frameworks, upgrade media production capacities, train facilitators comprehensively and design gender-sensitive support systems. These improvements are critical to achieving the EARN project's goal of reducing youth unemployment through inclusive vocational education and building a more resilient, empowered NEET population.

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Open Schooling in Southern Africa: Progress, Challenges and Opportunities

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Abstract

According to UNESCO's (2024) *Global Education Monitoring Report 2024/5*, about 251 million children and youth are out of school. The total includes 59 million children of primary, 62 million children of lower secondary and 138 million of upper secondary age. Added to this problem is the growing challenge of large numbers of youths who are not in employment, education or any form of training, commonly dubbed the *NEETs*. To achieve universal primary and secondary education by 2030, countries should use innovative ways to reach children and youth who remain excluded from education. In this regard, the use of data-informed decision-making and planning cannot be overemphasised. This paper is based on personal experiences with open schools in Southern Africa. It also draws from the experience of working with similar institutions in the South Pacific Island countries. The paper highlights progress that has been made in open schooling, challenges that are faced and opportunities that can be exploited to expand education and training through open schooling. The paper uses theoretical notions of openness in education as an analytical framework to propose approaches that are likely to alleviate the growing challenges of out-of-school children and youth in Southern Africa.

Keywords: open education, open schooling, open educational resources, out-of-school children

Introduction

UNESCO's (2024) *Global Education Monitoring Report 2024/5*, about 251 million children and youth are out of school. The total includes 59 million children of primary, 62 million children of lower secondary and 138 million of upper secondary age. Added to this problem is the growing challenge of large numbers of youths who are not in employment, education or any form of training, commonly dubbed the *NEETs*. Although the problem of youth unemployment is universal, it is most prevalent in the developing world, particularly in Sub-Saharan Africa. This is due to a number of socio-cultural and economic reasons, least of which is limited access to educational opportunities. This problem is exacerbated by the poor quality of education provided and a curriculum that is not well aligned with the needs of African economies. Given the relatively high population growth rates of these countries, demand for education far exceeds supply in most African countries, and this trend is likely to continue for the foreseeable future. The resources needed to meet this ever-increasing demand for education, like traditional schools, trained teachers and teaching and learning resources, are well beyond the reach of many African governments. To achieve universal primary and secondary education by 2030 and to equip young people with the relevant skills needed for them to participate in the globalised economy, countries should use innovative ways to reach children and youth who remain excluded from education and training. In this regard, the use of data-informed decision-making and planning cannot be overemphasised.

This paper is a reflection of open schooling experiences in Southern Africa. It draws from the experience of working with some of the open schools in this region and similar institutions in the South Pacific Island countries and makes a case for mainstreaming this mode of provision to increase both access and relevance of education and training in the region. The paper highlights progress that has been made in open schooling, challenges that are faced and opportunities that should be exploited to expand education and training through open schooling. Theoretical notions of openness in education are used as an analytical framework to recommend approaches that are likely to alleviate the growing challenges of out-of-school children and youth in Southern Africa. These notions of openness are premised on open learning principles of increasing access, enabling success and providing opportunities for continuing success.

Literature Review

Although it is generally acknowledged that every child has a right to education and that countries should achieve universal primary education by 2030, traditional brick-and-mortar schools alone will not be able to shoulder the burden of providing education to all relevant age groups and to excluded youths (Sharma, 2020). In many developing countries, access to formal school education is constrained by the limited number of places in schools, inadequate trained teachers, lack of teaching and learning resources and long distances to be travelled by learners from home to the nearest school. In some instances, there are security risks that learners face in travelling long distances to school, especially girl learners. The opportunity costs of attending school are generally high for learners from poor socio-economic backgrounds in African countries, which results in many children not attending school. Due to cultural factors, this tends to have greater negative impact on girl children than on boys. In Eswatini, for instance, around 18% of girls drop out due to pregnancy in primary school, and this figure jumps up to 35% at junior secondary level (Dlamini, 2019). As Dlamini has noted, this trend is largely attributed to high levels of poverty and the low level of social status accorded to girls in the society. Globally, UNESCO estimates that 244 million children and youth between the ages of 6 and 18 were out of school in 2021, of which 118.5 million were girls and 125.5 million were boys (Institute for Statistics, 2022). A worrying trend is the declining participation of boys and male students in education both at the schooling and tertiary levels. In South Africa, between 2021 and 2023, a cumulative 202,615 more girls passed matriculation than boys and, of these, 124,057 more girls got bachelor's degree passes (Bisseker, 2024). Increasing gender disparities in terms of access and success in education are an anomaly that cannot be ignored.

Acute shortages of qualified teachers coupled with resource-constrained learning environments often result in poor quality of education, which ends up pushing many learners out of school (Hamid et al., 2015). According to the UNESCO Institute for Statistics (2019), of all regions, Sub-Saharan Africa has the highest rates of education exclusion. The same report shows that school exclusion rates get worse as one goes up the education levels, with almost 60% of youth between the ages of about 15 and 17 being out of school.

Growing Youth Unemployment

A worrying trend in Sub-Saharan Africa, like in other parts of the developing world, is the increasing number of youths who are out of school, out of employment and not engaged in any form of training to equip them with vocational skills. Keeping young people for extended periods of disconnect from the labour market and education or training opportunities increases their risk of remaining trapped in income poverty. The situation feeds an endless cycle of exclusion that comes at a high cost for the individual young person, their family and society at large (Mudiriza & De Lannoy, 2023). In South Africa, the number of such young people aged between 15 and 24 is over 3.5 million, which was 34.3% of that age group by 2022 (Mudiriza & De Lannoy, 2023). Studies conducted across different regions of the world show that youth unemployment rates in different parts of the world were as follows as of 2023: Arab States 28.6%, Southern Asia 14.9%, Eastern Asia 14.3%, Sub-Saharan Africa 8.9%, North America 8.3% and Eastern Europe 13% (Zhu, 2024). Although these findings are based on selected countries that were used for the study in the different regions, the picture shown reflects fairly accurate trends in the reported regions. The same study shows that none of all the regions of the world has a youth unemployment ratio that is below 10% although there are individual countries within these regions that have lower than 10% unemployment rates (Australia: 8.29%, Vanuatu: 5% and Solomon Islands: 2.8%). Clearly, literature shows that youth unemployment is a global problem that threatens social and economic stability. There is a direct relationship between education and skills acquisition by young people and how well they can be integrated in the world of work.

Employability and Curriculum

A key factor to consider in implementing a school curriculum is how responsive it is to the needs of the economy. In many African countries, lack of relevance of the curriculum to the needs of the job market is one of the major causes not only for school dropouts but also for youth unemployment. In South Africa in particular, the apparent mismatch between industry needs and the educational outcomes of the system points to a potential lack of responsiveness on the part of the education institutions to enhance the employability of their graduates (Wedekind & Mutereko, 2016). Curriculum responsiveness is a pertinent ingredient of the employability menu within the African context, which many countries have not paid sufficient attention to.

Trends of Educational Provision in Wake of New Technology

The pervasive effect of new communication technologies at all levels of educational provision cannot be overemphasised. These technologies offer immense opportunities for improving both access and success in education. Open schools make use of open and distance learning (ODL) approaches to teaching and learning, which are characterised by separation of learner from the teacher, separation of the time that a learner chooses to learn from the time during which the teacher teaches, two-way communication system between learner and teacher and between learner and institution, and collaboration with peers in the learning process. New communication technologies have the potential to strengthen multiple ways of communicating thereby improving learner support. The second generation of technology, which involves multimedia teaching that integrates print-based materials with video, audio and minimal use of computers, and the third generation, which focuses more on the use of interactive information technology, have brought

about significant transformation of teaching and learning in ODL (Murangi, 2017). Thus, ODL in general and open schools in particular are leveraging the affordances of new communication technologies to broaden the scope of curriculum provision, reach out to more learners and improve the quality of provision (Mhlanga, 2022).

Amongst many other advantages, literature shows that using technology in ODL promotes student flexibility and autonomy in learning, encourages critical thinking and facilitates communication between teachers and students and amongst students themselves (Telefónica, 2023).

The Potential of Open Schools

Open schooling is the provision of schooling (teaching and learning) opportunities making use of open, distance and innovative e-learning methods that do not necessarily require teachers and learners to be in the same place at the same time. It refers to the physical separation of the school level learner from the teacher, and the use of unconventional teaching methodologies and information and communications technologies to bridge the separation and provide education and training (Commonwealth of Learning, 2023). As Kanwar (2020) has observed, existing open schooling initiatives in developing contexts in Africa, Asia, the Caribbean and the Pacific, as well as in developed contexts such as Australia, Canada, New Zealand and the United Kingdom, clearly demonstrate that it is possible not only to open the doors of learning for all but to keep them open even under the most trying circumstances. My experience shows that open schooling is gaining momentum in Southern Africa as governments realise the potential of this mode of provision in expanding access to education at relatively low costs. It is important to note that although it is offered at the schooling level, ideally, open schooling has a rich and diverse curriculum that integrates traditional schooling subjects with technical and vocational offerings.

In this paper, open learning principles were used as an analytical lens to understand how open schools should operate. Open learning principles provide guidelines on how education can be made accessible to all and enable achievement of the educational aspirations of individuals. They enable as many people as possible to take advantage of affordable and meaningful educational opportunities throughout their lifetime by sharing expertise, knowledge and resources, reducing barriers and acknowledging diversity of context of learning. Over years, Saide has developed open learning principles that have been grouped under three main categories, namely increasing access for success, enabling success and continuing success (Saide, n.d.). These principles were used as an analytical framework for reflecting on open schooling practice in Southern Africa.

Methods

This study resides in the qualitative domain, where non-quantitative data were collected through such methods as documentary analysis. Case studies compiled from countries in Southern Africa were the main source of data for the study. These case studies were compiled by in-country experts on open schooling, some of whom are directly involved in running the schools. Data obtained through documentary review were augmented by my personal experience of working with some of the open schools in Southern Arica. This work consisted of supporting open schools with processes like policy development, online course development, development of learner support activities and

use of technology to enhance delivery. Thus, the methodology of this study is partly ethnographic, where I draw from personal experiences with open schools in situ. Ethnography is a type of qualitative research that involves immersing oneself in a particular community or organisation to observe their behaviour and interactions. In the process, the researcher gains a deep understanding of the actors' shared culture, conventions and social dynamics (Caulfield, 2023). Typical of ethnographic approaches to knowledge generation is the researcher's ability to interpret observed phenomena and behaviour in the field and their personal encounters with actors to construct objective insights about phenomena under study.

Discussion

Most countries in Sub-Saharan Africa implement one form of open schooling or the other, using models that are significantly different. The success of these open schools also differs quite significantly from country to country. However, what is common amongst most of them is that they are supported by governments, with some falling directly under the relevant ministries of education. In line with the framework outlined above, this section looks at the extent to which these open schooling models meet open learning principles. It also highlights constraints that are faced in addressing the pressing issues of access and success, including alleviating the skills gap challenge that many of the countries face.

Successes Realised

In terms of business model approaches, implementation of open schooling ranges from decentralised offerings by institutions that are well funded and supported by government. Models used by such open schools have evolved over years, from largely paper-based and many hours of face-to-face contact sessions to technology-based models that rely primarily on digital resources, with minimal physical contact hours. Examples of such institutions are the Namibian College of Open Learning (NAMCOL) and the Botswana Open University Open School (formerly called the Botswana College of Distance and Open Learning. These government-supported institutions aimed primarily at providing access to secondary education to learners who either failed in the conventional systems, thus providing a second chance for them to realise their academic aspirations, or reaching out to the underprivileged communities who, for one reason or the other, could not participate in the conventional school system. Thus, access underpinned by a social justice philosophy was the major driver in investing in open schooling in these countries. The cost of participating in open schooling was very low as fees were capped by government.

To ensure sufficient reach to learners in remote areas, these open schools established regional centres that were supported by a network of study centres serving learners. Dedicated staff was deployed to these institutions, fully remunerated by government and trained in different aspects of ODL provision. There was clear division of labour in the staff to ensure specialisation. Teaching and learning materials were developed for independent use by learners. With time, learning management system platforms were secured and digital materials replaced paper-based resources, making it cheaper and faster to deliver to distributed learners. A wide range of learner support mechanisms was also institutionalised to cater for the needs of the varied learning contexts.

It is worth noting that given the delivery model highlighted above, NAMCOL student enrolment reached 29,917 in 2024, with a notable increase in the number of secondary school learners (Namundjembo, 2025). The Botswana Open University Open School (2021) boasted of 12,525 learners in 2021, including learners enrolled in short courses. In the 2024 academic year, NAMCOL enrolled 32,000 students; of this figure, 26,000 were enrolled in tertiary programmes (Eagle FM Namibia, 2024). This does not only show the extent to which NAMCOL increased access to school education, it also demonstrates its contribution in alleviating skills shortages through vocational training in the country. Like many other open schools, NAMCOL enrols more female students than male. In this regard, it contributes towards addressing gender inequity in so far as educational provision. is concerned. Thus, by diversifying its curriculum, open schools have the potential to address the problem of youth unemployment and at the same time contribute towards gender equity.

Policy at NAMCOL and at the Botswana Open University Open School allows learners to cross floors from the open school to the conventional system and vice versa.   I had personal experience of interacting with students from both institutions, who expressed excitement about their academic achievements and were proud of their open schools. In one of the regions visited, I met a graduate teacher who was a product of NAMCOL, who narrated her inspiring story of how the College "was a saviour in my life". After failing in the conventional system, the student registered with NAMCOL and attained matriculation points that enabled her to register for a degree programme at the University of Namibia. She proudly graduated and became a teacher, and at the time of the visit, was a part-time tutor at one of NAMCOL's regional centres. On a different occasion, I interviewed one of the regional governors as part of a NAMCOL study I was conducting. During the interview, the governor was excited to inform me that he was a product of NAMCOL. In yet a different study, I had the privilege of holding an informal interview conversation with the-then Minister of Education about the role NAMCOL was playing in enhancing access and alleviating youth unemployment. His remarks were most telling about his perceptions of open schooling in addressing social problems in Namibia: "As a minister, I would be happy if I can keep young people off the streets".

It is evident that both NAMCOL and the Botswana Open University Open School are success stories of how open schooling has increased access and enabled success, key open learning principles that are a measure of success in open schooling. These colleges have also imparted lifelong learning skills needed for continuing success through further studies.

Key factors highlighted in the above open schooling models, which have augured well for the success of open schooling in Namibia and Botswana, can be summarised as:

- National commitment to ODL, leading to political buy-in and support for open schooling. This is demonstrated through ODL policy.
- Mainstreaming of open schooling resulting in public funding of open schooling.
- Setting up of a network of learning centres throughout the country to reach out to the most disadvantaged in the country — bringing the "school" to the doorsteps of the learner.
- Embracing of technology in supporting open schooling and mobilising public and private sector support in investing in technological infrastructure nationally.
- Diversifying open schooling curriculum to include technical and vocational skills programmes.

- Strengthening learner support to enhance learner success through open schooling.
- Positive public perceptions of open schooling.
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Challenges Faced

Although there are success stories in providing open schooling in Southern Africa, as highlighted above, there are also challenges that have constrained provision of education through this mode. These challenges surface clearly through practice in some of the countries in the region. In three other countries where I have supported open schooling, in addition to the two mentioned above, although open schooling institutions are public institutions, ODL has not been mainstreamed at national level. Although there is a national ODL policy in one of the countries, the policy has hardly been implemented due to lack of funding. Besides, the schools have not been accorded the autonomy they need to develop an alternative curriculum to the traditional school curriculum. The conceptualisation of open schooling has largely been done within the confines of traditional forms of schooling where learners need to physically go to a central place to be taught. Unlike in the first two cases reported above, traditional prescribed textbooks have been used as the core learning resources. Such resources have not been customised for independent learning. In one instance, learners in very remote areas where physical schools are far apart are required to attend evening and weekend classes. Due to the prohibitive distances involved and the risk associated with navigating one's way at night, many of the intended target population do not participate in education. Thus, running an alternative schooling system that mirrors traditional school fails to meet the educational needs of many learners and does not increase access. In all the three countries under discussion, open schools do not have any decentralised service centres. All services are provided from the headquarters, which makes it difficult for most learners to access support services.

As in the formal school system, open schools in the three countries are struggling to embrace technology. Both learners and staff face challenges in accessing hardware and software technology. Apart from poor bandwidth, learners find the cost of data too expensive to manage. Enrolments in some of these open schools are too low for open schooling to be viable. This is in contexts where secondary school participation rates are well below 50%. This means that half of the population eligible for secondary education is out of school. In one country, transition from primary to secondary education is 47.2%, while the secondary gross enrolment rate is at a paltry 26%. Although records show that there are more than 400 open secondary schools, they enrol less than 20% of the conventional secondary school enrolment in the country. The conceptualisation of an open school is radically different from how such schools are conceptualised in countries like Namibia and Botswana. In this country, open schools are conventional schools that have been designated to offer evening and weekend classes, which still requires learners to attend classes physically. The model does not offer enough flexibility to attract large numbers of needy children, hence the limited enrolments. Although there have been significant investments in taking advantage of available technologies, this has not made significant impact on access.

Key factors that constrain open schooling in this second model of provision are:

- lack of or limited political buy-in of open schooling, resulting in poor public funding
- lack of proper structured open school with decentralised service centres

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- use of inappropriate models of open schooling, which are not open and flexible enough to suit the needs of learners
- poor quality of open schooling leading to negative public perceptions of this mode of provision

Recommendations

Open schooling has immense potential to address access and quality challenges faced in education systems in many African countries. For this mode of provision to succeed, the following recommendations are made:

- Government commitment is needed; therefore, open schooling can be well funded and mainstreamed in national education systems. This should be supported by a national policy that regulates ODL.
- Appropriate open schooling models that take into account the specific contextual challenges communities face should be adopted. Appropriate conditions affecting the most disadvantaged sectors of the community should be considered in establishing open school models — remote rural areas, the poor who hardly have any resources to spare for educational purposes and the disabled. An appropriate balance should be struck between use of technology and face-to-face interactions, depending on the context.
- Rich and contextually relevant learning materials should be provided, preferably openly licensed to facilitate adaptation and updating. These materials should allow independent study.
- Public-private partnerships should be forged to facilitate provision of the necessary technological infrastructure that leverages open schooling.
- Open schools should operate in flexible ways to accommodate the needs of the different learners in the country. However, quality of provision should be upheld to avoid compromising the credibility of open schooling.

Conclusion

This paper reflected on open schooling practice in Southern Africa. Examples were used to illustrate two broad models of open school provision, with a view to highlighting both enabling and constraining factors to effective roll out of open schooling. Although literature shows that open schooling can contribute significantly towards increasing success and quality of education provision, models that are used in any given context determine the success of this mode of provision. In general, open schooling requires government support, should be supported by an enabling policy environment, should be flexible enough to be inclusive, should be well resourced in terms of staffing and teaching and learning resources, should have strong learner support systems and should be of sound quality to earn public credibility. Ideally, open schools should have a wide range of curriculum offerings, consisting of the conventional school curriculum and technical and vocational courses. The latter helps to alleviate the ever-increasing challenge of youth unemployment.

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Building Resilient Graduates: Moi University's Model for Enhancing Employability and Lifelong Learning in a Dynamic Labour Market

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Abstract

This comprehensive tracer study of alumni from Moi University, Kenya, highlights critical insights into graduate employability, revealing a 6% unemployment rate among its graduates, aligning with national averages. The paper underscores the importance of lifelong learning and open education in fostering sustainable economic development and personal growth. It advocates for continuous curriculum updates in collaboration with industry, expanded university-industry linkages through internships and collaborative projects and the development of transferable skills like critical thinking and the much-needed digital literacy as students progress from campus to their chosen career paths. These strategies aim to enhance graduates' resilience in a rapidly evolving global economy. The study, employing a mixed-methods approach, identified key areas for improvement: enhancing practical skills, integrating technology into education and strengthening university-industry partnerships. Employability-focused interventions, such as real-world simulations, role-playing and mentorship programmes, proved effective in bridging the gap between academic knowledge and industry expectations. Moi University's model offers actionable recommendations for policymakers and educators, emphasising the alignment of educational systems with labour market needs. By drawing on the Commonwealth of Learning's employability model and fostering resilient, employable graduates, the university demonstrates the transformative potential of flexible education systems to address unemployment, support lifelong learning and drive economic progress in Kenya and beyond.

Keywords: employability, graduate employability skills, lifelong learning, tracer study, mentorship

Introduction

The demographic trajectory of Kenya, as projected by the United Nations (2024), indicates that the population will nearly double within the next three decades. This rapid growth is likely to exert mounting pressure on higher education institutions to ensure a seamless and efficient transition of graduates into the workforce, thereby mitigating the long-term risks of unemployment. Furthermore, it is clear that graduating from university does not necessarily ensure employability in the context of Kenya (Njeru, 2025). Siringi (2025, p. 14) found that "over 64% of Kenyan university graduates are reported to lack the job skills set needed by employers". In response to these challenges, Moi University has adopted a proactive model aimed at strengthening the employability and lifelong learning capacity of its students and alumni. Central to this model is the cultivation of robust employer relationships that inform the development of relevant skills aligned with dynamic labour-market demands through the university's various academic programmes.

This paper presents a study with two primary objectives. First, we sought to develop a structured approach to engaging employers, to translate insights from these interactions into a targeted employability skills course. Second, we explored the experiences of Moi University alumni as they navigate their entry into the labour market, thereby identifying essential competencies that support successful transitions. The findings should inform the design of responsive employability interventions and contribute to the establishment of a sustainable framework that fosters resilience, adaptability and lifelong learning among graduates in an ever-evolving employment landscape fostered by emerging new technologies.

The research was driven by the following questions:

1. What are the key employability skills demanded by employers, and how effectively are these skills developed through Moi University's academic programmes?
2. How do Moi University alumni perceive the relevance of their qualifications and the adequacy of their preparation for the current labour market?
3. What are the specific gaps that exist between the skills provided by Moi University and those demanded by the labour market, and how can these be effectively bridged through interventions such as internships, industry simulations and structured mentorship programmes?
4. In what ways can Moi University enhance its contribution to lifelong learning and graduate resilience in response to emerging demands of the labour market?

Theoretical and Conceptual Framework

Young people entering the world of work must deal with the challenges of creating a career in a world with decreased employment opportunities and diminished job security, fast-paced changing technologies and increasing personal responsibility for constant upskilling, employability and lifelong learning (Coetzee & Beukes, 2010; Scheuring & Thompson, 2025). These challenges, coupled with global economic downturns and significant population growth, are the current reality facing Moi University students.

The concept of employability has evolved to encompass a broad set of skills, knowledge, attitudes and attributes that enable individuals to gain, maintain and move between employment opportunities (Agbu et al., 2025; Dacre Pool & Sewell, 2007; Hillage & Pollard, 1998). Dacre Pool and Sewell proposed the CareerEDGE model of graduate employability, which emphasises emotional intelligence, self-management, career development, learning and generic skills. Coetzee (2008) highlighted the role of career meta-competencies, including adaptability, self-esteem, emotional intelligence and proactive career management. Furthermore, research on graduate employability skills is increasing worldwide (cf. Amarathunga et al., 2024).

This study adopted a broad perspective of employability (McQuaid et al., 2005; Mohee, 2019), recognising that it includes not only individual attributes but also external factors such as labour market conditions, social capital and institutional support. The framework is informed by social constructivist theory, which places a premium on collaborative knowledge-building between learners, educators and the broader society (Vygotsky, 1978).

Literature Review

Employability can be described as having a set of knowledge, skills and attitudes that make a person more likely to choose and secure occupations in which they can be satisfied and successful (Beukes, 2009; Dacre Pool & Sewell, 2007; Scheuring & Thompson, 2025). For Mohee (2019, p. 1), employability refers to the combination of "attributes, competencies and skills needed to increase the likelihood of an individual securing gainful employment after completing a programme of study or training". Coetzee (2008) has suggested that, in the 21st century, people are regarded as competency traders, and their employability depends on their knowledge, transferable skills, experience and attitudes. Employability, therefore, refers not only to a person's ability to secure employment but also their ability to create employment when necessary. Moi University students must transition into employment as quickly as possible, as research indicates that long unemployment spells at labour force entry may have persistent negative effects on employment probabilities and wages later in life (Neumark, 2007). The longer one is unemployed, the harder it is to reverse the negative psychological effects (Altman, 2007).

Rigopoulou and Kehagias (2008) have proposed that the current perspectives towards employability are narrow in terms of their goals, in the sense that they focus on the student as an employee-to-be, emphasising those skills that will make the student more competitive when applying for a job, without considering that these skills will not necessarily contribute to their success and happiness in life. Hillage and Pollard (1998) have cautioned that the term *employability* is used in a variety of contexts with a range of meanings and can lack clarity and precision as an operational concept. McQuaid et al. (2005) have proposed that some researchers and policymakers adopt a narrowly defined supply-side focus, while others adopt a broader perspective on employability.

According to McQuaid et al. (2005), the broader view focuses upon individuals' employability in terms of their capability to move into new employment within the labour market (such as moving from unemployment into a sustainable job or moving from one job into another) upon completion of their studies. The broad approach incorporates factors such as job search and labour demand conditions, which affect whether a person can find or change employment, as well as the set of employability skills and attributes that are the focus of the narrow supply-side concepts of employability.

Methods

This study was grounded in Vygotsky's (1978) social constructivist paradigm, aiming to capture a snapshot of key employability skills through collaboration with both the labour market and alumni. It adopted an exploratory approach that combines both quantitative and qualitative methods. The quantitative element involved collecting and analysing numerical data, or data that can be meaningfully quantified, to provide insights that support the research objectives. This approach enables a deeper understanding of graduate preparedness by drawing on measurable trends and stakeholder perspectives to inform strategies for enhancing employability and lifelong learning (Saunders et al., 2000).

In addition to the quantitative part of the research, a qualitative approach was employed to gather more open-ended and detailed insights into the importance of key employability skills and the ways in which they could be effectively developed. The study was non-experimental in nature, relying on the collection and analysis of primary data. This meant that we generated new data directly, rather than using pre-existing or secondary sources, allowing for a richer understanding of the subject matter from multiple stakeholder perspectives (Babbie & Mouton, 2001). Non-experimental research methods do not test the causal relationships between variables (Salkind, 2006).

This study was conducted as a cross-sectional survey, in which data collection took place at a single point in time. Participants only completed questionnaires and interviews on one occasion, resulting in a data set that captured a specific moment and perspective, often described as a snapshot in time. The decision to adopt a cross-sectional survey design offered several benefits, including relatively low data collection costs, high response rates and the ability to generate findings and draw conclusions within a short timeframe.

A random sample of 300 Moi University alumni was drawn from three schools across the institution, with representation from both social sciences and natural sciences disciplines. In addition, convenience sampling was employed to select at least 10 prominent employers or trade associations located in proximity to Moi University campuses. The research questions were formulated to identify the most in-demand employability skills from a labour-market perspective and to assess the gaps alumni perceived in their academic training.

Data collection involved two primary methods: online surveys were distributed to the selected alumni, facilitated by the Moi University Institute for Open and Distance E-Learning (IODEL), which managed the distribution of survey links to the alumni sample; and semi-structured interviews were arranged with key employer representatives, and these were recorded with the participants' consent and transcribed for analysis.

All responses from alumni and employers were entered into an electronic spreadsheet to prepare for analysis. A thematic analysis approach was employed to interpret the data. The triangulated results were presented through a range of visual and tabular formats, including diagrams, tables and graphs. The discussion of these findings was structured to provide clarity and coherence, ensuring the analysis effectively conveyed emerging patterns and insights.

The study also considered its limitations and offered recommendations for future research, particularly regarding the need for Moi University to remain agile in updating its employability training offerings in response to changing labour market requirements. The findings were further compared with those of a recent tracer study of Moi University alumni to identify recurring themes and enhance the validity.

The data collection tool was developed in collaboration with IODEL to ensure its relevance and quality. Once the alumni sample had been identified, IODEL facilitated the survey distribution process. Research questions specifically aimed to explore the employability skills expected of graduates, and how these could be better incorporated into academic programmes to enhance students' readiness for employment.

To ensure compliance with ethical and legal standards, a detailed research plan was submitted to the Moi University Research Office, requesting access to alumni contact information. This process adhered to the stipulations of the *Data Protection Act, 2019* (Government of Kenya, 2019).. Following institutional approval, a further application was made to the National Council for Science, Technology and Innovation. The research was launched upon receiving formal approval from both bodies.

A total of 218 responses were received from the randomly selected sample of 300 participants. This equates to a 73% response rate. A total of 62.5% of students were male, with 37.5% being female. The year of graduation varied significantly, with respondents graduating from 1988 through to 2022. Graduate alumni from each year between those dates were represented in the responses, except for 1989 and 2006.

Discussion

Employment Outcomes among Alumni

The analysis of Moi University graduate alumni data reveals encouraging patterns in employment status. Of those surveyed, approximately 83.5% indicated they were currently employed in various sectors, while 8.7% reported being self-employed. A further 6% were unemployed, and 1% were pursuing further academic qualifications. These figures highlight a commendable level of employment integration for the university's graduates, with the unemployment rate closely reflecting the national average of 5.85% recorded in 2023. This suggests that Moi University's academic programmes are, to a large extent, aligned with the general needs of the labour market. However, the presence of even a small percentage of unemployed graduates underscores the necessity of continuous improvement in aligning educational outcomes with labour market demands.

Salary Expectations Compared to Actual Earnings

Respondents were asked to reflect on their salary expectations and how these compared with their current earnings. Only 14.3% of graduates reported earning more than they had anticipated upon graduation. The majority, 59.2%, felt their earnings matched their expectations, whereas 26.5% found their salaries below what they envisaged. These statistics point to a moderate level of alignment between graduate expectations and the realities of the job market. However, the considerable proportion of graduates receiving less than expected suggests a gap in either market readiness or career orientation, which could be addressed through enhanced career guidance, labour market exposure or income expectation management embedded in employability training.

Levels of Job Satisfaction

The survey explored how satisfied alumni were with their current employment. Of the respondents, 10.9% expressed that they were extremely satisfied with their jobs, while a further 56.3% reported general satisfaction. A neutral stance was taken by 13.5%, whereas 12.5% were somewhat dissatisfied, and 5.7% were least satisfied. Overall, 67.2% of alumni combined expressed

satisfaction, which is markedly higher than the national employee satisfaction rate of 42% cited in Kenya's *Employee Satisfaction Report 2021* (BrighterMonday Kenya, 2021). This indicates that Moi University graduates, despite certain salary disparities, find their work generally fulfilling. This outcome could be attributed to the relevance of their skills or the adaptability fostered during their studies.

Relevance of Academic Qualifications to Current Occupations

When assessing the alignment between graduates' fields of study and their current occupations, 62% of respondents reported being employed in industries directly related to their academic qualifications. In contrast, 38% acknowledged working in fields either unrelated or only partially related to their area of study. This significant percentage suggests a labour market characterised by volatility and unpredictability, compelling graduates to apply transferable skills across sectors. It underlines the necessity for Moi University to continue strengthening its approach to embedding broad-based employability competencies in its curricula.

Preparedness for the Job Market

The alumni were also asked to assess how effectively their courses prepared them for employment. Only 12.5% felt that the university was highly effective in preparing them for the labour market, while 54.1% found the preparation generally effective. Neutral responses were given by 11.9%, and a combined 21.6% expressed various levels of dissatisfaction. The reasons for dissatisfaction included the predominance of theoretical over practical learning, limited attachment and internship opportunities, insufficient focus on global job markets and inadequate collaboration with employers for job placement. These findings highlight the importance of incorporating work-integrated learning opportunities and industry partnerships in all academic programmes.

Skills Acquired and Those Perceived as Missing

Graduates identified key skills they believed were effectively developed during their time at Moi University. These included communication, critical thinking, problem-solving, teamwork and adaptability. These core competencies are essential across professional domains and indicate some success in the development of transversal skills. However, a number of areas were flagged as insufficiently covered. Skills such as emotional intelligence, financial literacy, entrepreneurial acumen, public speaking, networking, negotiation, conflict resolution and self-motivation were consistently mentioned as lacking. These gaps point to a need for more holistic education models that extend beyond discipline-specific knowledge to include soft and life skills.

Employer Expectations for Graduate Competencies

Interviews with employers yielded valuable insights into their expectations for new entrants into the workforce. Employers strongly emphasised the need for job-specific skills developed through practical exposure. This expectation is driven by the fast-paced operational environments most organisations face, which offer little room for prolonged onboarding or training periods. Employers expect graduates to be ready to contribute from day one and to articulate, during interviews, how they have prepared for the role.

Additionally, employers noted that graduates often lack confidence and competence in self-presentation, both verbally and in writing. Many applicants fail to tailor their curriculum vitae and cover letters effectively, diminishing their chances at the application stage. These observations highlight a pressing need for structured employability workshops or modules that incorporate mock interviews, CV writing and presentation skills, thereby enabling students to practice and refine their employability profiles.

Critical Employability Skills According to Employers

Key skills that employers reiterated as essential for graduate success included professionalism, strong work ethic, effective communication (written and verbal), team collaboration, time management, leadership and self-motivation. One employer articulated the importance of trustworthiness, ethical conduct and the capacity for independent planning. Others highlighted that effective communication and teamwork are not merely desirable but indispensable in today's collaborative workplaces. Leadership was interpreted broadly, encompassing the ability to inspire peers and take initiative regardless of formal rank. The expectation for graduates to be self-driven and proactive in their roles was also frequently underscored.

Development Strategies for Employability Skills at Moi University

Feedback from both employers and alumni suggested several strategies to more effectively embed employability skills into university education. First, there is a clear need for systematic and regular mapping of curriculum content against market demands. Such analysis would help identify current and emerging gaps, allowing for timely curriculum revision. Building stronger linkages between academia and industry was seen as essential. These linkages should not only involve students through internships and attachments but also include lecturers. Teaching staff could greatly benefit from direct exposure to industry practices and trends through affiliations and active participation in professional associations. Regular industry engagement would enable lecturers to contextualise classroom content and deliver more practically relevant instruction.

Practical learning methodologies, such as simulations, case studies and role-plays, were recommended to cultivate job-relevant skills. For example, communication and teamwork could be enhanced through group presentations and scenario-based tasks. Moreover, incorporating entrepreneurship education would help address economic volatility and promote self-employment as a viable pathway for graduates. Another innovative suggestion involved the use of pre-recorded sessions with industry professionals. These recordings could form a growing multimedia resource bank, offering students consistent exposure to real-world expectations and guidance throughout their academic journey.

Recommendations

Feedback from Moi University graduate alumni highlights the evolving nature of the world of work and a pressing need to emphasise practical skill development within university programmes, coupled with entrepreneurial and technological skills. Alumni have noted a persistent misalignment

between academic training and labour market demands. To effectively address this challenge, the university should prioritise the development of stronger connections between academic schools and relevant industry players, particularly those that employ the graduates thereof.

These institutional partnerships would serve as critical platforms for enhancing curriculum relevance, providing students with practical exposure to job roles and facilitating pathways into employment. Therefore, each school should identify key industry stakeholders and establish a structured framework for relationship management. Such a framework should promote open dialogue and co-operation in areas including curriculum review, student attachments and graduate placement initiatives.

Mentorship has also been identified as a valuable component in enhancing graduate preparedness (Lumala, 2024). Alumni have proposed that each student be paired with a mentor, either from the university community or from the professional sector. The mentorship model used by Strathmore University was cited as a strong example.

In addition, alumni emphasised the importance of digital competency in today's job market. A compulsory computer literacy course for all first-year students is recommended. Finally, alumni expressed interest in maintaining lifelong learning connections with the university through access to short courses focused on emerging industry trends and skill requirements.

Further research could explore longitudinal trends in graduate employability, comparing multiple cohorts over time. Additionally, future studies might investigate the impact of specific interventions, such as curriculum updates, digital training modules or employer-mentorship programmes, on student and graduate outcomes.

Recommended Employability Interventions

To maximise graduate readiness, Moi University should implement structured and holistic employability interventions. These should span the entire student lifecycle and culminate in demonstrable competencies by the time a student graduates. A tiered training approach could be adopted to cover essential employment processes, including CV development and interview skills, workplace conduct and industry networking.

For instance, students in media studies could manage a publicly accessible digital platform showcasing their work across various media formats. This would simulate real job scenarios and enhance both technical and collaborative capabilities. The use of role-playing was also championed as a practical approach to situational learning. One suggestion involved converting classroom sessions into workplace simulations where students assume the roles of employees and supervisors, fostering realistic experiences and constructive feedback.

Finally, it is essential that Moi University formalise and deepen its partnerships with strategic employers. Such partnerships should benefit all stakeholders — students, lecturers and employers alike. Employers could contribute to student research agendas by identifying industry-relevant challenges, while lecturers could use these partnerships to ensure course content remains aligned with professional realities.

A biannual employer engagement model was recommended to coincide with the university's attachment cycles. These meetings would facilitate feedback on student performance, highlight areas requiring improvement and reinforce accountability on both sides. Continuous and structured employer involvement will support a sustainable model for nurturing resilient, employable graduates.

The study provides compelling evidence that a more integrated approach to curriculum development, university-industry collaboration and employability training is essential. By embedding practical learning methods and fostering lifelong learning pathways, Moi University is well positioned to build resilient graduates who can navigate and contribute meaningfully to an increasingly dynamic labour market. The findings offer a valuable foundation for institutional reform and national policymaking in higher education.

The following specific high-impact actions are recommended to higher education institutions towards building resilient graduates and promoting graduate employability:

- Institutions can embed practical learning activities by incorporating authentic assessments, simulations, role-playing and real-world projects across programmes, thereby bridging the gap between theory and workplace demands.
- Furthermore, they can strengthen industry partnerships by establishing structured collaborations with industry and employers for internships, attachments and curriculum co-design.
- The digital competencies of students need to be addressed through introducing compulsory information technology and generative artificial intelligence literacy modules in the first year to build foundational digital skills for all students.
- Mentorship programmes also have potential as students can be paired with industry professionals or alumni mentors to support career orientation and self-development.
- An essential aspect is the development of soft skills through the integration of training on emotional intelligence, public speaking, negotiation and conflict resolution into core curricula.
- Institutions can also offer career readiness workshops and host regular sessions on CV writing, interviews, self-presentation and workplace conduct.
- Alumni can be provided with access to continuing education through short courses and upskilling opportunities.
- Finally, university-industry dialogue is essential in order to institutionalise biannual employer feedback cycles to align educational delivery with labour market shifts.

Conclusion

This study explored how Moi University could enhance its graduates' employability and lifelong learning capacity through a strategic, evidence-based model. Drawing on a comprehensive tracer study involving alumni and employer input, the research addressed four critical questions: the employability skills most valued by employers, how effectively those skills are cultivated within

academic programmes, alumni perceptions of qualification relevance and job preparedness and ways the university can support lifelong learning in an ever-changing labour market.

The findings affirmed that although Moi University graduates demonstrate relatively strong employment integration, with unemployment figures consistent with national averages, there remains a significant gap between academic training and labour market expectations. Employers consistently emphasised the need for job-specific and soft skills that are developed through experiential learning, while graduates highlighted areas such as financial literacy, emotional intelligence and self-motivation as inadequately addressed. Alumni also expressed the need for stronger mentorship, expanded digital literacy and structured opportunities for industry engagement.

A key strength of the study is its mixed-methods design, which combined quantitative data with rich qualitative insights. However, the study's cross-sectional nature meant that it captured perspectives at a single point in time, limiting the ability to assess changes or trends. Moreover, although the study achieved a strong response rate, it was limited to graduates from three academic schools, which may affect the generalisability of the findings.

Acknowledgements

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Stakeholders' Perceptions of the Adoption of E-apprenticeship Programmes in Technical and Vocational Education and Training in Nigeria

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Abstract

This study investigated stakeholders' perceptions of adopting e-apprenticeship programmes in technical and vocational education and training in Nigeria. The research sampled 750 participants, consisting of trainers (200), apprentices (300), employers (150) and policymakers (100), using a mixed-method design. Data were collected via surveys and semi-structured interviews, and the instruments were standardised through pilot testing and expert consultations. Findings reveal mixed perceptions among trainers, positive attitudes from apprentices and cautious optimism from employers and policymakers. Trainers expressed concerns about digital infrastructure (70%), lack of face-to-face interaction (55%) and the urgent need for professional development to enhance their digital teaching skills, pointing to a gap in educator preparedness for e-learning environments (80%), while apprentices appreciated flexibility (75%) but noted the absence of hands-on practice (65%). Employers emphasised challenges in aligning programmes with industry standards (60%), and policymakers highlighted the need for regulatory frameworks (90%). Recommendations include enhancing digital infrastructure, integrating practical training components and fostering collaboration among stakeholders. The study found that addressing technological, infrastructural, and policy barriers is pivotal to leveraging the benefits of e-apprenticeship programmes and concerted efforts must focus on enhancing digital literacy, ensuring equitable access to resources and integrating hands-on training with virtual platforms.

Keywords: stakeholders' perception, e-apprenticeship programmes, technical and vocational education and training (TVET)

Introduction

Apprenticeships have traditionally combined on-the-job training and classroom instruction (Emamorose, 2023). This blended approach allowed apprentices to gain hands-on experience while acquiring theoretical knowledge in a structured learning environment. However, this traditional model faces several challenges. One challenge is accessibility. Traditional apprenticeship programmes often require physical presence at specific locations, challenging for individuals who cannot relocate or commute long distances (Emamorose, 2023). Limited capacity and resources can restrict opportunities for aspiring apprentices, particularly in competitive industries. Another challenge is scalability. Traditional programmes are often limited by the availability of skilled mentors, classroom space and resources. Scaling up these programmes to meet demand can be logistically challenging and costly (Billett, 2016). Traditional apprenticeships offer valuable benefits. They provide hands-on experience and mentorship, allowing apprentices to develop

practical skills relevant to their profession. The structured learning environment fosters accountability and discipline, preparing apprentices for workforce demands. Furthermore, traditional apprenticeships help bridge the skills gap and address workforce needs across industries. By combining practical training with theoretical knowledge, these programmes help develop a skilled workforce capable of meeting industry standards and driving economic growth (Billett, 2016). The traditional apprenticeship model is increasingly seen as inadequate for addressing the evolving challenges of technical and vocational education and training (TVET). As work and education transform with technological advancements, apprenticeship programmes must evolve. This evolution is reflected in e-apprenticeship programmes, which use digital technologies to redefine training and improve accessibility. E-apprenticeship programmes offer numerous opportunities. One advantage is the flexibility of training materials. Digital platforms enable apprentices to learn at their pace and adapt the curriculum to their learning styles. This personalised approach can enhance learning outcomes and engagement. E-apprenticeships facilitate remote learning, breaking down geographical barriers and expanding access to training opportunities. This benefits individuals in remote or underserved areas with limited access to quality programmes. By providing online training, e-apprenticeships can reach diverse audiences, promoting inclusivity and equal opportunities. Cost-effectiveness and scalability are additional benefits. Traditional models require significant investment in infrastructure and personnel. E-apprenticeships use digital resources and virtual environments, accommodating larger cohorts without increased costs. This scalability allows organisations to train more individuals simultaneously, addressing skills shortages efficiently (United Nations Conference on Trade and Development, 2019).

E-apprenticeships offer a paradigm shift in learning dynamics, providing flexible, interactive, and personalised educational experiences for learners. Through digital tools like virtual simulations, interactive modules and multimedia resources, e-apprenticeships transcend traditional classroom constraints, enabling anytime, anywhere learning (Smith, 2019). Traditionally, TVET apprenticeships faced challenges including limited accessibility due to geographical constraints and physical presence requirements. Scalability has been an issue, with programmes struggling to accommodate growing demand while maintaining quality. There were also concerns about apprenticeship curricula relevance to evolving industries and technologies. E-apprenticeships address these challenges by harnessing digital technologies and online platforms; they enhance accessibility by removing geographical barriers and allowing remote participation, benefiting those with transportation or scheduling constraints. E-apprenticeships offer scalability, as digital resources can be replicated to accommodate larger learner cohorts while maintaining quality. They enable flexible curriculum delivery, allowing updates to reflect industry trends and technological advances, ensuring apprentices gain relevant skills for their field. This paper explores stakeholder perspectives in TVET regarding apprenticeships, focusing on challenges and leveraging e-apprenticeship programmes. By examining perspectives of educators, employers, policymakers and learners, the research identifies potential concerns proactively. Through stakeholder collaboration, the paper seeks to facilitate e-apprenticeship programme development in TVET (Chinedu-Ali et al., 2020).

Statement of the Problem

The traditional apprenticeship model in TVET faces significant challenges that hinder its effectiveness in meeting the demands of modern industries. These challenges include limited accessibility due to geographical and socio-economic barriers, lack of scalability, inadequate infrastructure and insufficient alignment with evolving industry standards. Traditional programmes often require physical presence, making them inaccessible to individuals in remote areas or those with limited resources to commute or relocate. Additionally, the shortage of skilled mentors and resources further constrains the reach and quality of traditional apprenticeship programmes.

With the rapid advancement of digital technologies, e-apprenticeship programmes have emerged as a potential solution to address these limitations. However, the adoption and implementation of e-apprenticeship initiatives in Nigeria face critical barriers. These include inadequate digital infrastructure, resistance to change among stakeholders, gaps in digital literacy and concerns regarding the effectiveness of virtual training in providing hands-on practical skills.

Furthermore, stakeholders, including trainers, apprentices, employers and policymakers, hold diverse perceptions about the efficacy and potential of e-apprenticeship programmes. These perceptions influence the acceptance and engagement necessary for the successful implementation of such programmes. Without a clear understanding of these perceptions and the challenges they reveal, efforts to modernise TVET through e-apprenticeships may fail to achieve their intended outcomes.

This study sought to address these issues by exploring stakeholders' perceptions, identifying key challenges and proposing actionable strategies to overcome barriers, thus enhancing the adoption and effectiveness of e-apprenticeship programmes in Nigeria's TVET system.

Research Objectives

The objectives of the study were to:

1. explore the perceptions and attitudes of various stakeholders (trainers, apprentices, employers and policymakers) towards the adoption of e-apprenticeship programmes in TVET in Nigeria.
2. identify the key challenges faced by stakeholders in implementing e-apprenticeship programmes.
3. analyse the opportunities and benefits stakeholders associate with e-apprenticeship programmes.
4. examine the factors influencing stakeholders' acceptance and engagement with e-apprenticeship initiatives.
5. propose actionable recommendations for enhancing stakeholder collaboration and the successful adoption of e-apprenticeship programmes.

The research questions of the study were as follows:
1. What are the perceptions and attitudes of stakeholders (trainers, apprentices, employers and policymakers) towards the adoption of e-apprenticeship programmes in TVET in Nigeria?
2. What challenges do stakeholders face in the implementation of e-apprenticeship programmes?
3. What benefits and opportunities do stakeholders associate with e-apprenticeship programmes in TVET?
4. What factors influence stakeholders' acceptance and engagement with e-apprenticeship initiatives?
5. What strategies can be implemented to improve collaboration among stakeholders and support the adoption of e-apprenticeship programmes?

Literature Review

The Challenges of the Practice of Apprenticeship in Nigeria

In Nigeria, apprenticeship faces challenges that hinder its efficacy in developing a skilled labour force. One significant issue lies in the informal nature of apprenticeship arrangements, lacking standardised regulations and oversight (Fajobi et al., 2017). This informality leads to inconsistent training experiences and potential exploitation, making quality control difficult. The lack of formal recognition and certification limits opportunities for apprentices in the job market, constraining career advancement (Relly & Andrea, 2021). Securing apprenticeship placements is an obstacle, driven by limited awareness of benefits, concerns about productivity losses and reluctance to invest in training. This restricts apprenticeship opportunities, hindering skilled labour development. The quality of apprenticeship training varies depending on employer commitment and supervision levels. Inadequate training or exploitative conditions can compromise the apprenticeship experience (Relly & Andrea, 2021). Access to apprenticeships may be unequal, with groups facing barriers based on gender, disability or socio-economic status. Improving access and promoting diversity are crucial for equitable skills development. Regulatory challenges further complicate matters, as inadequate frameworks undermine the consistency and quality of apprenticeship experiences. Although apprenticeships offer valuable hands-on experience, the transition to permanent employment can be challenging in Nigeria's competitive job market. Many apprentices struggle to secure jobs or leverage their experience. Addressing these challenges requires collaboration from policymakers, employers, educational institutions and stakeholders. Formalising programmes, enhancing employer engagement, improving training quality, addressing equity issues, strengthening regulatory frameworks and supporting transition to employment are crucial steps in unlocking apprenticeships' potential to contribute to economic development and enhance Nigeria's workforce skills.

How Technology can help Apprenticeship Training

Technology plays a vital role in modern apprenticeship training, transforming traditional learning approaches and fostering innovation. Online learning platforms provide educational resources, allowing apprentices to access materials flexibly. Immersive technologies like virtual reality and augmented reality provide realistic simulations for hands-on practice, particularly in high-risk industries. Remote collaboration tools enable communication among dispersed apprentices and mentors. Digital skills training prepares apprentices for today's workforce, while e-portfolios showcase their accomplishments (Nore & Lahn, 2014). Mobile learning apps enable access to educational content, enhancing flexibility. Data analytics tools offer insights into learners' progress, enabling personalised learning experiences (Kumar, 2023). Technology integration prepares apprentices for emerging fields like automation and Industry 4.0, ensuring readiness for the digital age. Technology empowers apprenticeship programmes to deliver efficient training that aligns with industry needs and learners alike, adult apprenticeships and apprenticeship pathways for career changers (Relly & Andrea, 2021).

Stakeholders in E-Apprenticeship Programmes

E-apprenticeship programmes engage key stakeholders who contribute expertise and resources to support these initiatives. They are:

- *Employers:* Employers provide on-the-job training, mentorship, and practical experience opportunities. They define required skills for apprenticeship roles, assess progress and sponsor programme participation. Employers benefit by accessing skilled talent and developing workforce capability (Relly & Andrea, 2021).
- *Apprentices:* Apprentices undergo training through online learning activities, tasks, and practical experience. They develop skills, earn qualifications and advance careers through hands-on learning in e-apprenticeship programmes (Relly & Andrea, 2021).
- *Educational institutions and training providers:* These organisations collaborate with employers to deliver educational components. They design online courses, provide materials and assess learning outcomes. They may offer credentials upon programme completion, enhancing apprentices' employability (Relly & Andrea, 2021).
- *Government and regulatory bodies:* These bodies oversee programmes for compliance with laws and quality standards. They provide funding, incentives or accreditation and establish guidelines for administration and certification. Government support promotes growth of e-apprenticeship programmes nationally (Relly & Andrea, 2021).
- *Industry associations and professional organisations:* Industry associations represent specific sectors involved in e-apprenticeship programmes. They collaborate with employers, educational institutions and government agencies to develop industry-specific curriculum standards, training materials and certification requirements. These associations facilitate networking, knowledge sharing and best practice exchange among e-apprenticeship stakeholders (Relly & Andrea, 2021).
- *Technology providers:* Technology providers supply digital infrastructure and tools for e-apprenticeship programmes. This includes learning management systems, virtual reality simulations, videoconferencing platforms and e-learning technologies. They ensure reliability, security and usability of digital platforms, enabling seamless communication and learning experiences for apprentices and stakeholders (Relly & Andrea, 2021).

- *Community and non-profit organisations:* Community and nonprofit organisations support e-apprenticeship programmes through resources, advocacy and outreach services. They offer mentorship, career counselling and financial assistance to underserved individuals seeking to participate in e-apprenticeship initiatives. These partnerships enhance accessibility and social impact within diverse communities (Relly & Andrea, 2021).

Methods

Design

This study used a mixed-method research design, combining qualitative and quantitative approaches. Surveys and semi-structured interviews collected data, including statistical trends and detailed insights.

Population

The target population consisted four primary groups of TVET stakeholders:

- trainers (educators and administrators in TVET institutions)
- apprentices (students and trainees)
- employers (organisations involved in apprenticeship training)
- policymakers (government and regulatory bodies overseeing TVET programmes)

Study Sample

The sample consisted participants from each category:

- trainers: 200 participants, including teachers, professors and administrators from educational institutions
- apprentices: 300 participants from secondary schools, technical colleges, polytechnic and workplaces
- employers: 150 participants from small, medium, and large enterprises across sectors
- policymakers: 100 participants from local, regional, and national government officials

The total sample size was 750 participants, selected through stratified random sampling across regions and demographics.

Sampling Techniques

The study used stratified random sampling to ensure representation from all stakeholder groups. Participants were randomly selected from these strata.

Data Collection Instruments

The primary instruments were:

1. a structured survey questionnaire with Likert scale, multiple-choice, and open-ended questions
2. an interview guide for semi-structured interviews

Validation of Data Collection Instrument

The instruments were validated through:

1. expert review by TVET professionals
2. a pilot test with participants from each stakeholder group (10 from each category), used to refine the instruments

Administration of Data Collection Instruments

The survey was administered online to ensure broad reach. For participants with limited Internet access, paper surveys were distributed and digitised. Semi-structured interviews were conducted virtually or in-person, based on participants' availability. Follow-up communication ensured high response rates. Stakeholders' perceptions were measured using a structured survey with quantitative and qualitative components. Quantitative data were collected through Likert scale items, where respondents rated agreement with statements on a four-point scale from *strongly agree* to *strongly disagree*. Items assessed perceptions of programme effectiveness, accessibility, practical skills, digital infrastructure and regulatory frameworks. Open-ended questions allowed stakeholders to elaborate on experiences, challenges and suggestions. Quantitative responses underwent descriptive and inferential statistics, while qualitative data underwent thematic analysis. This mixed-method approach provided comprehensive understanding of stakeholders' attitudes towards e-apprenticeship programmes.

Results of Stakeholders' Perceptions of E-Apprenticeship Programmes in TVET

Trainers' Responses

- 45% of trainers appreciated the flexibility offered by digital platforms in e-apprenticeship delivery.
- 70% raised concerns about digital infrastructure, particularly issues like poor Internet connectivity, lack of hardware and unstable platforms.
- 55% of trainers were worried about the lack of face-to-face interaction, which they felt hindered relationship-building, real-time guidance and deeper engagement.
- 80% emphasised the need for professional development, specifically in digital teaching methods, instructional design and virtual classroom management.

Apprentices' Responses

- 75% of apprentices reported that they valued the flexibility of e-apprenticeship, which allowed them to learn at their own pace and from any location.
- 65% indicated a lack of hands-on practice as a major issue, making it difficult to develop practical, job-ready skills.
- Technical issues such as software glitches, device compatibility problems and poor Internet affected many apprentices' experiences.
- Despite these issues, 70% of apprentices were satisfied with the theoretical knowledge they acquired during the programme.
- Many advocated for practical components to be added to enhance skills application.

Employers' Responses

- 80% of employers acknowledged that e-apprenticeships provided greater reach and opportunities for continuous learning, especially during disruptions (e.g., pandemics or travel limitations).
- 60% expressed concern over the alignment of programme content with current industry standards, especially in rapidly evolving technical fields.
- 50% were sceptical about the credibility of e-certificates, citing uncertainty about whether virtual training sufficiently demonstrated competency.

Policymakers' Responses

- 85% of policymakers believed e-apprenticeships are essential for modernising vocational education in Nigeria.
- 75% considered these programmes vital for addressing skill gaps and youth unemployment.
- 90% strongly emphasised the need for regulatory frameworks and quality assurance mechanisms, including accreditation, monitoring and uniform standards across institutions.

Cross-Cutting Themes from all Stakeholders

- 70% across all groups emphasised the importance of reliable digital infrastructure, such as Internet, learning platforms and devices.
- 65% stressed the need to integrate hands-on training, perhaps through simulations, hybrid models or partnerships with industries.
- 75% appreciated the flexibility and accessibility of e-learning platforms.
- 85% supported the creation of regulatory policies and national standards for consistency and credibility.
- 60% called for greater collaboration and feedback mechanisms between stakeholders.

Findings on Stakeholders' Perceptions of E-Apprenticeship Programmes in TVET

Mixed Perceptions Among Trainers

- Although some trainers appreciated the flexibility and convenience of e-apprenticeship models, a significant portion were hesitant to fully adopt digital learning due to the inadequate digital infrastructure and lack of face-to-face engagement.
- Their emphasis on the need for professional development suggests a skill gap in effectively delivering digital content, indicating that even willing educators are underprepared for digital transformation in TVET.

Positive but Cautious Enthusiasm from Apprentices

- Apprentices generally viewed e-apprenticeships positively, especially due to the freedom and adaptability of online learning.
- However, their desire for practical, hands-on experience reveals that theoretical knowledge alone is not enough. This shows a gap in curriculum design, where the digital format is not yet capable of fully replicating traditional on-the-job training experiences.
- The technical challenges they faced also point to unequal access to digital tools, a factor that may widen disparities in learning outcomes among apprentices from different socio-economic backgrounds.

Employers See Potential but Demand Industry Relevance

- Employers recognised the potential of e-apprenticeships to expand training access and reduce the cost of in-house development.
- Still, many expressed doubts about the industry relevance of the content and the validity of digital certificates, suggesting a trust gap between training providers and employers.
- These findings indicate the urgent need for collaboration between industry and educators to co-create curriculum and validate competencies.

Policymakers Strongly Support E-Apprenticeship but Warn of Weak Oversight

- Policymakers are clearly supportive of the digital shift, seeing it as key to revamping Nigeria's TVET sector and combating unemployment.
- However, their overwhelming call for regulatory frameworks (90%) indicates that e-apprenticeship growth is currently outpacing policy and quality assurance systems.
- Without clear standards, there is a risk of inconsistencies in quality and credibility, which could harm long-term acceptance and scalability.

Common Priorities Across Stakeholders

- All groups highlighted that success of e-apprenticeships depends on:

- o strong and scalable digital infrastructure
- o blended models that combine theoretical online modules with hands-on training
- o clear national certification and quality assurance frameworks
- o collaborative mechanisms to gather feedback, update curricula and ensure shared ownership

- These findings suggest that technological, pedagogical and policy innovations must occur simultaneously for e-apprenticeships to thrive.

Discussion of Findings

This study provides insights into stakeholders' perceptions of e-apprenticeship programmes in TVET in Nigeria, revealing opportunities and challenges for policy, practice and vocational education. Trainers showed mixed attitudes towards e-apprenticeships. Although 45% appreciated the flexibility of digital platforms, concerns emerged about inadequate infrastructure (70%) and limited face-to-face interaction (55%). Moreover, 80% highlighted the need for professional development to enhance digital teaching skills. These concerns reflect broader issues in existing literature about infrastructure and educator training for digital learning. Apprentices demonstrated positive attitudes, with 75% valuing e-apprenticeships' flexibility. However, 65% reported limitations in hands-on practice. Although theoretical knowledge was well received, apprentices advocated for more practical training components, suggesting a blended approach may better address their needs. Employers identified opportunities in e-apprenticeships, with 80% recognising their potential for accessibility and continuous learning. However, 60% expressed concerns about alignment with industry standards and practical skills development. Additionally, 50% were sceptical about e-certificate credibility, indicating the need for standardised accreditation systems. Policymakers showed strong support, with 85% viewing e-apprenticeships as essential for modernising vocational education. However, 90% highlighted the lack of regulatory frameworks and quality assurance as a critical challenge, emphasising the need for comprehensive policies to guide implementation and evaluation.

Several recurring themes emerged across all stakeholder groups. Inadequate digital infrastructure was identified by 70% of respondents as a major barrier, underscoring the urgent need for investment in reliable Internet connectivity and digital tools. The lack of practical skills integration, noted by 65% of participants, highlights the limitations of current e-apprenticeship models and the need for hybrid learning approaches. On the positive side, 75% of stakeholders appreciated the flexibility and accessibility offered by e-learning platforms, which address geographical and scheduling barriers. Finally, stakeholders emphasised the necessity of robust regulatory frameworks and quality assurance mechanisms, with 85% advocating for policies to standardise and enhance the credibility of e-apprenticeship programmes (Aggarwal & Aggarwal, 2021).
In conclusion, the findings reveal significant potential for e-apprenticeships to address vocational training challenges in Nigeria. However, their success depends on addressing stakeholders' concerns, particularly those related to digital infrastructure, practical skills integration and regulatory frameworks (Relly & Andrew, 2021). By fostering collaboration among stakeholders and investing in necessary resources, e-apprenticeships can transform vocational training, bridge skill gaps and contribute to to economic growth in Nigeria.

Table 1 below shows the breakdown of the quantitative analysis of stakeholders' perceptions on the adoption of e-apprenticeship programmes in Nigeria.

Table 1: Quantitative analysis of stakeholder perceptions on the adoption of e-apprenticeship programmes in Nigeria

Research question	Key findings	Themes	Percentage of respondents
1. What are the perceptions and attitudes of stakeholders (trainers, apprentices, employers and policymakers) towards the adoption of e-apprenticeship programmes in TVET in Nigeria?	- Mixed perceptions: some educators are enthusiastic about the flexibility and accessibility, while others are concerned about the lack of face-to-face interaction. - Concerns about the adequacy of digital infrastructure and resources. - Need for professional development in digital teaching methods.	Positive perception of programme convenience and adaptability, concerns about inadequate resources and Internet access and the need for training in digital teaching methods.	Stakeholders exhibit mixed perceptions, with enthusiasm for flexibility (60%) but concerns about insufficient face-to-face interaction (40%). Key concerns include the adequacy of digital infrastructure (70%) and the need for professional development in digital teaching (80%).
2. What challenges do stakeholders face in the implementation of e-apprenticeship programmes?	- Challenges include aligning e-programmes with industry standards and ensuring practical skills acquisition. - Concerns about the credibility and recognition of e-certificates.	Difficulty ensuring adequate hands-on training in an e-learning environment, concerns about the acceptance and validation of e-certificates, and challenges with insufficient resources to support effective e-apprenticeship programmes.	Major challenges involve aligning e-programmes with industry standards (60%) and ensuring the credibility of e-certificates (50%).
3. What benefits and opportunities do stakeholders associate with e-apprenticeship programmes in TVET?	- Opportunities include wider reach and potential for continuous learning. - Positive experiences related to flexibility and convenience. - Generally satisfied with the knowledge gained but desire more practical components.	Ability to extend educational access to diverse audiences and promote lifelong learning, valued for the ease of learning at one's own pace, desire for enhanced practical components to complement theoretical knowledge.	Benefits include a wider reach (80%), flexibility and convenience. Stakeholders appreciate knowledge gained but emphasise a need for more practical components (70%).
4. What factors influence stakeholders' acceptance and engagement with e-	- Stakeholders see e-apprenticeships as crucial for modernising vocational education and training.	Programmes seen as essential for bridging skills gaps and reducing unemployment, emphasis on policies and quality	E-apprenticeships are seen as essential for modernising vocational education (85%) and

Research question	Key findings	Themes	Percentage of respondents
apprenticeship initiatives?	- Support for e-apprenticeships as a way to address skills gaps and unemployment. - Emphasis on the need for regulatory frameworks and quality assurance.	assurance to build programme credibility.	addressing skills gaps (75%). Stakeholders highlight the importance of regulatory frameworks and quality assurance (90%).
5. What strategies can be implemented to improve collaboration among stakeholders and support the adoption of e-apprenticeship programmes?	- Success factors: robust digital infrastructure, stakeholder collaboration and continuous feedback mechanisms. - Barriers: inadequate infrastructure, resistance to change and lack of digital literacy among some stakeholders.	Importance of robust and reliable technology infrastructure, stakeholder involvement, continuous improvement processes, oovercoming reluctance to adopt e-learning and addressing digital literacy gaps.	70% identify digital infrastructure as a success factor. 60% highlight stakeholder collaboration. 55% identify continuous feedback mechanisms. 50% note inadequate infrastructure as a barrier. 45% resistance to change. 40% lack of digital literacy.

Conclusion

The study underscores the transformative potential of e-apprenticeship programmes in addressing the challenges of traditional vocational training models within Nigeria's TVET framework. Although stakeholders recognise the benefits of flexibility, accessibility and scalability, concerns regarding digital infrastructure, practical skills integration and regulatory frameworks highlight significant barriers to effective implementation. The findings emphasise the importance of fostering collaboration among educators, employers, policymakers and technology providers to bridge these gaps.

To fully leverage e-apprenticeships, concerted efforts must focus on enhancing digital literacy, ensuring equitable access to resources and integrating hands-on training with virtual platforms. Robust quality assurance mechanisms and standardised certification processes are critical for gaining employer confidence and ensuring programme credibility. By addressing these challenges, e-apprenticeships have the capacity to revolutionise TVET, equipping learners with relevant skills, bridging workforce gaps and contributing to sustainable economic growth in Nigeria. This study offers a roadmap for future research and policy development, paving the way for a more inclusive and dynamic approach to vocational education.

Recommendations for Implementation

To address the challenges associated with the adoption of e-apprenticeship programmes in TVET, the following recommendations are proposed:

1. Investment in technological infrastructure:

   - Enhance access to high-speed Internet and provision of compatible digital devices, particularly in underserved and rural areas.
   - Establish centralised digital hubs for apprenticeships to ensure equitable access to necessary resources.

2. Educator training and professional development:

   - Conduct regular workshops and training sessions to improve educators' proficiency in online teaching methodologies.
   - Introduce certification programmes for digital teaching skills to standardise competencies across the sector.

3. Quality assurance and curriculum relevance:

   - Develop robust frameworks for evaluating and updating e-apprenticeship content to align with current industry standards and technological advancements.
   - Collaborate with industry stakeholders to ensure the inclusion of practical, hands-on training modules within the digital curriculum.

4. Addressing the digital divide:

   - Implement programmes to provide subsidised or free access to digital tools and broadband for disadvantaged communities.
   - Launch awareness campaigns to highlight the benefits of e-apprenticeships and drive inclusivity.
   - Enhancing stakeholder collaboration:
   - Foster partnerships among educational institutions, employers, policymakers and community organisations to promote shared responsibility and resource optimisation.
   - Establish feedback mechanisms to continuously refine e-apprenticeship strategies based on stakeholder inputs.

5. Regulatory frameworks and certification standards:

   - Introduce comprehensive policies to regulate and standardise e-apprenticeship programmes.
   - Create a nationally recognised certification system to improve the credibility and acceptance of e-apprenticeship qualifications.
   - Integrating flexibility and engagement in learning:

- Incorporate interactive and collaborative tools, such as virtual labs, peer-to-peer forums and real-time mentor interactions, to enhance learning experiences.
- Allow apprentices to customise learning pathways that suit their individual schedules and career aspirations.

6. Monitoring and continuous improvement:

- Set up monitoring systems to assess the effectiveness of e-apprenticeship initiatives regularly.
- Utilise data analytics to track learner progress and identify areas for programme improvement.

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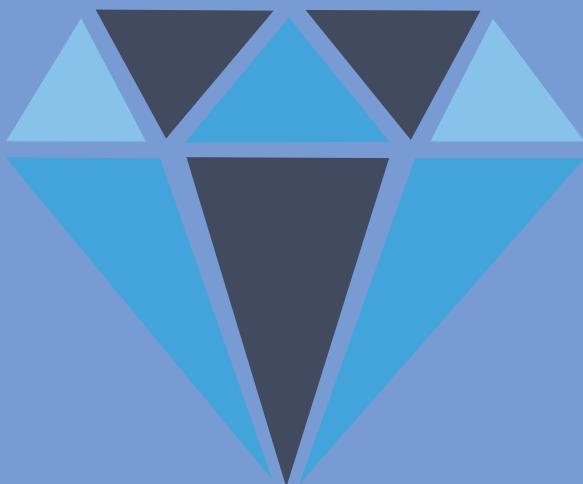
Towards a Commonwealth Credit Transfer Framework for Micro-Credentials: Advancing Education for a More Resilient Workforce

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Abstract

Micro-credentials present potential affordances as increased needs arise in Commonwealth countries and beyond for the mobility of qualifications and the integration of multiple short-term learning experiences. While economies undergo rapid digital transformation, micro-credentials have emerged as a flexible and scalable solution to bridge skills gaps and promote lifelong learning. This paper presents the Commonwealth of Learning's initiative to develop a Commonwealth credit transfer framework for micro-credentials, a standardised and inclusively developed mechanism to enhance the recognition and portability of micro-credentials within and potentially between member nations. This initiative is grounded in principles of open education and equitable access, and the envisaged framework aims to support workforce resilience and sustainable economic development. The project builds on research involving a structured review of micro-credential policies, technologies and national practices. Regional consultations with ministries, qualification authorities, and higher education institutions further shape the framework's design. This paper reports on the consultative development process and highlights key research findings, challenges in implementation and strategic recommendations to ensure that micro-credentials contribute effectively to sustainable and inclusive economic development within Commonwealth countries.

Keywords: micro-credentials, credit transfer, Commonwealth credit transfer framework

Introduction

The nature of jobs in the digital environment is changing. Traditional as well as jobs related to technology, such as coding, are being challenged by the emergence of generative artificial intelligence in its various forms (World Economic Forum, 2023). The socio-economic environment, including that of the Commonwealth countries, demands new ways for human capital development for economic growth. The formal education system needs a new impetus to provide quicker ways to gain knowledge and skills that are suitable for employment. The technological advancement has also brought in obsolescence in the job environment, requiring continuous training and retraining of employees to improve productivity. Online and blended learning opportunities have emerged in supporting such in-demand learning in the workplace and for upgrading skills for job change and growth (OECD, 2021). However, in a globalised world, qualifications and training certificates gained in one country are not always recognised in another when people migrate (Damelang et al., 2020). Sometimes, even in the same country, qualifications gained from one institution are not recognised by other institutions. Such scenarios are critical for short-term training offered and skills-based vocational education and training. As more and more jobs require licensing and certification, there is also a need to recognise on-the-job experiences and skills gathered through self-learning by

providing them opportunities to prove and verify the knowledge and skills gained (Ferguson & Whitelock, 2024). These needs and developments require structural and systemic changes in the education and training systems around the world, and more specifically in the Commonwealth.

Recognising the importance of working towards such reforms, the Commonwealth of Learning (COL) team started working on a project to mainstream micro-credentials in the Commonwealth countries. Micro-credentials are defined as "a digital certification such as a 'digital badge' that provides valid evidence of achievement of specific knowledge, skills or competences after going through a structured learning experience. Micro-credentials can be shared on social media and verified by others, including employers" (COL, 2023, p. 4). This project focuses on the development of a credit-transfer framework for micro-credentials (cf. COL, 2025). Such an activity is aligned with the mandate of COL. According to the *Memorandum of Understanding* on COL (Commonwealth Governments, 2014), COL aims to "create and widen access to opportunities for learning, by promoting co-operation between universities, colleges and other educational institutions throughout the Commonwealth, making use of the potential offered by distance education and by the application of communication technologies to education" (p. 2). Furthermore, one of the key objectives of COL is to specifically "establishing and maintaining procedures for the recognition of academic credit" (p. 3).

Recognition of qualifications in higher education has always been a matter of concern for UNESCO Member States, which has now adopted a *Global Convention on the Recognition of Qualifications concerning Higher Education* (UNESCO, 2023). The convention provides a framework for international academic mobility and allows for fair and transparent inter-institutional qualification evaluations. The convention not only supports processes around qualification recognition and recording but it also encourages the use of technology for easy access to information related to qualifications. Especially with the emergence of unbundling and the progress of micro-credentials in many countries, there is a need to develop a common credit transfer framework to provide a common language of communication for countries, education and training providers and learners. This paper is focused on sharing the work in progress by discussing the activities, experiences and challenges that need to be addressed while implementing a common Commonwealth credit transfer framework for micro-credentials.

This paper is organised to provide an overview of the consultative and evidence-informed approach to the development of the framework. The sections in the paper cover a short overview of pertinent theoretical and conceptual aspects and literature, followed by an overview of the regional consultations and relevant challenges and implications. The paper concludes with a reflection towards a Commonwealth credit transfer framework as well as some practical recommendations.

Theoretical and Conceptual Framework

For this paper, the affordances of micro-credentials in terms of supporting lifelong learning and advancing employability towards workforce resilience are relevant. From the literature, it is evident that micro-credentials have the potential to bridge the gap between education and industry demands (Gamage & Dehideniya, 2025). Micro-credentials also have the potential to recognise

achievement in terms of learning, not only through traditional avenues but also through alternative pathways, recognising lifelong learning (Mitchell et al., 2025).

Micro-credentials are conceptualised as flexible, modular learning units that offer transparent, learner-centred recognition of skills, knowledge and competences aligned with labour market needs (Ferguson & Whitelock, 2024). They are positioned at the intersection of formal and non-formal learning systems and serve as instruments for lifelong learning, upskilling and reskilling. In advancing a Commonwealth-wide framework, the recognition, validation and portability of micro-credentials must be situated within established qualifications frameworks and credit transfer systems. The envisaged framework rests conceptually on four interrelated pillars: (i) quality assurance, ensuring rigour and comparability across jurisdictions; (ii) transparency, supported by metadata standards and digital credentials; (iii) alignment with national qualifications frameworks, enabling stackability and articulation; and (iv) stakeholder engagement, involving higher education institutions, employers and learners. Integrating micro-credentials into higher education should not dilute academic standards but enhance them through flexible pathways and targeted outcomes (McGreal & Olcott, 2022).

Literature Review

The global acceleration of micro-credentials as an alternative and complementary mode of higher education is driven by pressing demands for agility in upskilling and reskilling the workforce (Gamage & Dehideniya, 2025; Peters et al., 2025). Within the Commonwealth context, where economic diversity, labour mobility and educational access vary significantly across member states, micro-credentials offer both opportunities and challenges (Ferguson & Whitelock, 2024). A critical examination of recent scholarly and policy-oriented literature reveals a growing consensus on the need for standardisation, quality assurance and the integration of micro-credentials into existing qualifications frameworks to support lifelong learning and workforce resilience.

Micro-credentials are defined as short, competency-based learning achievements certifying specific skills or knowledge. Definitions tend to converge around several shared characteristics: stackability, assessment against clear standards and alignment with labour market needs (McGreal & Olcott, 2022). Although some scholars have argued that micro-credentials present a strategic reset for universities to remain relevant and responsive (McGreal & Olcott, 2022), others have cautioned against their potential to fragment learning and perpetuate precarious labour market dynamics (Wheelahan & Moodie, 2022).

Globally, efforts to integrate micro-credentials into qualifications frameworks remain uneven. For instance, in Europe and Australia, national qualifications frameworks increasingly accommodate micro-credentials as part of formal higher education (McGreal & Olcott, 2022; Tammeleht & Rajando, 2024). In contrast, jurisdictions like Canada and the United States of America often separate non-credit micro-credentials from formal credit-bearing programmes, presenting challenges for recognition and transferability. The UNESCO chairs underscored the importance of standardisation for facilitating credit transfer and ensuring cross-border recognition (McGreal et al., 2022). They advocated for micro-credentials embedded into institutional systems and national policies to support Sustainable Development Goal 4 on inclusive and equitable quality education

(McGreal et al., 2022). A key insight from this work is the need to reconcile non-formal and formal learning, particularly in cross-institutional and cross-national contexts. Miao et al. (2023) have shown that student adoption of micro-credentials depends significantly on perceived ease of use, motivation and behavioural intent — factors that influence engagement and completion rates. This highlights the need for learner-centric design that accommodates diverse digital competencies and learning needs.

Establishing a credit transfer framework within the Commonwealth requires addressing disparities in national policies, digital infrastructures and pedagogical standards. Drawing on the European experience, the adoption of shared quality assurance principles, recognition protocols and digital verification technologies could support the interoperability of micro-credentials. Such a framework should also recognise the diversity of learning pathways and labour market contexts across Commonwealth countries, ensuring that micro-credentials contribute meaningfully to workforce development without fragmenting educational equity.

Activities and Processes

The overarching objective of the initiative is to develop a harmonised, yet adaptable, framework that enables the recognition and transferability of micro-credentials across Commonwealth Member States. This work builds upon existing international practices and frameworks in the micro-credentialing landscape and seeks to contextualise them within the unique educational and policy environments of the Commonwealth. For the development of the micro-credential framework, we have adopted three key approaches: (i) a desktop review of the concept and practices of micro-credentials around the world with a focus on policy in Commonwealth countries; (ii) a survey of governments and stakeholders to gather information on the current practice and their perceptions about micro-credentials; and (iii) regional consultations to include the voices of the key stakeholders, especially government ministries and agencies who could further implement micro-credentials in the Commonwealth countries.

By the time of the Eleventh Pan-Commonwealth Forum on Open Learning, the desktop reviews and the surveys and the five regional consultations (covering all the regions of the Commonwealth) had been finished (COL, 2025). The regional consultation meetings were convened to support awareness-raising, disseminate preliminary findings, investigate existing credit transfer systems and, crucially, collect stakeholder feedback to refine the framework. These engagements also aimed to identify regional and national priorities and stimulate the development of communities of practice to ensure ongoing collaboration in the implementation and evolution of micro-credentials. Furthermore, they provided an opportunity to discuss the establishment of regional communities of practice to sustain engagement and foster shared learning.

Collectively, the regional consultations engaged 181 senior representatives from 47 Commonwealth countries, encompassing a broad cross-section of regions. Attendance at these meetings was by invitation only, ensuring participation by individuals occupying strategic roles in policy formulation, education delivery, quality assurance and credential recognition. Delegates included officials from ministries of higher education, national quality assurance bodies, examination councils and higher education authorities, as well as representatives of postsecondary

institutions. In this paper, a qualitative approach was followed to report some key findings and discussions from the regional consultations held so far to provide an update on the work in progress. To this end, reports from the regional consultation meetings were analysed inductively to present the common and cross-cutting themes.

Findings and Discussion

The formulation of a Commonwealth-wide framework for micro-credential credit transfer faces a range of multidimensional challenges that must be addressed to ensure effective policy implementation, stakeholder alignment and institutional readiness. Some of the key issues that emerged during the stakeholder engagements are discussed below.

Defining Micro-credentials

One of the most pressing issues is the lack of a shared understanding and consistent definition of micro-credentials across Commonwealth countries. Divergent interpretations hinder cross-border recognition and comparability, impeding learner mobility and institutional collaboration. Participants expressed the need for a harmonised taxonomy that clearly delineates characteristics such as stackability, modularity and alignment with labour market needs. The absence of standardised credit definitions and transfer mechanisms further complicates efforts to achieve equivalency and coherence across educational jurisdictions. The use of micro-credentials as synonymous with short courses vs the credential as the qualification remains a point for further discussions. Practice shows the usage of the term in both contexts.

National and Regional Qualifications Framework

Another significant challenge concerns the integration of micro-credentials within national and regional qualifications frameworks. A notable disparity exists in the readiness and adaptability of national qualifications frameworks to incorporate non-traditional, short cycle learning experiences. Without formal alignment, micro-credentials risk being perceived as inferior or supplementary rather than complementary to existing qualifications. This integration is further hindered by fragmented regulatory landscapes, where rigid or underdeveloped national policies stifle innovation and transnational interoperability. Several participants noted that overregulation, particularly without corresponding quality assurance measures, may restrict the growth of micro-credentials in both vocational and higher education sectors.

Quality Assurance

The establishment of robust and sustainable quality assurance systems emerged as a third critical concern. Trust in micro-credentials is contingent upon transparent and consistent quality benchmarks embedded in their design, delivery and recognition. However, not all Commonwealth countries possess the institutional infrastructure to validate such credentials independently. This gap is exacerbated by the absence of centralised or federated accreditation registries and independent verification centres, which are vital for ensuring transparency, cross-border

comparability and employer confidence. Stakeholders underscored the importance of prioritising quality assurance over regulation to enhance credibility without constraining innovation.

Collaboration

Closely related to quality assurance is the challenge of building institutional trust and collaboration. Effective credit transfer relies on mutual recognition and co-operation among educational institutions, quality assurance bodies, and government agencies. Yet, silos and the lack of transparent protocols for self-assessment and benchmarking inhibit such co-operation. This lack of trust is particularly detrimental in fostering articulation pathways and stackable credential systems that span multiple countries and education sectors.

Sustainability

Financial sustainability represents another significant barrier. Many institutions lack the adequate funding models necessary to support the design, implementation and maintenance of micro-credential programmes. Overreliance on government funding may prove unsustainable, particularly in resource-constrained settings. Participants advocated for the development of blended financing models — incorporating public-private partnerships, employer co-contributions, and grant-based funding — to ensure accessibility and long-term viability. The need for affordable pricing structures was also highlighted as essential to promote equitable access for marginalised learners.

Awareness and Capacity Building

There is a widespread lack of awareness regarding the value, structure, and utility of micro-credentials. This knowledge gap is prevalent not only among learners but also within educational institutions and industry stakeholders. As a result, uptake remains limited and often fragmented. The need for extensive capacity-building initiatives, including faculty training, cross-sector workshops and the dissemination of practical implementation toolkits, was identified as fundamental to institutional readiness.

Technology Standards

Finally, the development of common micro-credential metadata standards and interoperable digital ecosystems to support issuance, verification and record-keeping of micro-credentials presents a complex technological challenge. Ensuring compatibility across platforms and countries, while adhering to open standards, privacy regulations and digital identity protocols, requires significant investment and policy co-ordination.

Collectively, these challenges highlight the need for a carefully phased, context-sensitive approach to implementation. If appropriately addressed, the Commonwealth micro-credentials framework could serve as a powerful instrument for promoting lifelong learning, workforce readiness, and educational inclusion across member states.

Recommendations

An important recommendation that emerged from these consultations was the establishment of a Commonwealth-wide micro-credential registry. Such a registry should be closely aligned with existing digital identity systems to ensure interoperability and scalability. Further, a Commonwealth-wide metadata-harvesting system was proposed to improve discoverability and interoperability of micro-credentials. In addition, participants called for the creation of dedicated regional communities of practice to foster sustained collaboration and shared learning. The significance of drawing upon existing national and regional initiatives was acknowledged, with many noting that these could serve as a foundation for the advancement of micro-credential frameworks.

Discussions also underscored the necessity of a unified digital infrastructure capable of supporting the lifecycle of micro-credentials. In particular, delegates proposed the development of a centralised, accessible repository to be utilised by institutions across Commonwealth member states. There was widespread interest in credentialing platforms, with participants advocating for targeted capacity-building initiatives to enhance understanding and implementation across diverse contexts.

In several regions, an aspirational and regionally coherent vision for micro-credentials is already beginning to take shape. These credentials are increasingly recognised as a strategic mechanism for fostering a more agile, inclusive and future-oriented workforce. Delegates collectively asserted that the framework should transcend its technical function, instead evolving into a transformative tool that promotes equitable access, supports learner mobility and facilitates lifelong learning throughout personal and professional trajectories.

The consultations also highlighted the importance of co-ordinated multi-stakeholder engagement. Delegates stressed the need for greater involvement of national training authorities, ministries of education, higher education institutions and employers. Such collaboration was deemed essential to ensure that emerging strategies are both contextually relevant and capable of scaling effectively.

Institutional actors and relevant agencies are already re-evaluating their existing standards and frameworks in many contexts. A growing number are committing to redesigning programmes in ways that accommodate flexible, modular and competency-based learning formats that are more responsive to labour market shifts. Delegates also advocated for the inclusion of micro-credentials as valid pathways within both secondary and tertiary education systems, with the aim of equipping learners and educators to respond dynamically to evolving economic and societal needs.

The consultations made it clear that the success of the framework is contingent upon a robust national or regional communication strategy. This should include public briefings, interactive webinars, and active engagement from designated champions. Participants also emphasised the need for clearly articulated policy and regulatory guidance, particularly regarding quality assurance and definitions of key terms such as credits and credentials.

Implications for a Commonwealth Credit Transfer Framework for Micro-credentials

The regional consultations made clear that advancing a Commonwealth credit transfer framework for micro-credentials requires greater coherence in how micro-credentials are defined and recognised across national and regional systems. This reflects concerns raised by McGreal and Olcott (2022), who cautioned that without shared frameworks, micro-credentials risk fragmentation and limited institutional uptake.

Relatedly, the framework's potential to support workforce resilience depends on integrating micro-credentials into both formal, informal and non-formal learning systems. Delegates from Southern Africa and the Pacific emphasised that flexible, stackable learning is vital for transitioning workers across sectors, especially in response to automation and climate adaptation. Mitchell et al. (2025) have supported this perspective, noting that micro-credentials allow individuals to upskill more quickly than through traditional degrees. However, many countries face regulatory rigidity that hinders this integration. If the framework provides clear pathways for alignment with national qualification structures, it can help institutions and governments adopt micro-credentials without needing to overhaul existing systems.

A further implication concerns the need for quality assurance mechanisms that can foster trust while allowing innovation. The consultations revealed support for a dual approach: allowing national quality assurance bodies to allow recognised accredited providers to offer micro-credentials and focus on emerging providers to align micro-credential quality benchmarks with national standards.

There is also strong potential for micro-credentials to expand inclusion and social mobility, if equity is embedded into their design. In the Asia and Southern Africa consultations, participants highlighted the value of recognising informal and experiential learning for marginalised groups, including women and rural learners. Ferguson and Whitelock (2024) have affirmed that transparent, learner-centred micro-credentials can democratise access and foster agency. However, insufficient infrastructure and limited awareness continue to constrain these possibilities. The framework must promote inclusive practices such as recognition of prior learning, flexible entry points and low-cost credentialing models to prevent the deepening of educational inequality.

Another important consideration is the digital infrastructure required for scalable implementation. While countries like Australia and Malaysia are advancing in digital credentialing, others lack the systems to issue, verify and store micro-credentials. Miao et al. (2023) found that user adoption depends significantly on ease of use and digital access. Stakeholders across all five consultations emphasised the need for interoperable platforms, metadata standards, and capacity building. The framework should advocate for digital ecosystems that are standards-based and open, enabling learner mobility and credential portability.

Finally, the consultations underscored a broader institutional shift. Delegates emphasised the need for deeper collaboration across ministries, institutions, and employers to ensure micro-credentials become a credible and scalable part of national systems. Tammeleht and Rajando (2024) have

argued that institutional and cross-sector alignment is essential to ensuring sustainable learning outcomes. Many countries are already experimenting with modular learning formats, and the framework can serve as a scaffold for supporting these innovations and encouraging shared governance models.

Towards a Commonwealth Credit Transfer Framework

The Commonwealth credit transfer framework had to be based on certain principles for its acceptability in the Commonwealth countries, and possible adoption. Therefore, the following proposed principles are articulated based on the discussions with stakeholders:

- *Quality assurance*: Quality of the micro-credentials offered by any recognised provider must be ensured. It must be responsibility of the national regulator to develop mechanisms to ensure quality of the qualifications issued.
- *Modality neutral*: The provision of training offered for micro-credentials is modality neutral from the perspective of assessing the learning outcomes. The mode of training should not be used for exclusion, but rather for demonstrating the knowledge, skills and competencies that become the criteria for credentialing.
- *Forms of learning*: All forms of learning, including formal, informal and non-formal learning, must be included for certification. In this context, the recognition of prior or experiential learning is important for micro-credentials.
- *Flexibility and stackability*: Micro-credentials offered may also be available for stacking to gain higher degrees or diplomas over a period of time in a flexible manner.
- *Privacy*: Considering the credentials earned will be digital, ensuring the privacy of the personal information of the learners is crucial. This means the learners must have the right to share the information they want with prospective employers.
- *Transparency*: The process of micro-credential delivery, assessment and quality assurance must follow a transparent process to ensure trust in the system.
- *Adoption of national and international standards*: The qualifications and credentials offered must follow international best practices, and available standards to offer interoperability and mobility of the qualifications. It is also important that the qualifications are also developed according to the needs and requirements of the industry to ensure employability.
- *Sharing of information*: Countries will agree to share information about micro-credentials and co-operate to adopt the framework in the true spirit of Commonwealth co-operation. This would require agreement on a standard set of information to be available through an online portal.
- *Non-binding*: The framework developed would be voluntary in nature for the Commonwealth countries to adopt. They will have opportunity to modify the provisions of the framework to adopt according to their country context.

While these basic principles were adopted in developing the framework, based on the concerns raised by the stakeholders, the framework also addressed the following issues:

- *Definitions*: The framework defines various terminologies, such as credit, credentials, credit transfer and associated terms that usually appear in the discourse of micro-credentials. Our

approach has been to provide definitions of the terms, and, where possible, provide explanatory notes to help countries and institutions align their definitions according to a wider acceptable meaning of the terms.

- *Process of quality assurance*: As expressed by the stakeholders, we discuss the process of quality assurance in-depth to provide some sort of direction, without being biased. The objective is to allow national quality assurance agencies to align their systems and processes easily to adopt the micro-credentials framework without substantive changes to their existing systems and processes.
- *Technologies and metadata*: As micro-credentials are digital in nature, it is not implied that all learning will be offered in a digital environment. The credential delivery system will be dependent on a credential management system and a credential discovery system. Both these would require substantial technology integration into existing processes. While the micro-credential framework covers the issues around technologies, it focuses only on the metadata and standards to be adopted to make the credentials interoperable for mobility of credentials, ensuring safety and privacy.

Within this context, the framework has since been published as the *Commonwealth Micro-credential Framework for Lifelong Learning* as part of the *Towards a Micro-credential Framework* for the Commonwealth report (COL, 2025).

Conclusion

In this paper, we discussed the ongoing discourse on micro-credentials by presenting insights from a consultative, evidence-informed approach towards the development of a common Commonwealth credit transfer framework. The discussions underscore the transformative potential of micro-credentials in enhancing the flexibility, relevance and inclusivity of education systems across the Commonwealth. By drawing on open education principles and aligning with sustainable development objectives, the framework aims to strengthen workforce resilience and promote equitable lifelong learning opportunities.

The stakeholder engagement across the regional consultations highlighted the necessity for harmonised definitions, interoperable digital infrastructures and robust quality assurance mechanisms. These inputs demonstrate both the urgency and the feasibility of establishing a unified credit transfer system that accommodates national diversity while enabling cross-border mobility. Implications for practice include the integration of micro-credentials within formal and informal learning systems, the strategic use of metadata standards and the embedding of modular credentials into national qualification frameworks. Future research should explore the operationalisation of the framework within country-specific contexts, assess the impact on learner outcomes, and evaluate institutional readiness.

Ultimately, the success of this initiative lies in its ability to foster a resilient, learner-centred and co-operative Commonwealth learning ecosystem. It calls for shared commitment, sustained dialogue and iterative refinement as education systems evolve in response to emerging global challenges.

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Collaborative Approaches in Open Education: Leveraging OER Creation, Adaptation and use for Sustainable Development

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Abstract

Many African education systems face scarcity of teaching and learning materials; this is compounded by a lack of localised and educator capacity. To close this gap, this study explored how collaborative approaches aimed at participation in open educational resources (OER) creation, adaptation and use can address these challenges within initial teacher education programmes across five African institutions. Through a qualitative research approach, focus group discussions revealed that institutional support, peer collaboration and contextual adaptation are critical to overcoming barriers to OER adoption. Activity theory was adopted as a lens for this study. Findings indicate that collaborating teacher educators recognise the benefits of OER, successful implementation requires a bottom-up approach, where teachers co-develop resources suited to local needs. Although grounded in a limited context, the findings offer in-depth insights into how collaboration can catalyse systemic change, even in resource-constrained environments. Evidence shows that training and advocacy are essential in equipping educators with the skills and confidence to engage in OER practices. Collaborative networks, institutional policies and partnerships with service providers (e.g., instructional designers) can further facilitate the accessibility and sustainability of OER. This paper argues that by fostering a culture of shared knowledge, OER adoption can contribute to building resilient education systems that support sustainable economic development. The study underscores that sustained OER adoption requires flexible funding models, diverse educator involvement, policy guidance and iterative reflection. By embedding collaboration as a systemic process, the paper argues for scalable strategies that can enhance resilience and equity in African teacher education.

Keywords: collaboration, open educational resources (OER), teacher education, sustainable development, institutional support

Introduction

Open educational resources (OER) have emerged as a transformative tool in education, offering opportunities for cost-effective, accessible and adaptable learning materials (UNESCO, 2019). In the African context, particularly within initial teacher education (ITE), OER can play a pivotal role in enhancing pedagogical practices, particularly in resource-constrained settings such as those found in many African institutions. The successful adoption and sustainability of OER depend on collaborative efforts among educators, institutional support and contextual adaptation (Cox & Trotter, 2016). However, the potential of OER remains underutilised due to barriers such as limited institutional support, lack of skills and the absence of localised resources (Cox & Trotter, 2016). This study examined the role of collaboration in the creation, adaptation and use of OER among teacher

educators across multiple African institutions, with a focus on overcoming barriers to adoption and fostering sustainable educational development.

Framed through Engeström's (2001) lens, this study explored how institutional policies, peer collaboration and partnerships with service providers (e.g., instructional designers) influence OER adoption. Although the scope is context-specific, the study offers insights into how localised collaborative networks, shared knowledge, participatory processes and systemic contradictions can contribute to sustainable OER practices that promote the sustainable development goal for education (SDG4; United Nations, 2015).

This paper is structured as follows: First, it reviews the literature on OER adoption in teacher education, emphasising collaborative models and challenges in African contexts. Next, it outlines the research methodology, including the use of activity theory (AT; Engeström, 2001) as an analytical framework. The findings are then presented, highlighting key themes such as institutional support, peer collaboration and the role of advocacy in OER sustainability. Finally, the paper discusses implications for policy and practice, advocating for stronger institutional frameworks and cross-institutional partnerships to advance OER in African higher education. In doing so, it contributes to the discourse on sustainable educational transformation through collaborative knowledge building — within and beyond the OER community.

Background

The project emerged as a strategic response to a University Capacity Development Programme (UCDP) initiative (2022–2024) focused on the scholarship of teaching and learning in African higher education. At its inception, the project was structured around collaborative development goals, requiring each participating institution and individual to take on defined roles within a distributed team. Initially, three South African institutions collaborated with a shared objective: to design an OER module aimed at training postgraduate student teachers. These roles spanned data analysis, module design, advocacy, editing, evaluation and dissemination.

As collaboration progressed, the need for expanded expertise, particularly in OER design and pedagogical localisation, prompted a restructuring of the team. This resulted in the recruitment of additional specialists from three more African institutions, increasing membership from five to ten and extending the network to six institutions. This phase marked a shift from a static team structure to a dynamic, skills-driven composition aligned with project complexity.

A significant turning point occurred when initial UCDP funding was reduced. Rather than halting momentum, this challenge triggered an adaptive funding-seeking process. Drawing on its collaborative strength, the team identified and secured an alternative sponsor, Commonwealth of Learning, Canada., which introduced revised expectations, including a broader scope expanding from a single OER module to five, and integrating baseline assessments, capacity-building workshops and policy development. This funding shift catalysed a second strategic pivot: the target audience changed from in-service teachers to teacher educators, based on insights from the Department of Higher Education and Training, which highlighted the need to first upskill those responsible for training others.

These shifts illustrate how collaboration in this project evolved through iterative processes of reflection, restructuring and role reallocation. Institutional and Department of Education engagement increased as the project gained visibility, with national departments expressing interest in future partnerships on policy, awareness and capacity building. The development process also became more formalised, supported by templates and quality standards introduced by sponsors to guide module development and documentation. The collaborative structure, supported by regular meetings, iterative review and co-accountability, emerged as a cornerstone for achieving deliverables, sustaining momentum and navigating systemic constraints.

In summary, the project followed an iterative development process. In the initial phase (2022), the project team was formed based on institutional partnerships and allocated roles according to project deliverables. Following the reduction in UCDP funding, the team underwent a strategic restructuring process, identifying new sponsors and adjusting deliverables to align with updated funding conditions. This evolution was not incidental but reflected an adaptive, process-oriented approach to collaboration and project management.

Literature Review

The emergence of OER has introduced transformative possibilities in the educational landscape, especially in resource-constrained contexts such as those found in Africa. Central to these developments is the role of collaboration among educators, institutions and support stakeholders in the creation, adaptation and meaningful use of OER. Increasingly, literature supports the view that collaboration is not only a practical strategy but a foundational condition for SDGs (Jensen & Kimmons, 2022; Wiley & Hilton, 2018), particularly within ITE programmes in the Global South (Luo et al., 2010).

Collaborative engagement in OER not only promotes access to knowledge but also fosters empowerment through localised adaptation and reuse (Wiley & Hilton, 2018). In teacher education, co-creation of content among practitioners has been shown to enhance pedagogical inclusivity and cultural alignment, particularly when educators co-develop content that reflects their sociocultural contexts (Hodgkinson-Williams & Trotter, 2018). This approach also supports knowledge ownership, a key factor in sustained OER use and integration. However, research also indicates that barriers to OER adoption such as limited digital skills, lack of confidence and absence of institutional support — must be addressed through structured collaboration and peer mentoring (Cox & Trotter, 2016; de los Arcos et al., 2016).

Beyond OER-specific literature, broader theories of collaboration provide additional insight into the value of sustained, community-based engagement in education. For example, Wenger's (1998) concept of communities of practice emphasises how professional knowledge is constructed through shared practice, mutual engagement and joint enterprise. Similarly, Adams et al. (2008) highlight how interdisciplinary collaboration can unlock innovation, especially in projects that require diverse expertise, such as instructional design, digital literacy and policy negotiation. These perspectives complement OER literature by positioning collaboration as a dynamic and

developmental process rather than a fixed structure capable of responding to evolving institutional needs.

These frameworks align well with AT, which conceptualises human activity as mediated by tools, rules, communities and division of labour (Engeström, 2001). This lens is especially useful in mapping how collaborative OER initiatives emerge, adapt and scale in response to system-wide tensions. For example, contradictions within an activity system such as between institutional policy and teacher readiness can lead to expansive learning and innovation (Engeström, 1987). Collaborative networks thus serve as catalysts not only for resource development but also for systems change.

Empirical studies show that when OER practices are integrated with training, advocacy and institutional policy, they lead to more durable forms of educational change. Educators need more than technical skills, they require an orientation toward openness, shared authorship and reflective practice (Stagg, 2014). Partnerships with instructional designers, librarians and policymakers further enhance this ecosystem, reducing duplication of effort and promoting long-term resource sustainability.

In summary, the literature underscores that collaborative approaches to OER in teacher education are not merely desirable but necessary for ensuring sustainability and local relevance. By embedding collaboration into institutional cultures, promoting peer-led resource development and fostering policy support, OER initiatives can meaningfully contribute to sustainable education systems and broader development objectives. Furthermore, by expanding the theoretical scope to include general collaboration literature, this paper positions its argument within both the OER community and the wider field of sustainable educational development. This integrative view strengthens the case for embedding collaboration as a systemic approach to overcoming structural inequities in education.

Methods

This study adopted a qualitative research approach to explore collaborative OER development among teacher educators across African institutions, drawing on principles of participatory action research (Creswell, 2014). The methodology was intentionally process oriented, aligning with the iterative, adaptive and reflective nature of the project's evolution.

Secondary data sources included project documentation such as meeting reports, workshop output and policy drafts, which helped track the evolution of the OER initiative (Bowen, 2009). Additionally, baseline assessments conducted through case studies involving teacher educators provided empirical data on OER readiness and institutional barriers (Yin, 2018). The research also incorporated participatory workshops, such as co-authoring sessions for OER module development, where educators collaboratively designed and refined resources (Heron & Reason, 2006). These workshops functioned as both data collection and capacity-building activities, aligning with the project's iterative, bottom-up approach.

These data sources were triangulated to enhance the credibility and validity of findings (Flick, 2018), combining focus group discussions, workshop outputs and policy feedback from Department of Education stakeholders. Ethical considerations included informed consent and anonymisation of participant identities. Focus group discussions and workshops not only served as data collection tools but were also central to capacity building and collaborative reflection, embodying the core principles of participatory action research (Heron & Reason, 2006).

Engeström's (2001) AT guided the analysis, framing collaboration as a dynamic system influenced by tools (e.g., digital platforms, training), rules (e.g., funding requirements) and community structures (e.g., institutional partnerships). Thematic analysis (Braun & Clarke, 2006) was used to code and interpret qualitative data, identifying key patterns such as contradiction-driven adaptation, institutional mediation and collaborative knowledge-building. The analysis was recursive and reflective, consistent with the action research tradition.

Ethical considerations included informed consent, anonymisation of participant contribution and institutional ethics clearance obtained from the lead university. Data were securely stored and used exclusively for research and development purposes.

The research purposively sampled participants to ensure a degree of diversity across gender, institutional roles and technological proficiency. Although participants were largely urban-based due to logistical feasibility, the sample included both novice and experienced educators, enhancing the range of perspectives captured. However, the representation of rural-based educators remains limited, a noted limitation of the study.

By integrating multiple qualitative methods, this methodology captured the complexities of collaborative OER development, offering actionable insights for sustainable implementation in African higher education (UNESCO, 2019).

Effectiveness was not solely determined through participant feedback. Tangible outcomes, such as the successful development of five OER modules and sustained collaboration across institutions, were treated as key indicators of impact. These concrete deliverables provided validation of the project's reach and sustainability beyond self-perceptions.

AT as a Framework for Collaborative OER Development

AT, as advanced by Engeström (2001), offers a powerful lens for analysing the systemic, collaborative and transformative processes inherent in initiatives like this OER project. Grounded in Vygotsky's (1978) sociocultural theory and refined by Leont'ev's (1978) work on mediated action, AT conceptualises human activities as collective endeavours shaped by tools, rules and community dynamics. This framework is particularly suited to examining collaborative knowledge building, where diverse stakeholders co-create knowledge artifacts through shared objectives and distributed labour (Scardamalia & Bereiter, 2014). In the context of this multinational OER project, AT illuminates how institutional policies, interdisciplinary teamwork and evolving goals interact to drive innovation or reveal contradictions that necessitate adaptive solutions.

The project's multidisciplinary nature spanning educators, instructional designers and policymakers across African institutions epitomises AT's focus on collective activity systems. Figure 1 depicts Engeström's (2001) model, where subjects (e.g., teacher educators) pursue objects (e.g., OER module development) through mediating tools (e.g., digital platforms), community (e.g., cross-institutional teams), rules (e.g., funding requirements) and division of labour (e.g., role specialisation). For instance, early challenges such as team members' limited OER expertise, mirror AT's emphasis on contradictions as catalysts for change. The recruitment of additional experts from six institutions transformed these tensions into opportunities for expansive learning, enabling the team to reframe their object from training in-service teachers to equipping teacher educators first.
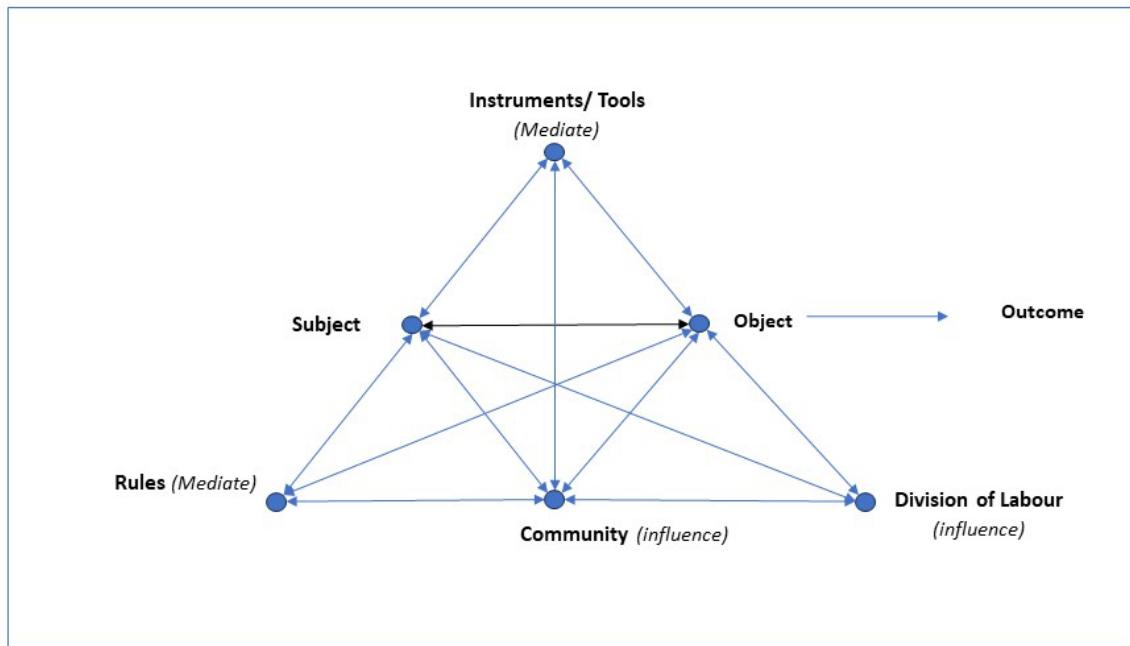
Figure 1: AT.

Source: Adapted from Engeström (1987, p. 78)

AT further clarifies how collaborative dynamics influenced outcomes. The project's shift toward localised capacity-building workshops and policy advocacy reflects AT's principle of contextual mediation: tools (e.g., training templates) and rules (e.g., funder guidelines) were adapted to align with institutional and Department of Education priorities. Similarly, the division of labour evolved organically, with roles like hosting and advocacy or module roll-out assigned to leverage individual strengths — a process AT would classify as systemic negotiation of labour.

Ultimately, this AT analysis underscores how collaborative OER initiatives can foster sustainable educational change. By framing challenges (e.g., resource constraints) and solutions (e.g., partnerships with instructional designers) as interconnected elements of an activity system, the study demonstrates AT's utility in advancing 4's vision for equitable, resilient education (United Nations, 2015). The model also invites future research into how such systems might scale across Global South contexts, where collaborative resource-sharing is both a pedagogical necessity and a development imperative.

Findings

Findings from focus group discussions highlighted that although educators recognise the benefits of OER, successful implementation requires a bottom-up approach, where resources are co-developed to meet local needs. Additionally, targeted training and advocacy are essential in equipping educators with the necessary skills and confidence to engage in OER practices.

The analysis of this multinational OER project through the lens of AT revealed three key themes that shaped the collaborative development and implementation process: (1) the role of contradictions in driving systemic adaptation, (2) the mediating influence of institutional and community structures and (3) the transformative outcomes of expansive learning.

First, contradictions within the activity system acted as catalysts for change. Initial gaps in OER expertise among team members (subject-tool contradiction) prompted the recruitment of specialists from six African institutions, transforming the team's composition and capacity. Similarly, the realisation that teacher educators — not in-service teachers — needed prioritisation (object-outcome contradiction) led to a strategic pivot in the project's focus. As one participant noted, "We had to step back and equip the trainers first; this reshaped our entire workflow". These tensions aligned with AT's emphasis on contradictions as drivers of innovation (Engeström, 2001).

Second, institutional and community mediation proved critical. Rules (e.g., UCDP funding requirements) and tools (e.g., shared templates for module development) structured collaboration, while cross-institutional partnerships expanded resources. For example, the hybrid data analytics training (2024 deliverable) emerged from a need to align team competencies with project goals, demonstrating how tools and division of labour co-evolved. The involvement of the Department of Education stakeholders further underscored the role of broader community engagement in legitimising OER adoption.

Third, the project fostered expansive learning through iterative problem-solving. The co-authoring workshops (Activity 4) exemplified collective knowledge creation, where educators localised OER content to reflect African pedagogical contexts a process mirroring Scardamalia and Bereiter's (2014) collaborative knowledge building. Participants highlighted that "co-developing module outlines [Activity 4] built ownership and relevance", reinforcing AT's assertion that shared labor leads to transformative outcomes.

Ultimately, the project achieved its deliverables (e.g., policy guidelines, capacity-building workshops) by navigating systemic tensions through collaboration. The AT framework illuminated how micro-level interactions (e.g., role negotiations) and macro-level structures (e.g., institutional policies) interdependently advanced OER sustainability a finding with implications for scaling similar initiatives across the Global South.

Analysis: Unpacking Collaborative OER Development through AT

Figure 2 presents the AT framework applied to this multinational OER project, revealing how systemic interactions and contradictions drove both challenges and innovations. The analysis examines three critical dimensions evident in the diagram's structure.
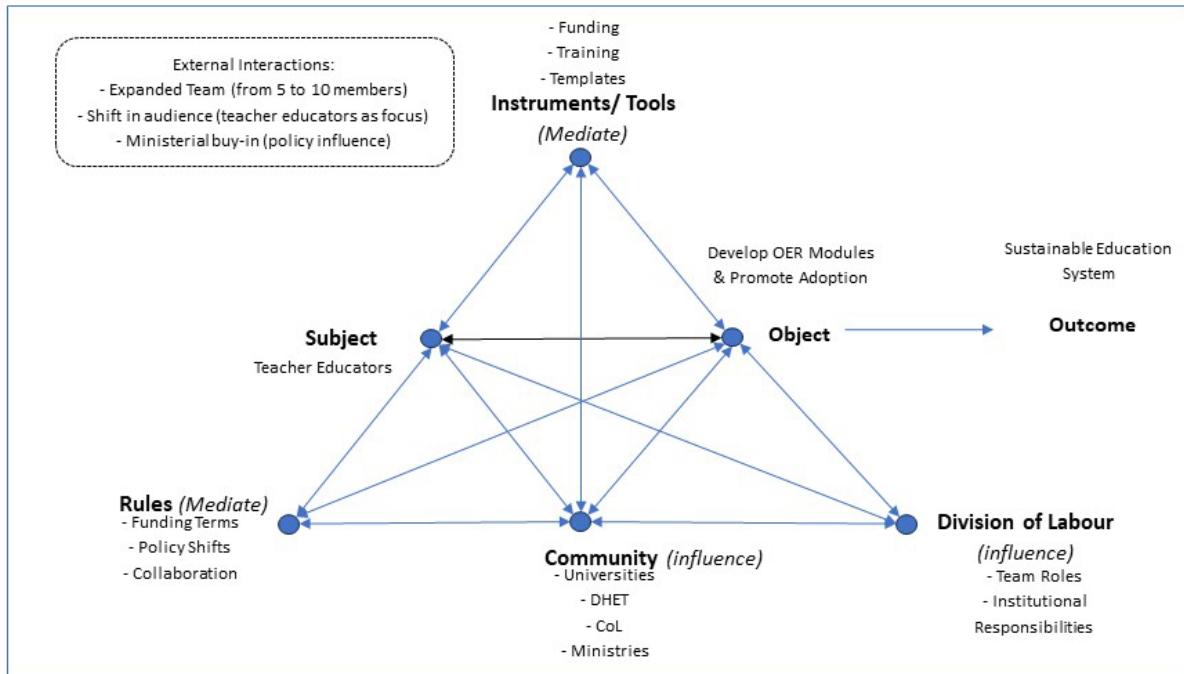
Figure 2: Mapping findings to the AT.

Contradictions as Catalysts for Systemic Adaptation

Systemic contradictions within the activity system were not seen as failures, but as drivers of change. The project's evolution reflects Engeström's (2001) model of contradictions as engines of change:

- Primary contradictions emerged within individual components, particularly the tension between teacher educators' existing skills (subject) and the technical demands of OER development (tools). As shown in Figure 2, initial gaps in expertise (e.g., data analytics, module design) necessitated tool-mediated solutions, such as the hybrid training workshops (2024 deliverables). Furthermore, this subject-tool contradiction triggered the expansion of the collaboration to include additional institutions and specialists, reinforcing the importance of distributed expertise in complex projects.
- Secondary contradictions arose between components, exemplified by the misalignment between the original object (training in-service teachers) and community realities (teacher educators' unpreparedness). The diagram highlights how Department of Higher Education and Training feedback triggered a rule-based pivot to prioritise teacher educators with the aim to resolve this tension through systemic adaptation: rather than training teachers directly, the project reoriented to first building capacity among teacher educators. This

object-outcome contradiction led to a realignment of roles and deliverables, including the development of five tailored OER modules and revised policy frameworks.

Mediation Dynamics in the Activity System

Figure 2's core components illustrate how mediation shaped outcomes:

- Tools (funding, templates, training) evolved from barriers to enablers. For instance, the reduction in UCDP funding could have jeopardised the initiative, but it instead served as a process trigger. The collaboration mobilised alternative funding by securing an alternative sponsor, demonstrating agility and reinforcing the rule-tool-community dynamic.
- Rules (e.g., institutional policies, funding terms) acted as both constraints and scaffolds. The requirement for collaboration (outer ring) forced role specialisation (division of labour), while flexible deliverables allowed adaptive responses like the audience shift.
- Community expansion (from five to ten members across four nations) enriched the division of labour but required new coordination tools (e.g., shared templates).
-

Expansive Learning and Outcome Transformation

The project manifested all phases of expansive learning (see arrows in Figure 2):

- Questioning: Baseline assessments (Activity 2) exposed gaps in OER readiness.
- Modelling: Co-authoring workshops (Activity 4) prototyped locally adapted solutions.
- Implementing: Policy guidelines (Activity 5) institutionalised new practices.
- Reflecting: Symposiums evaluated outcomes to inform scaling.
- The double stimulation process (Vygotsky, 1978) is visible in Figure 2's feedback loops: initial failures (e.g., expertise gaps) stimulated tool development (e.g., training dashboards), which then enabled goal attainment.

Implications for Policy and Practice

The AT diagram (Figure 2) underscores that sustainable OER adoption requires:
Anticipating contradictions by designing flexible funding and team structures.
Leveraging mediation through adaptable tools (e.g., open templates) and iterative rulemaking.

Embedding reflection cycles to sustain expansive learning beyond project timelines.
This analysis demonstrates how AT transforms apparent obstacles into opportunities for systemic innovation, a critical insight for collaborative educational projects in resource-constrained contexts.

Evidence of Impact: Effectiveness, Policy Integration and Institutional Uptake

The impact of the collaborative OER initiative is best understood as a work in progress, with early indicators of effectiveness and momentum towards long-term sustainability. To date, the project has produced five collaboratively developed OER module outlines, designed to guide future full-module creation. These outlines reflect input from participating institutions and draw on contextual

insights gained through focus groups, workshops and baseline assessments. They represent an important step towards co-developing contextually relevant professional development materials for teacher educators across African higher education institutions.

These outlines are currently undergoing internal review and quality assurance. Only after this review process is complete will the full modules be developed. This staged approach ensures that the content aligns with institutional needs, pedagogical relevance and the expectations of both educators and funders. Although the outlines have not yet been shared externally or adopted within any formal curriculum, the development process itself has fostered increased institutional awareness and engagement around OER practices.

Discussions regarding institutional uptake are ongoing and remain a priority for the next phase of the project. Some schools of education have informally expressed interest in piloting or adapting the modules once completed, but no formal integration has occurred. Future engagements will focus on introducing the finalised modules to partner institutions, conducting pilot testing and facilitating training workshops to support implementation.

The issue of sustainability particularly around ongoing support, hosting and content updating remains under consideration. Although some institutions have begun exploring internal mechanisms for managing OER resources in the future, such plans are still in the conceptual stage. Two of the five institutions have taken a step forward in responding to the need to capacitate teacher educators by initiating capacity building within their institutions. One of the institutions is replicating this OER collaborative intervention where team members are coming from different disciplines as they work towards designing and implementing capacity building that can be sustainable. It is hoped that the trained teacher educators will collaborate withing their divisions together with their students to produce, adapt and use contextualised OER and thus contribute to the scarce resources in our education system. These activities has been met with full support from institutional leadership and possible additional funding. The project team envisions that future phases will include working with information technology departments, academic programme managers and national policymakers to develop models for maintaining and scaling the OER outputs.

In summary, although many of the project's anticipated impacts are still forthcoming, the development of collaboratively authored module outlines, engagement with stakeholders and preliminary institutional interest point to a solid foundation for future expansion. The processes established thus far demonstrate the value of structured collaboration, shared ownership and reflective practice in building capacity for sustainable OER use in African teacher education/

Limitations

Although this study offers in-depth insights, its findings are drawn from a limited number of institutions within Africa and therefore may not be fully generalisable across the diverse educational contexts of the African continent. Further studies involving broader cross-national representation are recommended.

Conclusion

This study highlights the transformative potential of collaboration in developing OER for teacher education in resource-constrained African contexts. Grounded in AT (Engeström, 2001), the analysis demonstrates how systemic contradictions, institutional mediation and iterative adaptation can serve as levers for educational innovation. Although the project is still in progress with module outlines under internal review and full module development pending early outcomes indicate growing institutional interest, emerging policy engagement and a strong foundation for future sustainability.

The paper also acknowledges the contextual limitations of its findings, drawn from a focused network of South African institutions. Nevertheless, the depth of process insights offers valuable implications for similar initiatives across the continent. Future work will involve extending the collaboration, finalising and piloting the full modules and engaging more deeply with policy and infrastructure considerations. Ultimately, this research affirms that embedding collaboration as a deliberate, structured process, not just a project strategy, can contribute meaningfully to building resilient, locally relevant education systems aligned with sustainable development goals.

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Empowering Voices in Open Education: Reflections and Future Directions from the Global OER Graduate Network's 10th Anniversary

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Abstract

The Global OER Graduate Network (GO-GN) has emerged as a pivotal community of practice for doctoral candidates focused on open education, supported by over 200 experts and mentors worldwide. GO-GN supports doctoral researchers working on open education topics, amplifies their work, models open research in practices and promotes equity, diversity and inclusion (EDI). The network has rapidly increased its membership since its inception in 2013 and has deepened its work with members to include collaborative publications and resources to support doctoral researchers. During Covid-19, GO-GN pivoted its model from face-to-face workshops to an online community of care, which prioritised emotional and academic support. Although supporting EDI principles hs always been core to the network's aims, since 2018 the network has deepened its EDI activities, increasing collaboration and research to better understand the needs of its membership and open education in different regions. Also, as the network matures and a growing number of members successfully complete their doctorates, deepening our understanding of how best to support the network's growing alumni has become an important aspect of what we do. This paper is a reflection piece about GO-GN past trajectory and future plans, and it is based on the tenth anniversary report *GO-GN at 10: Strategic Review*. This report was written in collaboration with some of our members, including PhD students and alumni. It presents some key historic events that marked the progress of GO-GN and explores the network's future strategic plans, some of which have already commenced. Core to this is continuing to amplify and champion the research of marginalised researchers and those based in the Global South. To conclude, we also briefly reflect on the network's activities since this report was published, and our responses to the priorities and steer of our membership.

Keywords: GO-GN, Global OER Graduate Network, GO-GN strategic review, open education

Introduction

There are numerous research communities that cater to a variety of fields, interests and professional needs. Engaging with these communities can significantly benefit both researchers and research students alike. In fact, being part of a supportive network is not just an asset for research students; it is a vital component of their success. By fostering connections within academic communities, research students can enhance their learning experiences, overcome challenges and pave the way for fruitful careers. One exemplary community is the Global OER Graduate Network (GO-GN), a supportive network of practice focused on open education research. GO-GN empowers

research students to thrive by harnessing the power of open education, ultimately creating a more equitable and successful academic journey.

GO-GN is a network of nearly 200 doctoral (professional doctorate and PhD) candidates and alumni around the world whose research projects include a focus on open education. A wider community of practice, comprising over 250 experts, supervisors, mentors and interested parties, connect to form a community of practice. The aims of the GO-GN are to:

- raise the profile of research into open education
- offer support for those conducting doctoral research in this area
- promote equity and inclusion in the field of open education research
- develop openness as a process of research

GO-GN is currently funded through the open education programme of The William and Flora Hewlett Foundation and is administered by the Open Education Research Hub at the Institute of Educational Technology at the Open University, United Kingdom (OUUK). In 2023, GO-GN celebrated its tenth anniversary, marking this significant milestone with the collaborative development of a report titled *GO-GN at 10: Strategic Review* (Farrow et al., 2024). This document reflects on GO-GN's major achievements over the past decade and provides an opportunity to look ahead as the team plans the next stages and future activities for the network. This paper presents key highlights from the strategy review and includes recent activities and research conducted by the team. The paper also reflects on the network's activities aimed at responding to the priorities of its members, alumni, and the wider open education community.

Looking Back: 10 Years of GO-GN

GO-GN was founded by Professor Fred Mulder, a pioneer in open education who had been working at Open University of the Nederlands since 1985. After stepping down as rector in 2010, Mulder took on a UNESCO chair on OER and began developing the concept for a network to support PhD students researching open educational resources (OER) (UNESCO, 2019). Initially conceived as a *global OER graduate school*, the initiative was renamed a *network* at its formal launch during the OCWC conference in Cambridge, United Kingdom, in April 2012. The network aimed to expand the OER research base, improve evidence for practice and provide guidance by connecting PhD students with supervisors and institutions. Early funding came from the Netherlands Ministry of Education, European Commission and The William and Flora Hewlett Foundation. The first four GO-GN seminars were held between 2013 and 2015 in Cape Town, Ljubljana, Washington and Banff, typically alongside larger open education conferences. By December 2012, GO-GN consisted of 19 experts from five institutions and nine PhD students. Between 2013 and 2015, doctoral membership grew from 15 to 35 members, primarily from Africa and Europe, though supervisor numbers remained stagnant.

When Mulder retired in 2014, the network was transferred to the OUUK in 2015, aligning with their OER Research Hub. During this transition, and reflective of the development of open education research globally, the network's focus expanded beyond OER to include broader aspects of openness like massive open online courses, open pedagogy and social justice perspectives, while

maintaining its core mission of supporting doctoral researchers, particularly those working in isolation. After relocating to the OUUK, GO-GN developed a structured programme combining an annual workshop (held alongside major OER conferences) with ongoing online support including monthly webinars, social media engagement, and newsletters.

The network experienced significant growth from 2015 to 2019:

- Membership expanded to over 100 members and 20 alumni across 16 countries by 2019.
- Members produced approximately 30 peer-reviewed journal publications.
- The GO-GN Twitter account grew from 209 followers in 2015 to 1,369 by 2019 (reaching 2,441 by April 2024).
- Website traffic averaged 1,200 visitors monthly.

To enhance recruitment and participation, GO-GN:

- relaunched their website in September 2015 with simplified sign-up
- established a monthly webinar series featuring experts and members' research
- created an open researcher pack with practical resources
- developed two incentives: fully funded seminar attendance and research awards

The network also established the Fred Mulder Awards in 2017 to recognise excellence in open education research papers and open research practices, though these became less active in later years. GO-GN successfully established itself as a significant contributor to the global OER research community, with members actively participating in major conferences. Members consistently cited the network as vital to their motivation and completion of doctoral studies, with alumni publishing over 40 open access articles and contributing 31 sessions at the OER19: Recentering Open: Critical and Global Perspectives conference (Association for Learning Technology, 2019).

During the period 2020–2023, GO-GN transformed in response to the COVID-19 pandemic, evolving from its previous model to become an online community of care supporting doctoral researchers during challenging times. The network recognised that PhD students were particularly vulnerable to isolation during pandemic lockdowns, shifting focus to provide emotional support through group and individual sessions alongside academic guidance. A 2021 evaluation showed 81% of members felt well-supported during this period, valuing GO-GN primarily for (1) the peer community, (2) research communications and (3) advice on open practices. Members have also consistently highlighted the value of GO-GN in providing emotional support beyond traditional supervision, opportunities to present research, connections with an international community and combating isolation during pandemic lockdowns. The network demonstrated adaptability by pivoting planned in-person activities to online formats while maintaining its commitment to open values and EDI. After the pandemic, GO-GN resumed some of its in-person activities, in particular the annual in-person workshop offered alongside a relevant OER or open education related conference, the last one being Open Education Global 2024, held in Brisbane, Australia.

Other key initiatives that took place between 2020 and 2023 included:

- Fellowship scheme: Nine fellowships were awarded to alumni across three cohorts (2020–2022), supporting projects that promoted GO-GN, conducted research, and strengthened connections with other networks, with particular emphasis on encouraging Global South participation (Iniesto et al., 2023).
- Research member specials: A new type of webinar was introduced to showcase member and alumni research. Members are invited to share more on their work. These sessions currently take place biannually. As at mid-2025, nearly 30 GO-GN members have presented in 10 sessions.
- Resource co-creation: Despite pandemic restrictions, GO-GN produced several collaborative publications:
  - *Research Methods Handbook* (Farrow et al., 2020) — winner of the Open Education Global Open Research Award
  - *Conceptual Frameworks Guide* (Farrow et al., 2021)
  - *Annual Research Review 2020* (Weller et al.,2020)
  - *Annual Research Review 2021* (Weller et al., 2021)
  - *Annual Research Review 2022* (Weller et al., 2022)
  - *Open Research Handbook* (Farrow, 2023) — a comprehensive 350-page guide to open education research which comprises of OER Hub and earlier GO-GN collaborative publications.

In addition to the activities mentioned above, GO-GN has expanded its research focus to investigate EDI in open education across various contexts, particularly in the Global South. This expansion aims to better support GO-GN members and amplify the voices of underrepresented groups within the network and the broader open education community. Although EDI has been integral to the GO-GN agenda since its inception, it has become increasingly crucial in open education discourse. To align with this trend, we began intensively researching EDI in open education in 2018.

The first phase of this work aimed at investigating EDI practices in open education in Africa (2018–2019), and the second phase investigated these practices in Latin America (2020–2021). The findings and recommendations from these EDI projects have been consolidated into the GO-GN EDI guidelines (Bossu et al., 2023). We are now expanding this research to other contexts and regions of the world, including in Asia and the Asia Pacific. Since the GO-GN workshop in Edmonton, Canada, in 2023 to celebrate GO-GN's 10th anniversary, it was decided to include EDI discussions and workshops within the GO-GN annual workshops to leverage from the network and take the opportunity to discuss this timely topic with researchers working on a diverse range of OE research and contexts.

After reflecting on the past 10 years of GO-GN, we will now present our future plans and activities, the majority of which were discussed with our members. Feedback on the strategic direction of GO-GN was collected both in-person during the Edmonton workshop and online through the event evaluation survey. Next, we will explore GO-GN's strategic direction and evaluation.

Looking Forward: Strategic Direction and Evaluation Insights

This section draws together reflections and insights from evaluation activities carried out with GO-GN members and the coordination team. In the survey, we asked respondents about the activities GO-GN members think have worked well. Some of the responses included advocacy, connecting, informing, co-authoring, staying on the cutting edge of research, bringing people together, fostering a welcoming community that provides opportunities for sharing work and receiving supportive feedback during the dissertation process, funding of members and alumni to participate in the GO-GN seminars and workshops, good researches and support in EDI and special consideration to members and alumni from the Global South.

The survey also asked if there were areas where more could be done by GO-GN. Responses included a variety of suggestions, including the supervision of projects funded by international organisations such as the United Nations Development Programme and the World Bank, and to reframe how work on EDI is prioritised, as some believe that EDI should be guiding all other work and research in open education. Other suggestions were that GO-GN alumni should be invited to mentor new doctoral students, that GO-GN should organise its own conference and that we should create regional branches of GO-GN.

A key challenge for GO-GN and the open education movement more widely is to manage the transition from being a relatively new area of interest to a mainstream research field. Many open education researchers are advocates and/or are motivated to use OER because of their personal values. As the field matures, the need for high quality, objective research has become more apparent, in terms of effective approaches and the development of a critical mindset within the field (Weller et al., 2019). Concomitantly, there is a need for research which, while robust, can describe and share the contextually specific nature of OER and OEP implementation in diverse contexts.

GO-GN members are also interested in ensuring that our researchers are at the forefront of leading open education research into new areas, including:

- AI and open educational practices
- AI and EDI, particularly in the Global South
- exploring the relationship between creativity and openness
- ways to communicate the OER value proposition according to context

Our members also had advice regarding how research into open education should be conducted:

- Continue the supporting and inclusive vision and practice.
- Create groups of interest and promote the creation of frontier knowledge in the matter based on the work of doctoral students.
- Create national and regional GO-GN communities, connected by the network (avoid the fragmentation!).
- Promote and support collaboration among members regarding publication, projects, professional development and network diversity.
- Talk with (not only talk about) marginalised voices.

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One important consideration here concerns the capacity of the GO-GN co-ordination team and the limits of what might be possible with current organisation and resourcing configuration. Options here include expanding the coordination team, moving to a decentralised or federated model of organisation or some combination of both. One possible way forward is to run pilots for regional hubs that could offer insights into how alternative organisational structures might work in practice. This could be complemented by a code of conduct that sets out expectations for how network activities are managed. Small-scale pilots could help to inform the contextual differences around the world and help GO-GN to improve its support to members in these contexts. A key tension in open education research is that most expertise and experience exist in the Global North, while it is those in the Global South who can potentially benefit the most from open practices. Many researchers in the network are increasingly interested in localised knowledge and ways of using OER to address systemic inequity. Co-ordinating through local hubs may offer a balanced approach, but, as some of discussions in the latest workshop indicated, defining "regions" is not necessarily straightforward. A piloting scheme could facilitate bottom-up, authentic coordination.

Another strategic direction concerns the sustainability of the network. The extent to which GO-GN federalises is also connected with the long-term sustainability of the network. Costs would increase as the network scales or takes on regional hubs. Diversifying the income grants of the network improves the viability of the network. Financial support could be sought from other foundations or funding bodies. Regional hubs or collaborations could also be supported in applying for funding or could include the "home hub" GO-GN team as a partner.

There has always been a question regarding the focus of GO-GN research. Should we focus only on those researching "pure" OER or other things like massive open online courses that might not include openly licensed material? There is a balance to be struck between developing new areas of research around "open" and retaining a distinct perspective. GO-GN has been more focused on open practices in recent years as a response to the direction of members. These can take various forms, such as open policy, open educational practice and open pedagogy, and often reflect the attention currently paid to wider social and political issues. Currently, many researchers are interested in artificial intelligence and the implications for open education. Indeed, its rise has the potential to make the OER value proposition look very different.

GO-GN researchers use many different theoretical frameworks, epistemologies and methods, and are highly diverse in this respect. Sometimes our alumni (and experts) are several years post-doctoral, and their research interests have broadened. There remains a core interest in OER adoption processes and how these may empower different stakeholders, but with a wider sense of potential impacts of using open approaches for self-empowerment. Researchers newer to the network are often using "open" as a lens to examine something that need not involve OER — or even learning outcomes — directly. The manifold interpretation of openness also means that contexts and definitions can vary widely, and many members are asking themselves whether particular theories do much to advance the social good that they see themselves as working towards. Ultimately, it is for the membership to decide which areas can be prioritised in their research. The idea that GO-GN should somehow impose a dogma on what should be researched seems antithetical to the idea of openness. However, there is arguably a role for the network in attempting to demonstrate the value of open practices to those who could potentially adopt and advocate.

The growth of GO-GN has implications for how we communicate with members. The use of a blog (https://go-gn.net/) as a central point of coordination remains effective, though we have been looking at ways to make it easier for members to post there (e.g., Smallest/Simplest *Possible/Portable *Open/Online *Learning/Living *Tool/Technology, or SPLOT) (Levine, n.d.). One communication challenge is that the network is now more fragmented across different social media channels as a result of market change. It may be necessary to refresh some aspects of communication strategy, and it will be important to be receptive to member feedback. It is important to retain dialogue as a key aspect of communications as the network scales. This could include different strategies for different stakeholder types. Ideally, GO-GN would engage to understand and communicate the diverse needs and circumstances of its members. One approach here is the co-creation model that has been used to produce the *Research Methods Handbook* (Farrow et al., 2020), the *Conceptual Frameworks Guide* (Farrow et al., 2021) and the *Open Research Handbook* (Farrow, 2023). Another is to collaborate through research activities.

Presenting GO-GN at conferences remains a good way of introducing those new to open education to the network. The network has a strong profile at the three main open education conferences (Open Education Global, OERx, Open Education). GO-GN has strategic partnerships with organisations like Association for Learning and Teaching, in the United Kingdom, and Open Education Global, acting as a conference sponsor. These relationships work well to mutual benefit. GO-GN may wish in the future to consider additional strategic partnerships. Having a strong presence at open education conferences is essential, but risks overlooking those interested in open practice who do not attend the same conferences. Our webinar series on YouTube (https://www.youtube.com/user/GOGNOER) remains popular and combines presentations from new and established members, guest speakers and the co-ordination team. In response to the growth of the network, it was agreed at the workshop that GO-GN would create a code of conduct that would set out expectations for interactions within the network.

Conclusion and Further Considerations

This short paper, which is based on the *GO-GN at 10: Strategic Review* (Farrow et al., 2024), reflected on GO-GN history and presented the network strategic plans for future activities, based on members' suggestions and reflections from the GO-GN management team. Throughout the years, GO-GN has adopted an agile approach and continuous collaboration with its membership to ensure that the network addresses opportunities and challenges. By focusing on collaboration, inclusivity and innovation, while remaining grounded in its core values of openness and mutual support, GO-GN continues to fulfil its mission and continue to impact on open education research.

As open education research has diversified, the research interests of members have developed from a "pure" interest in OER towards wider social issues and applications of OER. As GO-GN members complete their doctorates — and become alumni — the network also continues to grow, reflecting the growing interest in open education.

Since the publication in 2024 of the *GO-GN at 10: Strategic Review* (Farrow et al., 2024), several developments have taken place to advance the GO-GN open agenda. One of these initiatives was the development of the *Code of Conduct* (GO-GN, 2025), which is based on a review of various existing

codes for open education events and initiatives. We shared a draft of the code for feedback with participants at our 2024 GO-GN workshop, and a subsequent iteration was disseminated to the wider GO-GN membership for feedback in January 2025. Following this input, the draft code was further revised. This document represents our commitment to ensuring that all GO-GN members and participants in our online and face-to-face activities and events feel respected and supported.

A significant development has been the awarding of additional funding from The William and Flora Hewlett Foundation to support GO-GN's exploration of regional hubs to expand the network. The pilot implementation of several hubs is scheduled for the second half of 2025, and the evaluation of these activities will inform GO-GN's future planning. This initiative aims to build capacity and better support our diverse and growing membership. Also, this pilot is a direct response to members' requests for greater federation (Farrow et al., 2024) and aligns with GO-GN's ongoing commitment to EDI in open education.

Disclaimer

ChatGPT 4.0 was used to assist in the summary of some sections of the report *GO-GN at 10: Strategic Review* (Farrow et al., 2024).

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Collaborative Peer Learning for International Course Development in the Empowering Women and Girls (EWG) Project: Challenges and Lessons Learned Through this Case Study

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Abstract

This paper explores collaborative peer learning practices as a case study during the Empowering Women and Girls Project during which six courses were developed over a period of eight months, engaging subject experts from India, Jamaica and Malaysia, with the editor from Canada and the project co-ordinator from Australia. Each writer developed five units for their allocated course, after which each of them initially peer reviewed at least one unit from another writer. Writers thereafter had to review each other's work beyond the first unit, with the units distributed among the team. This included reviewing their early work as well as their final work, leading to high-quality courses. The project co-ordinator reviewed all the units in a collegial way, further extending the peer review approach. The asynchronous peer review and feedback were central to the success of the collaboration. Using a Commonwealth of Learning template and the fortnightly online sessions, the writers collaborated. They further shared and learned within the same online space, extending the peer learning approach. The positives of peer learning, the challenges how these were resolved and lessons learned are also explored in this paper, such as the unplanned unavailability of writers, different professional perspectives on other writers' work, and successfully collaborating across various cultures and time-zones.

Keywords: peer learning, peer review, team course development, high quality

Introduction

This paper explores collaborative peer learning practice, predominantly through peer review, during the Empowering Women and Girls (EWG) Project in which six courses were developed over a period of eight months from August 2023 to March 2024, The project engaged subject experts from various countries: two writers from India, one from Jamaica and one from Malaysia, with the project co-ordinator being from Australia and the editor based in Canada. In total, there were thus six peers from five countries who contributed to peer learning.

The project was carried out entirely remotely using synchronous and asynchronous digital and online technologies such as Zoom, emails and shared files on One Drive.

The courses[1] developed are part of the Strengthening Communities to Attain Resiliency and Food Security series:

- Course 1: Climate Change and Climate Action
- Course 2: Attain Food Security through Subsistence and Sustainable Agriculture
- Course 3: Gender Equality in the context of Climate Change and Food Security
- Course 4: Designing Innovative, Climate Responsive and Sustainable Livelihood
- Course 5: Role of Innovations and Climate Responsive actions to attain Community Resilience
- Course 6: Sensitivity to and respect for Indigenous Rights and Practices - in Climate Responsive actions and mitigation

The research methodology used for this paper is that of a case study of peer learning practiced during this project. The study was enriched through the frank feedback that the four writers provided on the following questions:

1. What were the positives of this peer learning development process?
2. What challenges did you perceive about this peer learning development process?
3. What lessons have you learned about this peer learning development process?

The feedback was used verbatim but de-identified.

This study is significant as there are often teams working together with the Commonwealth of Learning (COL) across time zones that could benefit from a peer learning approach to review and enhance each other's work, leading to improved quality outcomes.

Background on Peer Learning

Peer learning is based on educational theories that emphasise social interaction as a key component of learning; for instance, Vygotsky's (1930–1934/1978) theory of social constructivism highlights that learning is a social process derived from interaction with peers. Similarly, Bandura's (1977) social learning theory highlights the role of observation, imitation, and modelling in knowledge acquisition (Whitfield et al., 2025).

In their study of a virtual peer learning model among university students, Omiles and Ramirez (2025) found that the peer learning model is very relevant to online collaborative learning

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[1] The published courses:
https://oasis.col.org/entities/publication/aa03af25-b97b-4928-a261-27e57ae33f93
https://oasis.col.org/entities/publication/85944239-d4f6-4b85-b88c-6da2dc5fab53
https://oasis.col.org/entities/publication/3c965b9d-a90a-4e21-9cbe-8aa4df3b6282
https://oasis.col.org/entities/publication/9409b1f2-ec56-4f2a-a75d-40dc2551a4e4
https://oasis.col.org/entities/publication/22d0d493-1ad1-4257-99c5-14b47d6c94b6
https://oasis.col.org/entities/publication/5238caab-3429-418d-99e2-24864f388d37

environments, which is akin to the online, remote course development environment in which peer learning occurred in this project.

Peer learning is a pedagogical approach often used in adult learning, which enables the participants to engage in knowledge sharing, the acquisition of skill and collaborative problem-solving (Whitfield et al., 2025). Peer feedback is central to peer learning and is seen as "the mutual process through which students learn and cooperate through shared dialogue" (Ardill, 2025, p. 3) and follows on from the peer review activity that "involves students reviewing each other's work by giving and receiving peer feedback comments, while offering suggestions for development" (Ardill, 2025, p. 4).

Peer tutoring and peer-assisted learning are practices embedded in peer learning in tertiary institutions and within work environments, and the peer tutors — who were co-writers in this project — are expected to benefit from the experience of peer tutoring (Shrivastava et al., 2024). In the work context — as in the course development in this project — peer learning is characterised by individuals exchanging knowledge, skills and experiences with one another, whereas the writers in this project interacted primarily with each other rather than only with a project team leader.

The additional advantages of peer learning in adult education were also realised in this project, namely improve engagement, develop critical thinking skills and foster a sense of accountability (Whitfield et al., 2025). Engagement, among participants — as in this project — involves more than participation, as it also requires meaningful, emotional and cognitive engagement through active dialogue with feedback processes (Ardill, 2025; Zepke, 2015).

Peer Learning Practices in this Project

The peer learning practices that were employed in this project were fortnightly online meetings using Zoom, where open peer discussions among the writers were held primarily about work done in the previous fortnight, while feedback was also provided to the writers in summary by the project co-ordinator, who operated as a peer in the development process. Issues encountered by the writers in the previous fortnight were also discussed.

The work of the writers that was peer reviewed led to peer learning. The work comprised each writer's learning design, which was reviewed by another writer, sometimes by more than one peer. The storyboards used by some writers were also reviewed.

The writers had to review each other's work, starting with the first unit, but thereafter beyond the first unit. The units were distributed among the team. This included reviewing their early work as well as their final work, thus following iterative processes that lead to improved quality courses (see Figure 1).
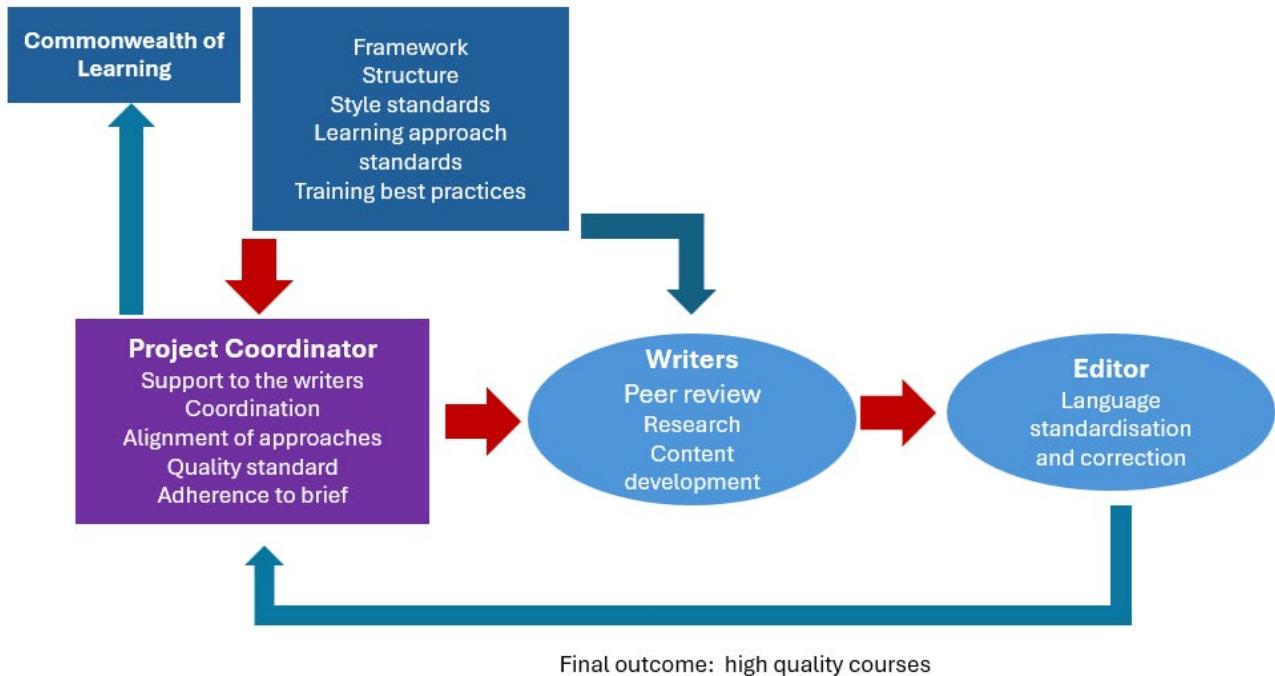
Figure 1: Peer learning ecology.

Each writer developed five units for their allocated course, during which each unit was peer reviewed by at least one other writer, and either shared by email with a copy to the project co-ordinator or shared directly in the document in the online space.

The four writers were subject matter experts (SMEs) in their own knowledge domain but with limited content knowledge of the other domains, and their feedback on each other's work was thus mostly focused on the quality principles developed during the project; the course structure; the layout; consistent use of icons; length of the unit; referencing; inclusion of generic sections (such as study skills, who to contact for assistance and the like); the judicious implementation of COL's course template; implementation of COL's course styling guide, and policies of COL regarding privacy, accessibility and inclusivity, such as COL's checklist for the development of gender-responsive learning materials Wong & Frei, 2015)). In terms of the technological pedagogical content knowledge model (Mishra & Koehler, 2006), the writers thus operated predominantly in the technological pedagogical knowledge dimension as shown in Figure 2, although some of the writers had some content knowledge of the other knowledge domains.
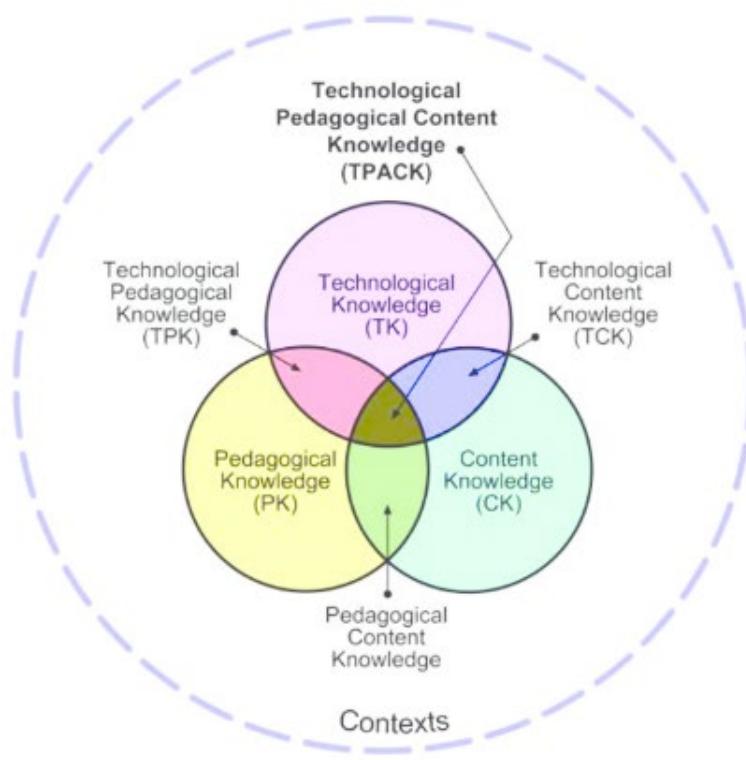
Figure 2: TPCK framework.

The project co-ordinator similarly reviewed all the units in a collegial way in the same areas as mentioned above. This approach further extended the collaborative peer review approach in which the project co-ordinator acted both as a peer and a co-ordinator.

The writers further collaborated and learned within the same online space in One Drive, with the drafts and final versions of their work being visible to all in the project, further extending the collaborative peer learning approach. The editor, who mainly reviewed the use of language and length of the sections towards the end of the project, operated as another peer that the writers responded to.

Findings

Positives

Peer learning led to higher quality courses, than the case would have been with feedback only from the project co-ordinator and editor. The writers reflected:

> At first glance, was doubtful the peer review would help. But after reading 2 times for other aspects such as content arrangement, how facts are connected and no disjointed paragraphs, it was all right. I had to bear in mind not to be over critical but give constructive feedback. Satisfactory method which did help the writer.

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The primary positive was surely the cross-pollination and inspiration of ideas … the review of the … course helped me to recalibrate my content as well as helped me to look for case studies … that establishes the importance of women led efforts; and also highlights how efforts led to women empowerment in communities.

The peer review helped me come up with alternatives and realign some of the already existing content developed by me; particularly when the subtopics and sessions were in the similar line.

The assignments/ activities developed by <two other writers> really helped to create mine in a way that is doable. Initially my approach was more of assigning mini-projects that may not have been feasible for the learner to achieve within the given time frame.

Healthy competition, I had to be better than everyone else 😊 as well as to showcase the possibilities that we could explore as a group.

The process of peer review of other units was useful to get feedback from a different perspective and experience. This helped enrich the units in terms of content and treatment. Each subject expert brought experience that provided an opportunity to learn from.

Peer learning and review sped up the creation of high-quality courses and minimised the iterations to completion as writers used materials from each other where possible. The writers reflected:

The definition of some terms provided by other writers was useful in expanding my own assumptions and understanding and helped in the progress of the course writing – in some cases there were no need to explain and define further.

It helped to seek for specific areas or content so that our own content could be enriched.

Peer learning fosters a collaborative and interactive learning environment (Whitfield et al., 2025). Instead of the traditional interactions during course development in which the interactions are largely between a project co-ordinator and the writers (subject matter experts), a collaborative peer learning approach created a high level of interactivity among the writers.

The usual advantages of peer learning in adult education were also realised in this project, namely improve engagement, develop critical thinking skills and foster a sense of accountability (Whitfield et al., 2025). One of the writers reflected:

The awareness that you may have to defend your submissions among other writers from different backgrounds and specialisations brought about a determination to be as explicit as possible. Knowing that the 'peers' were not of the same discipline ensured that my narrative was simultaneously as thorough and as simple as possible.

Using templates from COL assisted greatly in creating consistent learning structures for the courses. The writers reflected:

> Utilising the online platform and templates provided by COL was an extremely useful exercise.

> I am more of a field trainer and most of the material I developed in the past were for training, so it really helped to have peers who follow specific structure of publication and ODL.

Whitfield et al. (2025, Results and Discussion section) have pointed out that another "key benefit of peer learning … is the development of communication and interpersonal skills. Engaging in discussions, providing constructive feedback, and resolving conflicts within peer groups contributed to learners' personal and professional growth". This positive in the project was realised unintentionally, as one of the writers reflected:

> The opportunity to engage with writers from completely different backgrounds, countries and ethnicities was extremely rewarding in terms of networking and building knowledge about other cultures. These learning experiences were different and apart from the course writing exchanges.

Challenges

There were diverse professional perspectives on other writers' work, which was sometimes an issue, and the project co-ordinator had to provide some final, overall perspectives. The varied perspectives were particularly challenging when a unit was peer reviewed by more than one peer.

Peer review does initially require more input and time (although, it normally could be a shorter route to high quality work). One of the writers reflected:

> The main challenge was the time available to work on the units, peer review other units, and make suggested changes.

In some cases, the language of the feedback could have been interpreted as somewhat strict, in which case, the project co-ordinator guided and provided nuanced feedback. Although the feedback was generally provided in a respectful way, there were also diverse cultural expressions and approaches to feedback, which confirms a typical challenge in peer learning — the diverse participant backgrounds (Whitfield et al., 2025). One of the writers reflected:

> Sometimes was worried that the reviewer would not understand my topic or I would [not] understand his/her topic which made it difficult to give proper feedback. Since most of us had not done it before, was sceptical whether it was worth doing in the first place. Also wondering how the other SMEs would receive the feedback.

Deep and regular collaboration was challenging across various time zones as represented by India, Jamaica, Malaysia, Australia and Canada. Times for meetings with the least disruption were identified, but there were still some difficult times for some.

Another typical challenge of peer learning is group dynamics (Whitfield et al., 2025), which was also evident in this project, where different personalities played a role. One of the writers reflected:

> All of us were strong headed!! So letting go of already developed content was a heartbreak!

Typically for longer projects, like this project over eight months, unplanned absence of writers occurred due to family incidents, illness or high volumes of competing work. This impacted significantly on the collaborative peer learning processes, which depended heavily on writers reviewing and commenting on each other's work in a timely fashion.

Ensuring consistency among the writers was a challenge. The writers reflected:

> This also led to my primary challenge, which, was to adhere to the structure of the courses and edit out the text part. as I wanted to use more visuals that makes the component of usability feasible for field implementation (reusing the content by the learner). However, to standardize and to achieve consistency, I had to follow my peers and focus lot more on text.
>
> I was disappointed that there were no reviews around the 'content' since comments coalesced around definitions/interpretation of terms. Counterintuitively, at the final stage, the editors posed some queries on some aspects of content. I also found that the editor's style of writing was different to mine which led to some debates/disagreements.
>
> it would have been useful to get specific input on the content itself, its relevance, and how it was presented. Different subject expertise meant that there was a limitation on specific content inputs to the writer.

Lessons Learned

The blend of synchronous and asynchronous peer learning and feedback was central to the success of the collaboration. The synchronous dimension built a positive and personable team culture, while the asynchronous dimension supported peer work and peer learning across time zones.

The input from peers with different vantage points and working on different courses led to a more wholistic programme view, and not merely a course view. The writers reflected:

> Each of the courses was an entity by itself, but to focus on the entire programme SCARF, aligning was necessary - the peer review assisted the process of alignment.
>
> As the units were being developed individually by the subject experts, the peer learning development process, which included regular meetings and sharing of work by the

writers, helped get a deeper insight into the overall course and each unit within that. This was useful in aligning the unit to the overall learning outcomes.

The project co-ordinator regularly reminded the writers that it is their prerogative to accept or reject feedback, or to implement variations of the feedback received, thus creating a respectful environment in which the writers remained responsible and accountable for their work, and retaining the ownership of their work.

The role of the project co-ordinator, not only in being another peer but also in guiding the course development process in a flexible way, was important to ensure the objectives were achieved — and ultimately high-quality courses — within the targeted timeline. The writers reflected:

> The role of the 'moderator' (the <project co-ordinator>) as 'time keeper' was crucial to the development of the final deliverables.

> The process was a great learning in terms of time management by the facilitator who gently nudged when needed, gave feedback and ensured the timely completion of the writing process. A structured method, but flexible to individual pace and style, is necessary to apply during these processes.

Respectful interactions and temperate feedback language were essential to the writers remaining open to each other's feedback over the eight-month period and thus contributed significantly to effective peer learning. Peers have a deeper sense of empathy for their colleagues, as they are working with the same goals and under the same conditions.

The commitment to peer review and learning needs to be clearly stated in the contracts with writers so that it would not be seen as "extra" work. The mutual learning that occurs through collaborative peer learning needs to be stressed from the outset.

The maturity and willingness of writers to have their work publicly critiqued by other writers, whom they might not have met before a project, is critical for peer learning, and the writers in this project are to be commended for displaying these characteristics.

Conclusion

Concise training in peer learning at the beginning of a project could be very helpful as this approach might be new to many, as Whitfield et al. (2025, Results and Discussion section) have pointed out that also in adult education "to optimize peer learning … institutions should implement structured guidelines for peer interactions, provide training on effective collaboration". Such training could ensure that all the writers have a shared and common understanding of what the peer learning processes will entail, and what is expected of them. One of the writers reflected:

> A good exercise to do but there must be some guidelines to assist in the peer learning process. Not be judgemental. Take on other opinions to write an improved piece.

The general advantages of peer learning in adult education, namely improving engagement, developing critical thinking skills and fostering a sense of accountability (Whitfield et al., 2025), were also realised in this project.

An iterative and agile peer review and course development process where regular, smaller chunks of work are critiqued, instead of a waterfall approach in which a full course would have been developed before any feedback is received, seemed to work better for effective peer learning, as work was improved during each iteration, and the peers also got to know each other's feedback styles and language.

Professional and personal maturity of welcoming critique and seeing it as an opportunity to improve one's work is critical for the success of peer learning. Respectful feedback, in which cultural differences are understood and appreciated, is vital to ensure that the receiving writer responds productively to feedback, thus ensuring peer learning. Honest peer review leads to high levels of peer learning, and in this project also to high quality courses.

Teams working in learning for sustainable development practice can benefit from the above findings and conclusions regarding peer learning, as it will contribute to improved individual and team outcomes. For this purpose, the key insights and lessons from this case study are summarised in Table 1:

Table 1: Key insights and lessons

Realistic expectations	The commitment to peer review and learning needs to be clearly stated in the contracts with writers so that it would not be seen as "extra" work. The mutual learning that occurs through collaborative peer learning is to be stressed from the outset.
Initial input and time	Peer review normally requires more input and time but is normally a shorter route to high quality work.
Respectful interactions	The feedback is to be provided in a respectful way especially when there are diverse participant backgrounds.
Openness to feedback	Respectful interactions and temperate feedback language is essential for continued openness to feedback.
Public critique	The maturity and willingness of writers to have their work publicly critiqued by other writers — especially those they might not have met before such a project — is critical for peer learning.
Dealing with time zones	Times for synchronous meetings with the least disruption should be identified, while asynchronous activities are key to working over time-zones.
Building team culture remotely	Synchronous peer learning and feedback can be used to build a positive and personable team culture.
Overall perspectives	When there are diverse professional perspectives on other writers' work, the project co-ordinator could provide final, overall perspectives.
Nuanced feedback	Should the language of the feedback seem somewhat harsh, the project co-ordinator could guide and provide nuanced feedback.
Need for guidance	The project co-ordinator is not only another "peer" but also need to guide the course development process in a flexible way, to ensure that the objectives are achieved leading to high-quality courses within the targeted timeline. Using learning design

	templates can further provide guidance in creating consistent learning structures for the courses.
Iterative peer learning	An iterative and agile peer review and course development process where regular, smaller chunks of work are critiqued, instead of a waterfall approach in which a full course would be developed before any feedback is received, will work better for effective peer learning, as work is improved during each iteration, and the peers also get to know each other's feedback styles and "peer review language".

Acknowledgements

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Building Sustainable Communities of Practice Through Mentor-Supported OER Development: An Iterative Approach in Pacific STEM Education

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Abstract

This paper examined a data-driven approach to teacher professional development implemented by the Commonwealth of Learning and the Pacific Centre for Flexible and Online Learning for Development across Solomon Islands, Tonga and Fiji in 2024. The blended workshop series was structured into three phases: pre-workshop engagement where participants enrolled in online courses and completed surveys; in-workshop co-creation incorporating participatory learning with mentor-facilitated activities and structured feedback cycles; and post-workshop community participation involving follow-up surveys and ongoing community activities on science, technology engineering and mathematics. Through systematic collection and analysis of participant and mentor feedback, we continuously refined the two-day blended workshop model to better serve the needs of teachers of science, technology engineering and mathematics. The iterative improvement process revealed crucial insights about technology access, mentorship requirements and community building in Pacific contexts. Our experience demonstrates how evidence-based programme adjustments can enhance professional development effectiveness while building foundations for sustainable communities of practice in resource-constrained environments.

Keywords: iterative design, teacher development, blended workshop, open educational resourses (OER), mentorship, communities of practice

Introduction

The Partnership for Open, Distance and Flexible Learning Project, a five-year initiative to enhance Pacific education systems, addresses unique regional challenges including geographical dispersion, limited resources,and the need for culturally relevant materials. The project leverages technology and innovative pedagogies to overcome these barriers while building sustainable communities of practice among educators. The Commonwealth of Learning (COL) and the Pacific Centre for Flexible and Online Learning for Development have implemented several initiatives across nine Commonwealth Pacific countries. This collaboration combines global best practices with local expertise, which has proven essential for developing mentor-based approaches that create lasting educational communities.

One critical workstream focuses on building resilience in Pacific education systems by training at least 500 teachers of science, technology engineering and mathematics (STEM) to use quality improvement tools. These include open educational resources (OER) and national OER Collection Sites — repositories tailored to specific national curricula, languages and cultural contexts (Muthu

& Mays, 2022). COL and the Pacific Centre for Flexible and Online Learning for Development developed an innovative OER for STEM workshop model, initially implemented with the University of the Pacific, Solomon Islands. This blended experience incorporated mentors — local teachers familiar with OER for STEM instruction — connecting participants with experts who understood their specific challenges while fostering sustainable communities of practice.

The workshop employed a three-phase model: pre-workshop engagement with online courses and surveys in-workshop co-creation through mentor-facilitated activities and feedback cycles and post-workshop community participation involving follow-up surveys and ongoing STEM activities. A key innovation was COL's OER Generator powered by artificial intelligence (AI), enabling educators to create curriculum-aligned materials despite technological constraints.

A persistent challenge in professional development, particularly in resource-constrained contexts, is sustaining communities of practice beyond initial interventions. This paper examined how systematic, data-driven programme design centred on mentor-based facilitation can build foundations for sustainable communities of practice among Pacific STEM educators. The research addressed three key questions: How does systematic feedback contribute to sustainable communities of practice? What role does mentorship play in immediate and long-term community engagement? How can AI-powered tools be integrated into mentor-supported models to enhance resource creation and sustainability? Through analysis of data from Solomon Islands, Tonga and Fiji implementations, we share our experience of how iterative improvement can create lasting professional development impact.

Literature Review

This review examined theoretical foundations and practical considerations for building sustainable communities of practice through mentor-supported professional development in Pacific contexts. The theoretical foundation for communities of practice stems from Wenger's (1998, p. 2) work, which defined them as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly". Effective communities require three elements: a shared domain of interest, a community that engages in joint activities and a shared practice where members develop a shared repertoire of resources (Wenger-Traynor & Wenger-Traynor, 2015). However, establishing such communities in geographically dispersed, technologically constrained environments presents unique challenges.

The value of mentorship in teacher professional development is well-established. Walters et al.'s (2020) literature review provides substantial evidence for mentorship benefits for both mentors and mentees, such as improved teaching practices and enhanced professional networks. Chambers et al. (2015) have characterised mentorship as a collaborative partnership where both parties engage as co-learners. Byars-Winston and Dahlberg (2019) have advocated for nurturing mentoring relationships responsive to diverse approaches and environments. In STEM fields, mentorship provides both career-oriented assistance and psychosocial support, vital in shaping professional identity and navigating disciplinary complexities.

Blended learning approaches offer promise for overcoming geographical constraints in professional development. Picciano (2006, p. 96) has defined blended learning as "a wide variety of technology/media integrated with conventional, face-to-face classroom activities", strategically intertwining the two to maximise learning effectiveness. Cleveland-Innes (2018) has emphasised that successful implementation requires informed pedagogical decisions beyond mere technology integration. The appeal lies in flexibility, allowing learners to engage anytime and anywhere while increasing interaction opportunities (Cleveland-Innes, 2018). Jeffrey et al. (2014) have argued that teachers (in our case, facilitators) play key roles in maintaining student (participant) engagement throughout the learning process.

AI-powered content generation represents an emerging frontier in educational professional development. Recent research has highlighted the transformative potential of generative AI in reshaping educational practices (Denny et al., 2024; Holmes et al., 2019; Kasneci et al., 2023), though challenges, including digital adoption barriers and resistance to change, have been identified. In a small-scale study, Lee et al. (2024) found that although 66.6% of their educators had engaged in AI-related professional development, only 12% felt adequately prepared to discuss AI use with students.

Professional development in Pacific contexts faces unique challenges. Bush (2018) has noted that most professional development research originates from developed nations and discusses the challenges of adopting Western paradigms and processes (Bush, 2008). Economic, social and educational challenges restrict professional development provision in these regions. Thonden (2020) has advocated for Pacific-contextualised resources to enhance regional resilience, while Dorovolomo et al. (2023) have emphasised how socio-cultural structures remain central to effective teaching and learning.

Technical capacity represents another significant challenge. Gani et al. (2019, p. 3) found that despite available infrastructure, "an important fact that must be borne in our minds is the need to have teachers versed in using educational technology". Craney (2021, p. 342) noted that in Solomon Islands, "roughly one in three teachers have minimal occupational training".

The literature underscores the need for culturally responsive, relationship-driven mentorship models that incorporate indigenous knowledge systems. Blended learning approaches show potential for overcoming geographical constraints, but realising this potential requires a nuanced understanding of Pacific contexts and systematic approaches to programme development and refinement.

Methods

This study employed an iterative design approach to examine how systematic feedback collection and mentor-based facilitation can build sustainable communities of practice among STEM educators in Pacific contexts. The research methodology was grounded in the COL's findings on effective mentorship within open education ecosystems, which highlighted the effectiveness of blended delivery options in enhancing completion rates and digital literacy among participants (OER Foundation, 2022).

Research Design and Implementation Framework

The research followed a multi-stage implementation across three Pacific countries — Solomon Islands, Tonga and Fiji — with each workshop systematically refined based on comprehensive participant and mentor feedback. This approach enabled continuous programme evolution while maintaining core objectives of OER integration and community building. The methodology incorporated Byars-Winston and Dahlberg's (2019, Chapter 2) theoretical framework of four mentorship stages — initiation, cultivation, separation and redefinition — with our workshops implementing the first three stages systematically across all implementations.

The mentoring approach employed in our workshops drew from emerging co-creative mentoring frameworks that blend traditional hierarchical mentoring with collaborative peer-based learning (Adu-Manu & Ogange, 2025) Specifically, our workshops incorporated three key mentoring methods: (1) traditional one-on-one guidance where experienced OER practitioners provided focused support to participants based on their expertise; (2) collaborative peer mentoring through small group activities where participants engaged in mutual learning and shared problem-solving; and (3) co-creation of knowledge where mentors and participants worked together to develop OER, with mentors facilitating rather than directing the creative process. This hybrid approach aligned with Pacific cultural values of collective learning ("let's make good together") while ensuring structured support for participants navigating new technologies and pedagogical approaches.

Our approach to data collection was comprehensive and multi-layered, occurring at strategic points throughout each workshop cycle. Pre-workshop surveys captured participant expectations, technological readiness, baseline OER knowledge and demographic information that informed workshop customisation. During the workshops, we conducted structured daily feedback sessions that documented real-time experiences, challenges and successes as they emerged. Immediate post-workshop evaluations assessed participant satisfaction, perceived skill acquisition and concrete implementation intentions. Comprehensive two-month follow-up surveys measured sustained engagement, actual classroom implementation and ongoing challenges faced by participants in their home contexts.

Mentor feedback was systematically collected through multiple mechanisms, including dedicated surveys, structured focus groups, and individual reflection sessions after each implementation. This created a comprehensive feedback loop that informed not only immediate workshop adjustments but also fundamental programme modifications for subsequent implementations. The analytical framework employed thematic analysis of qualitative feedback combined with quantitative metrics on participation rates, resource creation outputs and indicators of long-term engagement and community development.

Three-Phase Workshop Model and Evolution

The blended workshop model consisted of three carefully designed phases that evolved significantly across implementations based on systematic feedback integration. This structure was strategically chosen to leverage the benefits of both online and in-person learning modalities while maximising available resources and building sustainable learning communities that could persist beyond the workshop period.

Phase 1: Pre-workshop engagement was conducted online over approximately one week, introducing participants to the workshop's dedicated WordPress site where they could access the complete workshop programme, comprehensive resource lists and detailed mentor profiles. The initiation stage of mentorship began during this phase, with participants introduced to their assigned mentors through detailed biographies, professional backgrounds and profile photographs. This early introduction allowed for initial rapport building and expectation setting before in-person meetings occurred. Participants were required to complete COL's (n.d.) Understanding Open Educational Resources (OER) course, to establish baseline knowledge of OER concepts, benefits, and practical applications. They were also systematically introduced to key resources, including Integrating OER in Teaching: A Guide for Teachers in the Pacific, a comprehensive OER Finding Guide and materials from the Teacher Education in Sub-Saharan Africa project (COL, 2021).

Phase 2: In-workshop co-creation spanned two intensive days, beginning with expert presentations on OER applications in STEM education and comprehensive introductions to national and regional OER Collection Sites. The cultivation stage of mentorship occurred primarily during this phase, with mentors leading subject-specific breakout sessions and small-group discussions while providing tailored guidance, encouragement and individualised problem-solving support. Desktop computers were strategically arranged throughout workshop venues to ensure universal access to workshop materials and online platforms for all participants, regardless of their personal device availability.

The in-person activities were organised around five core thematic areas designed to systematically address workshop learning objectives: comprehensive understanding of OER concepts and their specific benefits for enhancing STEM pedagogy; hands-on exploration of OER Collection Sites and other relevant repositories; collaborative co-creation and strategic implementation planning; practical experience with generative AI tools for OER creation and curation; and comprehensive guidance on accessing ongoing resources for sustained professional learning beyond the workshop period.

Phase 3: Post-workshop community participation began immediately with comprehensive feedback surveys, followed by structured two-month follow-up assessments designed to evaluate long-term impact and practical classroom implementation. This phase placed particular emphasis on sustained community engagement through ongoing STEM-focused activities and continued interaction with AI-powered OER generation platforms. Our initial attempt to establish online discussion forums in the Solomon Islands implementation showed low uptake rates, leading us to refine our approach in subsequent workshops to focus more heavily on mentor-supported community activities rather than technology-dependent platforms.

Participant demographics varied meaningfully across the three implementations, providing valuable insights that informed our programme adaptations. The Solomon Islands workshop attracted 73 participants, with 72% identifying as male and the majority of those who provided age information falling between 31 and 50 years old. Mathematics and biology emerged as the dominant teaching subjects among Solomon Islands participants. The Tonga workshop engaged 46 participants, with 74% identifying as female, and showed particular strength in mathematics and information technology instruction. The Fiji workshop involved 36 participants, including regional attendees from Kiribati, Papua New Guinea, Vanuatu and Samoa, with 58% identifying as male.

Technology emerged as the dominant subject area in Fiji, reflecting different regional educational priorities and needs that informed our curriculum adaptations.

Final Report

Following each workshop implementation, comprehensive documentation was undertaken to capture lessons learned and inform future programme development. An initial report was produced after the Solomon Islands workshop to document the baseline implementation, participant feedback and preliminary findings about mentor-supported OER integration in Pacific contexts. This report was subsequently expanded and rewritten to incorporate data and insights from the Tonga and Fiji workshops, creating a comprehensive final report that documented the complete iterative improvement process across all three countries. The final report development process utilised systematic analysis of all collected feedback data, workshop observations and mentor reflections to identify patterns and extract actionable insights for scaling similar initiatives. Claude AI (Anthropic) was used for proofreading and editing to enhance report cohesion and clarity. This report has been completed and is in the process of getting published.

Claude AI (Anthropic) was also used for this paper for structural reorganisation, editing and condensing to adapt content from a longer research report into a conference paper format suitable for the submission requirements for the 11th Pan-Commonwealth Forum. Claude AI assisted with reorganising existing content to ensure coherent flow between sections. The authors reviewed and verified all AI-assisted modifications to ensure accuracy and alignment with their research findings and intended meaning.

Key Findings

Our systematic data collection across the three workshop implementations gave us some insights into the evolution and effectiveness of the mentor-supported OER professional development model. Through pre-workshop surveys, daily feedback sessions, post-workshop evaluations and follow-up assessments, we gathered comprehensive data from 155 participants and their mentors. This multilayered approach enabled us to track both immediate workshop impacts and longer-term community development outcomes.

The quantitative analysis of participant feedback revealed clear patterns in both successes and challenges, which directly informed our iterative improvements from Solomon Islands through Tonga to Fiji. Table 1 summarises the workshop participation and feedback collection across all three countries, while Table 2 demonstrates feedback categorisation, showing the distribution of 108 analysed feedback responses across key thematic areas.

Table 1: Workshop participants an deedback response summary

Workshop	Participants	Feedback responses collected
Solomon Islands	73	Post-workshop survey responses
Tonga	46	Post-workshop: 61 combined responses Mentor feedback: 3
Fiji	36	Post-workshop: (included in combined) Mentor feedback: 7
Total	155	108 feedback items analysed

Table 2: Feedback themes from participant responses

Feedback theme	% of feedback responses	Example topics
Pre-workshop communication & preparation	17.6%	Earlier notification, access to materials, clearer requirements
Technology & equipment needs	14.8%	Laptop availability, internet connectivity
Positive feedback	11.1%	Workshop quality, valuable experience
Time management	6.5%	Workshop duration, session timing
AI tools & OER generation	6.5%	New tool adoption, feature requests
Mentorship & facilitation	5.6%	Mentor preparation, support quality
Other suggestions	38.4%	Various improvements

These findings reveal three critical areas where the programme evolved significantly: mentorship structures, community-building approaches and OER creation methodologies. The following sections examine each area in detail, demonstrating how systematic feedback integration led to measurable improvements in workshop outcomes.

Mentorship Evolution and Impact

The mentorship model employed across our three workshop implementations demonstrated significant evolution and measurable impact, revealing crucial insights about effective mentor-supported professional development in Pacific contexts. Although our approach did not strictly adhere to established mentorship frameworks, this flexibility proved beneficial. As Byars-Winston and Dahlberg (2019, p. 50) have observed, mentorship literature is "often driven by practical considerations" rather than rigid theoretical adherence.

Our workshops successfully implemented three mentorship stages: initiation during pre-workshop activities, cultivation during intensive workshop sessions and initial separation. However, participants consistently requested ongoing guidance rather than seeking autonomy, indicating successful trust building while highlighting OER integration complexity in technologically challenged environments.

Mentor preparation emerged as critical to success. The Solomon Islands implementation provided minimal mentor training, conducted only on the morning of the first workshop day while participants registered. Post-workshop feedback highlighted significant preparation inadequacies, with several mentors feeling unprepared despite their subject expertise. Based on this feedback,

subsequent workshops incorporated comprehensive pre-workshop mentor training protocols, detailed role descriptions, and session guides developed from Solomon Islands experiences

Despite these improvements, mentor surveys revealed ongoing challenges and mixed preparedness levels. Tonga mentors reported lower confidence with limited pre-workshop meeting participation, compared to Fiji mentors who had higher pre-workshop meeting participation and generally felt more prepared. One mentor specifically mentioned that "knowing the content of the workshop well before" would have made them feel more prepared, and we learned that one of the reasons for low attendance was that our "[notification to] mentors of pre-workshop briefings were done very late" . The variation in preparedness between the different mentor groups highlights the importance of mentor engagement in preparatory activities and flexible support systems.

The effectiveness of our mentorship approach was demonstrated through engagement metrics. All mentors across Tonga and Fiji workshops reported high participant engagement, achieved through culturally appropriate facilitation strategies including open-ended questions, clear objectives and active dialogue-based engagement. When asked about the mentoring aspects that they found the most rewarding, one mentor commented, "the workshop itself was the reward. However, the opportunity to learn and utilise different tools provided in the workshop and incorporate it into the work we do makes it simpler". Analysis of participant feedback revealed that 23.2% of all responses directly addressed mentorship and preparation issues, highlighting the critical importance of mentor support structures (Table 3).

Table 3: Mentorship evolution and impact

Feedback theme	% of feedback responses	Relevance to mentorship
Mentorship & facilitation	5.6%	Mentor preparation, support quality
Pre-workshop communication & preparation	17.6%	Mentor briefings, role clarity

Community Building Experiences and Lessons Learned

Our workshops revealed strong appetite for peer-to-peer learning and collaborative resource sharing among Pacific STEM educators, signalling potential for thriving OER-focused communities of practice. Participants consistently expressed desire for mentor relationships to continue beyond workshops, indicating need for ongoing support spaces where educators could discuss implementation challenges and share strategies.

This desire aligns with Pacific methodologies emphasising collective problem-solving and mutual support. As noted in previous COL research, Pacific educational approaches often embody the principle of "let's make good together — you have something, I have something, let's do this together" (Institute of Education, 2021, as cited in OER Foundation, 2022, p. 8), combined with incorporating indigenous expertise from individuals who understand what works in a local context.

However, our experience demonstrated that simply bringing people together does not automatically create effective communities of practice. According to Wenger-Traynor and Wenger-Traynor (2015, p. 2), effective communities require three elements: commitment to shared

domains, collaborative engagement through joint activities and practitioners who develop "shared repertoires of resources: experience, stories, tools, ways of addressing recurring problems". Although Pacific STEM teachers shared the domain (OER integration) and were practitioners, fostering sustained collaborative engagement proved challenging given geographical distances and technological barriers.

Our attempt to establish online discussion forums following the Solomon Islands workshop provided important lessons about technology-dependent community building. Despite theoretical benefits including opportunities for quieter participants and extended reflection time, forums showed low uptake rates and minimal sustained engagement. Based on this experience, we discontinued online forum components in subsequent implementations.

In contrast, we observed much more successful community building through mentor-facilitated small group activities during in-person sessions. Participants consistently rated collaborative opportunities highly, with Solomon Islands participants averaging just under four and Tonga and Fiji participants averaging closer to 5 on 5-point scales. One participant post-workshop survey response mentioned the group discussions as a way to "gain more knowledge on how to create and formulate lesson plans for a specific level and topic that we need to teach especially those that our students always seem to struggle [with]. The collaborative discussions from other colleagues also help us improve our teaching pedagogies in our respective field". Group discussions and hands-on demonstrations were identified as particularly valuable, suggesting preference for synchronous, facilitated interaction over independent online engagement. Participant feedback related to community building barriers and successes comprised 32.4% of all responses, with technology access and time constraints emerging as key factors affecting collaborative engagement (Table 4).

Table 4: Community-building experiences and lessons learned

Feedback theme	% of feedback responses	Relevance to community building
Technology & equipment needs	14.8%	Barriers to participation
Time management	6.5%	Collaboration time needed
Positive feedback	11.1%	Collaborative activities valued

OER Creation Outcomes and Impact

The workshops demonstrated remarkable productivity in OER creation, with outcomes varying significantly based on tools and approaches employed. The Solomon Islands workshop, focusing on exploration and contribution to national OER Collection Sites, produced 28 distinct submissions spanning Grades 7≠12. Lesson plans emerged as the dominant content type, representing 20 of 28 submissions, indicating participants' preference for immediately implementable classroom resources.

Subject matter distribution revealed insights and challenges in resource categorisation. Science and mathematics were the primary subject areas represented, though the absence of controlled taxonomy led to inconsistent classifications. Some participants chose broad categorisations like "Science", while others selected specific designations such as "Physics". Notably, no materials were explicitly categorised as "Engineering" resources, suggesting either subsumption under broader

categories, fewer engineering teachers among participants, or genuine scarcity of engineering-focused OER suitable for local contexts.

The introduction of COL's AI-powered OER Generator in Tonga and Fiji workshops represented a significant shift from curating existing resources to actively generating new materials. This innovation led to creation of over 150 OERs across both workshops in just four days, demonstrating remarkable teacher adaptability despite receiving only introductory training. As one participant noted, the use "of AI-Powered OER was very helpful since this is the first time for [them using] OER and [they found] it very helpful… especially in the classroom so that there will be less time for planning [and] more time to look for the OER".

However, publication outcomes varied dramatically between locations. Although Tonga participants unanimously utilised the AI platform and created teaching materials across various topics, none progressed to official repository publication. In contrast, Fiji achieved concrete success with 25 resources successfully completing the publication process. This variation suggests important differences in support structures, understanding of requirements or technological comfort levels.

Quality assessment revealed that AI-generated resources demonstrated curriculum alignment and local relevance, with teachers engaging in sophisticated discussions about platform capabilities and limitations. Teachers identified technical improvements needed, including reliability of AI-generated citations and requests for advanced features like AI-generated images and mathematical notation support. These discussions demonstrated teachers' positioning as informed stakeholders rather than passive technology consumers.

The resource creation process significantly enhanced participant confidence and skill development. Post-workshop surveys indicated majority of participants felt highly prepared to engage with national OER Collection Sites and implement OER strategies learned during workshops. Participants planned various implementation steps including training other teachers and students about OER, finding additional resources and creating original materials to share with colleagues.

Long-term follow-up revealed sustained engagement with created resources. Of six Solomon Islands final survey respondents, four had tried using resources shared during workshops, with all four completing the Understanding Open Educational Resources (OER) course and two using regional and national OER Collection Sites. This sustained engagement indicated successful knowledge retention and practical application in classroom contexts. Feedback specifically addressing OER creation tools and barriers represented 21.3% of responses, reflecting both enthusiasm for new AI-powered generation tools and persistent technology challenges (Table 5).

Table 5: OER creation outcomes and impact

Feedback theme	% of feedback responses	Relevance to OER creation
AI tools & OER generation	6.5%	Tool adoption, features
Technology & equipment needs	14.8%	Creation barriers

Discussion: Implications for Sustainable Communities of Practice

The systematic evolution of our workshop model across three Pacific countries provides crucial insights for developing sustainable communities of practice in resource-constrained educational environments. Our experience demonstrates that effective community building requires careful balance between technological innovation and human-centered support systems, with mentorship serving as a critical bridge connecting individual professional learning to sustained collaborative practice.

The theoretical implications for communities of practice literature are significant. While Wenger's foundational framework remains relevant, our research reveals that in geographically dispersed, technologically constrained contexts, the cultivation phase of community development requires more intensive, structured support than traditional models suggest. The contrast between our failed technology-dependent community-building efforts (online forums) and the success of mentor-mediated collaborative activities indicates that digital tools alone cannot substitute for relationship-based community foundations, particularly in cultures valuing personal connections and collaborative problem-solving.

Our experience with mentor-based approaches provides important practical insights for community development and shows some potential issues with sustainability. The evolution from minimal mentor preparation in Solomon Islands to comprehensive training protocols in subsequent workshops demonstrated measurable improvements in participant engagement, resource creation outcomes and expressed desire for continued collaboration. However, our experience also revealed that even well-designed mentor support systems require ongoing refinement, with communication gaps persisting despite comprehensive documentation and support structures.

Technology integration in resource-constrained environments presents complex challenges requiring multifaceted solutions. The success of AI-powered OER generation demonstrated Pacific educators' remarkable adaptability when supported by appropriate mentorship and training. Although participants showed enthusiasm for AI-generated content creation and sophisticated understanding of limitations, persistent challenges of connectivity, device access, and institutional support highlight that technological solutions require accompanying infrastructure and support to achieve sustainability.

Cultural considerations proved essential for community building effectiveness. The alignment between Pacific collaborative methodologies ("let's make good together") and communities of practice principles created natural foundations for peer learning. However, cultural alignment alone did not automatically translate to sustainable communities; systematic support structures, technological accessibility and ongoing facilitation remain necessary for long-term success.

Conclusions and Recommendations

Our experience implementing OER workshops across three Pacific countries demonstrates that systematic, data-driven approaches to professional development can build foundations for sustainable communities of practice among STEM educators in challenging contexts. The iterative

improvement methodology, centred on mentor-based facilitation and responsive design, yielded measurable improvements in participant engagement, resource creation and community development indicators.

Key Findings

Mentorship, whether peer, coaching, or collaborative, emerged as a powerful potential foundation for sustainable professional development in resource-constrained environments. The evolution from minimal mentor preparation to comprehensive training protocols resulted in enhanced satisfaction and a stronger desire for continued collaboration. Participants consistently requested ongoing mentor relationships rather than autonomy, indicating successful trust building while highlighting the complexity of OER integration in technologically challenged contexts.

A consistent challenge was to support the mentors so that they felt informed, supported, and prepared. Preparing guidance documentation to clearly outline the workshop session objectives, outcomes, and the role that the mentor would be taking was a large improvement to the workshop delivery. Once these documents were made, they required minimal adaptation for use in subsequent workshops and publishing them under an open licence would further enhance their usability in more Pacific countries and other regions of the Commonwealth. Organising mentor meetings to go through these documents allows space and time for mentors to ask questions and request clarification.

Community building revealed a strong appetite for collaborative learning among Pacific STEM educators, though online platforms alone proved insufficient for sustained engagement. Success emerged through mentor-facilitated activities leveraging cultural preferences for dialogue-based collaboration and locally relevant resource creation.

AI-powered content generation demonstrated remarkable educator adaptability, with over 150 resources created across four workshop days. However, varying publication success rates highlighted the importance of supportive institutional frameworks and ongoing technical assistance for sustainable technology adoption.

Practical Recommendations

For educational leaders
We recommend investing in comprehensive mentor training including pre-workshop preparation, ongoing support, and post-workshop community-building activities. Educational leaders should develop systematic feedback collection mechanisms enabling responsive programme modification and prioritise technology infrastructure improvements alongside professional development initiatives.

For professional development designers
We recommend implementing multi-stage programme structures incorporating pre-engagement, intensive facilitation, and sustained community participation phases. Design iterative improvement frameworks enabling systematic programme evolution based on comprehensive data collection and analysis. Balance technological innovation with human-centred support systems.

We recommend developing cultural competency in Pacific collaborative methodologies, incorporating indigenous knowledge systems into community-building approaches. Create multiple engagement pathways accommodating varying technological access levels and establish ongoing support structures extending beyond initial workshop periods.

Limitations and Future Research

This study's focus on three Pacific countries limits generalisability, though the systematic methodology provides replicable frameworks for similar contexts. Low response rates for the long-term follow-up survey (8% in Solomon Islands) prevents a comprehensive assessment of sustained impact.

Future research should include comparative analysis of community sustainability factors across diverse contexts, longitudinal studies tracking teacher practice changes, investigation of optimal mentor-to-participant ratios and analysis of institutional factors supporting sustained community participation.

Our approach offers valuable frameworks for educational leaders seeking to implement responsive, participant-centred professional development. By prioritising mentorship, cultural responsiveness, and iterative improvement, educational programmes can create lasting impact in building sustainable communities of practice in challenging contexts.

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