Research Article

Mathematics Education Lecturers' Experiences in Supervising Online Teaching Practice Lessons: An Ubuntu Approach

Kereng Gilbert Pule[1]* iD

Sophy Mamanyena Kodisang[2] iD

Rosina Nkadi Ngoako[3] iD

AFFILIATIONS

[1,2&3]Department of Mathematics Education, University of South Africa, Pretoria, South Africa.

CORRESPONDENCE

Email: pulekg@umisa.ac.za*

Abstract: This study documents mathematics education lecturers' experiences supervising pre-service teachers' lesson presentations in various schools across South Africa to maximise their support. The convergent conversation focuses on the lived experiences of ten mathematics education lecturers during an online teaching practice at an Open Distance and e-learning (ODeL) university. This qualitative case study draws on Ubuntu pedagogy, which promotes positive community relations grounded in the principles of collaboration, cooperation, coordination, interdependence, and kindness within the techno-educational landscape. Data were collected using classroom observations. The study explores fostering a collaborative culture through innovative approaches to enhance lesson presentations, benefiting future in-service teachers and learning environments. The findings shed light on the significance of cultivating a culture of collaboration among mentor teachers and pre-service teachers to enhance pedagogical strategies and ultimately improve techno-educational outcomes. The findings reveal that overcrowded classrooms and insufficient teaching resources impede effective instruction and learning; resource constraints underscore fundamental inefficiencies in educational planning and infrastructure, while insufficient support from mentor teachers and lecturers constrains the professional growth of pre-service teachers. Other challenges relate to inadequate ICT integration and unstructured lesson planning. These challenges may be mitigated through the implementation of well-structured pre-session interactions with pre-service teachers. The practical implications emphasise the significance of reflective practice in educational research, particularly for insider researchers. Effective pedagogical mentoring and the amalgamation of domain expertise with instructional methodologies embody Ubuntu's principles of guidance and communal knowledge.

Keywords: ODeL university, teaching practice, pre-service teachers, Ubuntu pedagogy, online supervision.

1. Introduction

A notion of ubuntu or botho is a South African concept for human interdependence, which relates to activities such as citizenship, social responsibility, collaboration, kindness, and awareness of uniqueness within the techno-educational landscape. This concept is intertwined with work-integrated learning or teaching practice in South African universities (Bhengu, 2006; Blackwood, 2018; Ngubane & Makua, 2021; Ukpokodu, 2016). Nonetheless, although these principles are recognised in educational discourse, their incorporation into the supervision of online teaching practice remains insufficiently examined. Recent research (Blackwood, 2018; Freeman et al., 2014; Ukpokodu, 2016) highlights educational methods that prioritise the viewpoints and knowledge of pre-service teachers; nevertheless, there is a lack of critical analysis regarding the translation of these perspectives into substantive online teaching experiences.

These perspectives are challenging traditional educational approaches in teacher education, arguing that lecturers should not serve as the 'sage on the stage' in imparting knowledge to students (Schmidt

et al., 2015; Whiting, 2001). The alternative approach in pedagogical theory is defined by Whiting as a mindset that focuses adequately on humans (Whiting, 2001). This learner-centred approach requires a reassessment of the responsibilities of lecturers in supervising online teaching practice. According to Whiting, pre-service teachers can achieve superior outcomes in the learning process by creating multiple pathways for learning, acknowledging that 'one size does not fit all' (or even most) during their teaching practice (TP) period (Whiting, 2001).

These approaches necessitate an instructional strategy that prioritises the interests and abilities of pre-service teachers. The objective of TP is to support and enhance the autonomy, responsibility, and learning outcomes of pre-service teachers (Trinidad, 2015; O'Neill et al., 2005). Pre-service teachers have the autonomy to submit the schools of their choice to the TP office at this ODel institution for placement. Nonetheless, online supervision presents novel issues, such as diminished lecturer participation, absence of prompt feedback, and the depersonalisation of educational experiences.

To adequately address these issues, it is imperative to reference self-determination theory (SDT) (Deci et al., 2000), which acknowledges autonomy as a fundamental necessity for all individuals and vital for optimal motivation, integration, and well-being during the TP period in the selected schools. Although SDT offers a helpful framework, the strategies for maintaining and improving autonomy in online supervision have yet to be investigated. The involvement of pre-service teachers (Lea et al., 2003; McCabe & O'Connor, 2014), autonomy (McCabe & O'Connor, 2014), the acceptance of the freedom to err, and the profundity of learning (Lea et al., 2003; McCabe & O'Connor, 2014) seem to be interconnected with this possibility. Despite theoretical assertions, the manifestation of these aspects in the online supervision of TP is limited, especially in the South African context. Our article covers the supervision experiences in the TP programme, which aims to challenge and reorient existing pedagogical practices, with particular emphasis on connecting with pre-service teachers' classroom support and thinking.

According to pre-service teachers in Trinidad (2015) and O'Neill et al. (2005), being more involved in planning learning activities yields better educational outcomes. The primary role of the lecturers and mentor instructors in this methodology is to facilitate and enhance learning to accomplish the designated outcomes. Mentor instructors ought to facilitate and support pre-service teachers in their educational journey rather than monopolising the classroom and positioning themselves as the principal source of knowledge. However, online learning settings may impede such engagement by restricting direct connections with mentors. The extent to which Mathematics education lecturers address this difficulty using Ubuntu-driven pedagogical practices is inadequately investigated.

Even though numerous pre-service teachers are confronted with pressures to excel during online TP supervision, the literature reveals a prevailing tendency towards increased dependence on technology and online platforms across various electronic practices (Bhuda et al., 2024; Davids et al., 2023; Robinson & Rusznyak, 2020). In our opinion, it is essential to pay more attention to maximising pre-service teachers' support using the Ubuntu approach. Despite the growing transition to online TP supervision, a gap persists in understanding how Ubuntu principles might be effectively implemented to cultivate a sense of community, collective learning, and interdependence.

This study seeks to address this gap by rigorously analysing how Mathematics education lecturers manage online supervision while adhering to Ubuntu-driven pedagogical principles. This aims to elucidate the structuring of online TP supervision to enhance lecturer and student engagement in a digitally mediated context.

1.1 Research questions

Our argument revolves around the central question of how Mathematics education lecturers' experiences in supervising online Teaching Practice Lessons can maximise pre-service teachers' support using the Ubuntu approach. We unpacked it with these sub-questions:

- What are your lived experiences as a Mathematics education lecturer during online TP at ODeL?
- How can Mathematics education lecturers support the improvement of lesson preparations and presentations of pre-service teachers?
- How can we improve the pedagogical strategies and the techno-educational outcomes?

2. Literature Review

Ubuntu pedagogy is defined as a "humanising approach to teaching" that cultivates a learning environment in which pre-service teachers are accorded dignity, irrespective of their backgrounds (Blackwood, 2018; Ukpokodu, 2016). The idea of Ubuntu, expressed in the phrase 'umuntu ungumuntu ngabantu' (a person is a person via other persons), underscores the interdependence between mathematics education lecturers and pre-service teachers as collaborative knowledge providers. Adopting Ubuntu principles can enable mathematics education instructors to address exclusion and promote inclusive teaching methods that improve pre-service teachers' self-esteem and performance (Phasha, 2016).

Even though numerous pre-service teachers are confronted with pressures to excel during online TP supervision, the literature reveals a prevailing tendency towards increased dependence on technology and online platforms across various electronic practices (Davids et al., 2023; Bhuda et al., 2024; Robinson & Rusznyak, 2020). However, existing research often overlooks how these technological adaptations affect the relational dynamics between lecturers and pre-service teachers, particularly within an Ubuntu framework. Additionally, challenges such as depersonalisation, lack of immediate feedback, and reduced social engagement pose risks to student-teacher interaction (Wake & Burkhardt, 2013).

Despite the growing body of literature on online learning in teacher education, there is a lack of critical engagement on how Ubuntu pedagogy is practically implemented in online TP supervision. Current studies (Davids et al., 2023; Bhuda et al., 2024) emphasise pedagogical approaches that prioritise pre-service teachers' perspectives and knowledge, yet there is minimal exploration of how these perspectives translate into meaningful online teaching experiences. Additionally, while self-determination theory (Deci et al., 2000) emphasises autonomy as fundamental to motivation, research has yet to address how autonomy is maintained in digital environments where supervision may be less interactive.

Ubuntu pedagogy is defined as a "humanising approach to teaching" that cultivates a learning environment in which pre-service teachers are accorded dignity, irrespective of their backgrounds (Blackwood, 2018; Ukpokodu, 2016). The idea of Ubuntu, expressed in the phrase 'umuntu ungumuntu ngabantu' (a person is a person via other persons), underscores the interdependence between mathematics education lecturers and pre-service teachers as collaborative knowledge providers. Adopting Ubuntu principles can enable mathematics education instructors to address exclusion and promote inclusive teaching methods that improve pre-service teachers' self-esteem and performance (Phasha, 2016).

2.1 Conceptual framework

This study is grounded in Ubuntu pedagogy, emphasising cooperation, inclusion, and interdependence as fundamental concepts for cultivating supportive connections among pre-service teachers, mathematics education lecturers, and mentor teachers. The study incorporates the Technology, Pedagogy, and Content Knowledge (TPACK) framework (Pule, 2020) to assess how pre-service teachers integrate ICT into their teaching. Additionally, self-determination theory (Deci et al., 2000) is used to examine how autonomy, competence, and relatedness are supported in online supervision. By integrating these frameworks, this study provides a structured analysis of how mathematics education lecturers navigate online supervision while upholding Ubuntu-based

pedagogical principles. This conceptual approach also helps bridge the identified gaps in the literature by offering a practical lens to explore the complexities of online teaching practice supervision. This study aims to contribute to discussions on how online teaching practice supervision can be structured to enhance both student learning and lecturer engagement in a digitally mediated environment.

3. Methodology

The supervision in this study involves fourth-year and postgraduate certificate in education (PGCE) student teachers. A qualitative descriptive case study design was adopted to illustrate the natural events that occurred during online lesson presentations by pre-service teachers (Siedlecki, 2020). The research aimed to explore and analyse a single case to capture the complexities of online supervision. As Aguboshim (2021) notes, qualitative research prioritises in-depth exploration over inferential analysis, making the careful selection of a sample size crucial for achieving reliability and validity. In line with this, ten mathematics education lecturers were purposively selected for their extensive experience and expertise in supervising student teachers in an Open Distance e-Learning (ODeL) environment (Akkaş & Meydan, 2024; Yildiz & Arpaci, 2024). All 14 lecturers in the department were invited to participate, but only 10 consented. These participants were chosen through judgemental sampling due to their deep content knowledge, pedagogical insights, and sustained engagement with online teaching practice sessions (Creswell & Creswell, 2018; Douglas, 2022; Merriam & Tisdell, 2015; Wilson et al., 2016).

Data were collected exclusively through online classroom observations. Researchers analysed video recordings capturing interactions between lecturers and pre-service teachers during lesson presentations and post-lesson feedback sessions. This observational method enabled the researchers to document authentic supervisory practices in real-time. As Creswell and Creswell (2018) defined, observation supports the systematic collection and analysis of accurate information in qualitative inquiry. Thematic analysis, as outlined by Braun and Clarke (2006), was used to identify and report recurring themes in the data. The process began with open coding, followed by categorisation into a final coding framework (Braun & Clarke, 2023). The researchers compared individual findings to establish a consensus on core themes. This method aligns with Cohen's (2018) principles of qualitative observation, allowing for a comprehensive interpretation of supervision practices within a naturalistic setting.

3.1 Ethical considerations

The College of Education Ethical Committee granted ethical approval for the project with an ethical clearance number 2021/11/10/90194969/41/AM. Participants were apprised of the study's objectives and methodologies, with guarantees of voluntary participation and the freedom to withdraw at any moment while underscoring data confidentiality and anonymity. Rigorous measures, including anonymity via unique identification codes, were implemented to safeguard participants' rights and maintain transparency and confidence during the research. This was implemented to avert individuals from experiencing negative consequences in social, economic, or psychological domains (Kang & Hwang, 2023).

4. Data Presentation and Analysis

The data collected was thoroughly analysed, with valuable insights from observations. These insights were further illustrated through visual representations, as depicted in the accompanying pictures. The themes from the data are indicated in each picture's heading. The selected pictures not only helped to clarify and reinforce a deeper understanding of the topic. This combination of qualitative data and visual evidence provided a comprehensive view of what was observed by the participants.

4.1 Lived experiences of mathematics education lecturer during online TP at ODeL

This section addresses research question number one by analysing three distinct pictures. Picture one depicts the challenges of overcrowded classrooms and mentoring; picture two shows systematic learner support; picture three illustrates limited access to and use of teaching resources; and picture four confirms excessive workload.
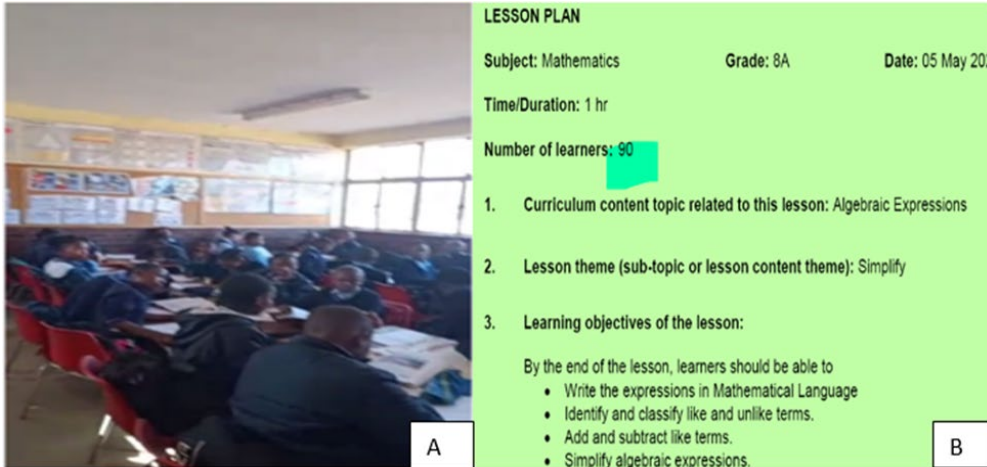

***Pictures 1**: Challenges of Overcrowded Classrooms and Mentoring*

Overcrowded classrooms (***see Picture A and the number of learners as indicated in Picture B***) underscore a systemic problem in resource distribution, hindering lecturers and pre-service instructors from facilitating effective teaching and learning environments. The deficiency of physical and human resources is apparent, as mentor instructors are frequently unavailable. This compromises collaborative initiatives and fosters a disordered atmosphere in which learners find it difficult to concentrate. Overcrowding restricts the ability to employ personalised or group-oriented learning methodologies, thereby diminishing educational quality.
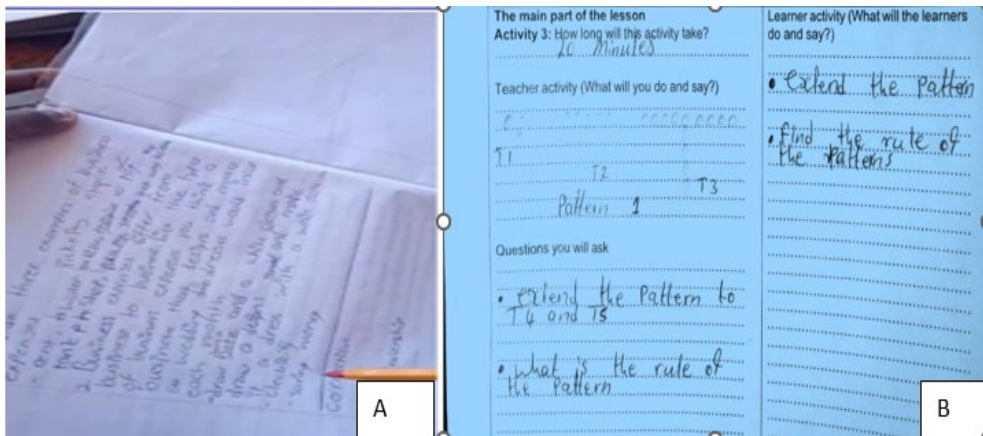
***Pictures 2**: Systematic learner support*

The engagement of pre-service instructors in grading and assisting students with spelling and error analysis (Picture A & B) demonstrates their active participation in classroom activities. However, the lack of systematic instruction and support from mentor teachers makes them susceptible to mistakes. The activity captured by the pre-service teacher does not align with the given instructions, illustrating a deficiency in mentorship. This underscores the necessity for ongoing support from seasoned educators to ensure appropriate intervention and learning outcomes.
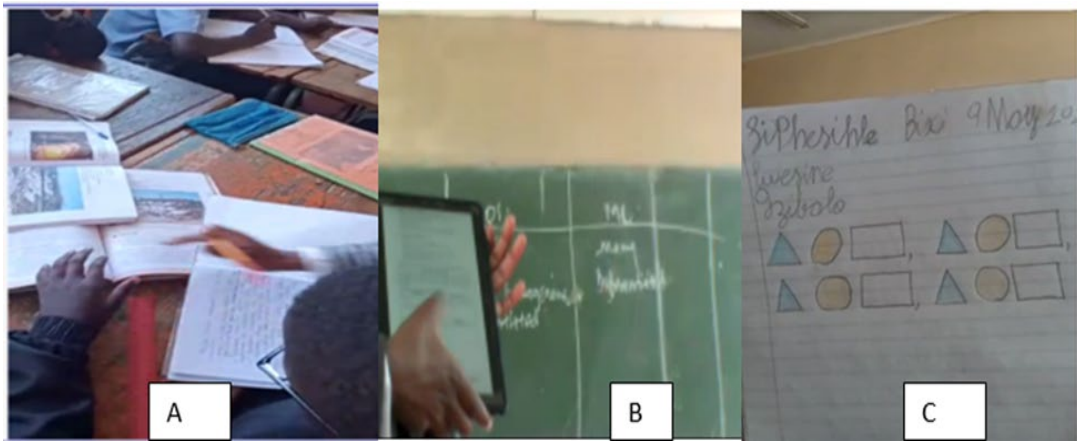
Pictures 3: *Limited access and use of teaching resources*

The restricted utilisation of mathematical (***Picture A & C***) instruments indicates inadequate access to vital tools and insufficient training in their use. For example, the four-sided figures may not necessarily be rectangles unless the correct instrument is used to verify the dimensions. Secondly (***Picture B***), the pre-service teacher was using his tablet for reference while the students were simply listening. This deficiency impedes pre-service teachers' capacity to conduct interactive and stimulating classes, highlighting the necessity for resource allocation and skill enhancement. The absence of instructional materials in classrooms indicates inadequate infrastructure and preparation. Pre-service teachers encounter difficulties in presenting engaging classes without crucial tools such as visual aids, manipulatives, or electronic devices. This constraint hampers learners' comprehension and recall of mathematical concepts, emphasising the necessity for careful resource allocation.

| Grade 8E1										
PERIOD NUMBER	**0**	**1**	**2**	**3**	**B R K**	**4**	**5**	**B R K**	**6**	**7**
TIME	07:30-07:50	07:50-08:40	08:40-09:30	09:30-10:20		10:40-11:30	11:30-12:20		12:50-13:40	13:40-14:30
Day 1	Register	HL	LO	EMS		MATH	NS		FAL	TECH
Day 2	Register	FAL	HL	LO		MATH	CA		SS	CORO
Day 3	Register	TECH	FAL	EMS		NS	SS		MATH	HL
Day 4	Register	MATH	CA	FAL		SS	HL		CORO	LO PE
Day 5	Register	CA	NS	HL		SS	LO		MATH	FAL
Day 6	Register	EMS	NS	MATH		TECH	FAL		CORO	HL

Picture 4: Excessive workload

Pre-service teachers frequently experience an excess of administrative and instructional duties during online teaching practice sessions. This undermines their capacity to deliver prompt and substantive feedback to pre-service teachers. The increased workload diminishes their principal responsibilities of mentoring and helping students, thereby lowering the overall quality of TP supervision.

4.2 Lecturers' support for lesson preparations and presentations of pre-service teachers

This section addresses research question number two by analysing two illustrative sets of images. Picture five reveals' issues in chalkboard usage, illustrating poor visual organisation, inadequate training in the use of classroom materials, and the resulting barriers to learner focus. Picture six explores difficulties in developing effective lesson plans, highlighting the importance of systematic planning. It exposes gaps in mentorship and instructional coherence, underscoring the need for improved guidance, consistent

supervision, and focused professional development to enhance lesson delivery and preparedness among pre-service teachers.
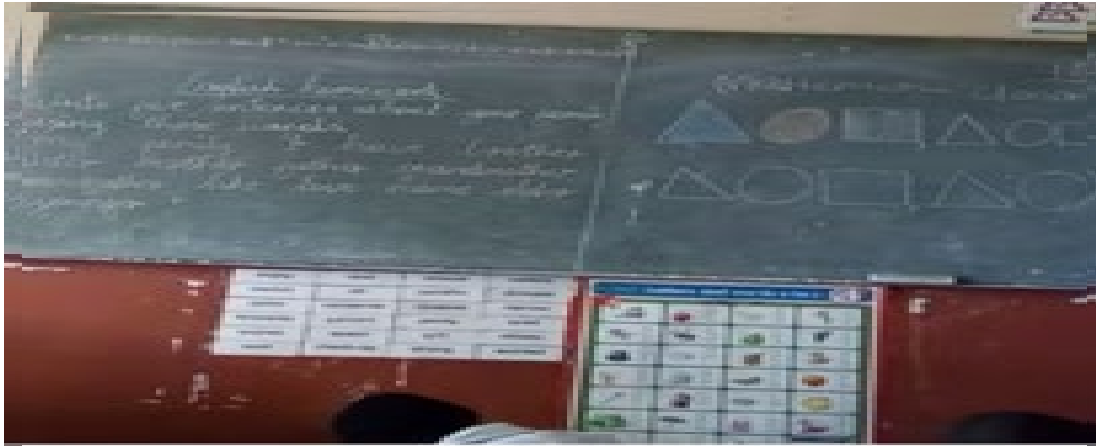
Picture 5: *Poor chalkboard work…. writing on a dirty board with different subjects in the middle of the board, drawing with hand*

Substandard blackboard execution indicates insufficient preparation and restricted access to training in efficient visual communication. Utilising a soiled board and employing disorganised techniques hinders learners' concentration and understanding. This signifies a necessity for professional advancement in the appropriate utilisation of classroom materials. Learners see many things that are relevant to the subject during the lesson presentation. Certain learners interact with pertinent topic matter throughout lessons, suggesting the possibility of effective pedagogical methods. Nonetheless, the varied execution of these tactics indicates disparate levels of readiness and assistance among pre-service educators. This underscores the necessity for unity and guidance.
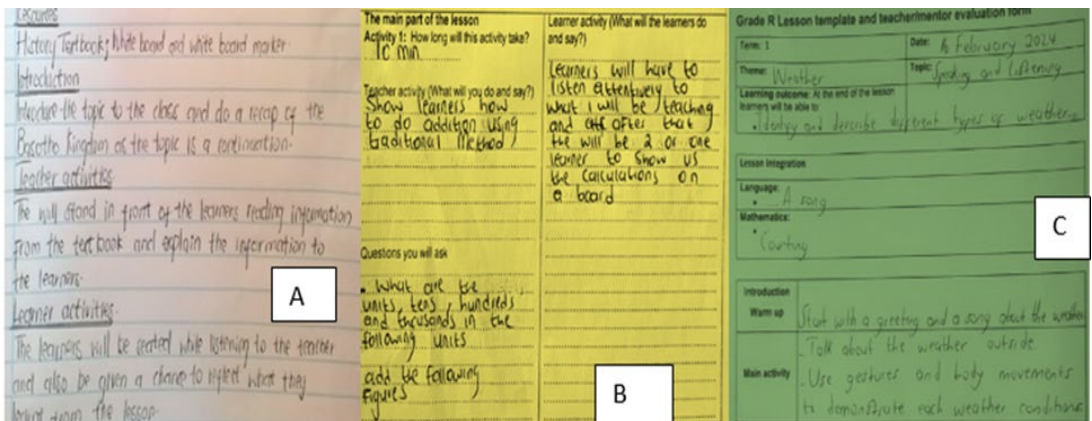
Picture 6: *Challenges in student ability to develop comprehensive lesson plans*

Incomplete lesson plans (Picture A) indicate a lack of systematic direction in class preparation. Furthermore, in Picture B, the pre-service teacher omitted the figures, despite the question being centred around them. Similarly, in Picture C, the pre-service teacher referenced "a song" in the language section. Without a defined framework, pre-service instructors struggle to provide coherent and impactful lessons. This highlights the need for training and mentorship focused on lesson planning. Unfinished lesson plans reflect systemic difficulties. The absence of mentorship from experienced instructors and inadequate infrastructure exacerbate these challenges, hindering pre-service teachers from implementing successful instructional practices.

4.3 Improving the pedagogical strategies and the techno-educational outcomes

This section addresses research question number three by analysing three images that reflect the intersection of pedagogy and technology integration in schools. Picture seven highlights the limitations of using a cell phone to capture classroom teaching in a teacher-centred environment, indicating challenges in learner engagement and holistic representation. Picture eight shows a systemic failure in resource delivery, with technology remaining inaccessible. Picture nine demonstrates the underutilisation of laptops due to missing software and a lack of planning. These images reveal the pressing need for effective resource allocation, stressing the urgency for strategic planning and capacity-building for techno-pedagogical advancement.

Picture 7: Using a cell during a lesson showing a small part of the class in a teacher-centred classroom

The utilisation of cell phones to depict a limited segment of the classroom during teacher-centred instruction underscores the constraints of technology in specific circumstances. This approach diminishes engagement and inadequately reflects the comprehensive nature of classroom dynamics, highlighting the necessity for improved technical resources and training.
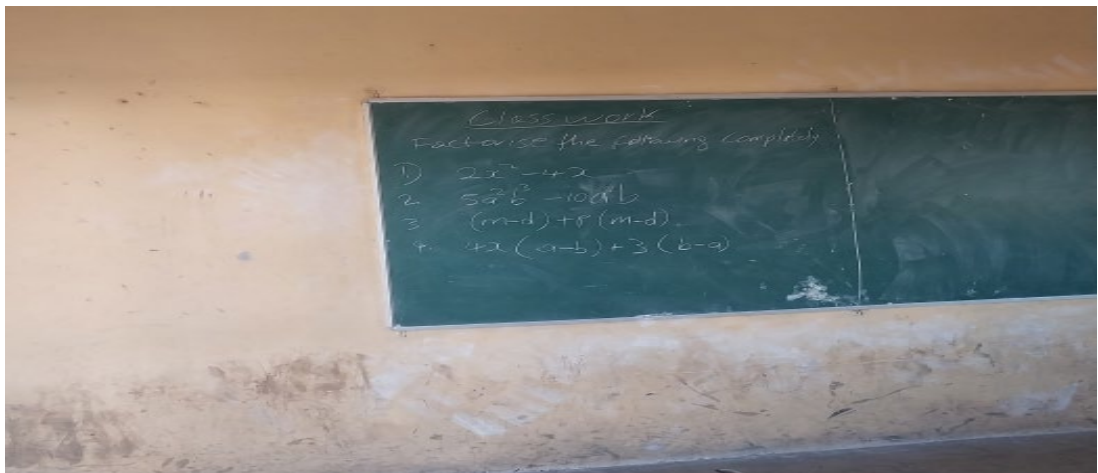
Picture 8: Laptops and whiteboards were procured but never arrived at the school, but schools prefer the use of blackboards only

The presence of unused computers and whiteboards, attributable to systemic inefficiencies, signifies inadequate planning and resource management. The predilection of schools for traditional instruments such as blackboards exacerbates this issue, constraining the possibilities for innovation in pedagogical methods.

Picture 9: Laptops without software gathering dust in the principal's office for over 5 years

Laptops devoid of software and accumulating dust in principals' offices exemplify the difficulties of integrating ICT in educational institutions. This situation highlights the necessity of incorporating technology into the curriculum and ensuring that resources are operational and available. It also stresses the importance of regular evaluations and strategic planning to avoid resource waste and optimise their instructional efficacy.

5. Discussion of Findings

The discussions of the results were done based on the research questions to show that they were answered for clarity and understanding.

Question 1: What are your lived experiences as a mathematics education lecturer during online TP at CODeL?

The experiences of lecturers during online teaching practices expose systemic inefficiencies, such as overcrowding, resource deficiencies, and high workloads. Classroom overcrowding, as emphasised by Wake and Burkhardt (2013), diminishes teaching efficacy and intensifies stress for both instructors and pre-service educators. Overcrowded classrooms with insufficient teaching materials hinder effective teaching and learning. Resource restrictions highlight inherent inefficiencies in educational planning and infrastructure. These constraints impede the implementation of learner-centred pedagogical techniques, necessitating equitable resource allocation and deliberate investment in education. This issue compromises the tenets of Ubuntu's educational philosophy, which prioritises collective responsibility and reciprocal assistance. The absence of instructional aids and resources hampers the execution of creative ideas, resulting in an inequitable learning environment that disproportionately impacts underprivileged schools.

Furthermore, the heavy workloads cited by lecturers underscore the structural mismatch in their employment, where administrative responsibilities frequently overshadow substantive coaching. Ngubane and Makua (2021) assert that the Ubuntu ideology promotes collaborative methods that emphasise human interdependence and reduce individual obligations. The lack of institutional support systems undermines lecturers' capacity to promote collaboration effectively. A holistic approach grounded in Ubuntu pedagogy and Self-Determination Theory (Deci & Ryan, 2000) is necessary to confront these challenges. These frameworks advocate for improved resource allocation, organised mentorship initiatives, and equitable workload distribution. By enacting these modifications, lecturers can more effectively assist pre-service teachers, fostering a more equitable and efficient teaching practice environment.

Question 2: How can maths education lecturers support the improvement of lesson preparations and presentations of pre-service teachers?

Assisting pre-service teachers in class preparation and execution necessitates a comprehensive strategy grounded in both theoretical and practical frameworks. The TPACK paradigm, as articulated by Pule (2020), emphasises the amalgamation of technology, pedagogy, and subject knowledge as crucial for preparing pre-service teachers with the competencies required to operate in contemporary classrooms. This approach ensures that lecturers may proficiently employ technology while upholding robust educational ideals and subject matter expertise.

The incorporation of Ubuntu pedagogy, which prioritises cooperation, mutual support, and community, fosters a nurturing environment that promotes the growth and development of pre-service teachers. Workshops and mentorship programmes can significantly improve the issues encountered by pre-service teachers, including inadequate lesson planning and substandard blackboard work, as illustrated in Pictures 2.1 and 2.4. Ngubane and Makua (2021) assert that mentorship rooted in Ubuntu values cultivates a culture of collective accountability and perpetual learning. The quality of teaching is negatively impacted by both a lack of proper lesson plans and unstructured planning, which leads to insufficient preparation. To tackle this issue, pre-service teachers need organised training and workshops on effective lesson planning that incorporates the TPACK framework. This will enhance lesson delivery and the overall effectiveness of instruction.

Moreover, addressing systemic challenges such as overcrowded classrooms and insufficient resources, as emphasised by Wake and Burkhardt (2013), necessitates a cooperative endeavour among all stakeholders. Establishing collaborations among lecturers, mentor teachers, and pre-service teachers helps create a unified support structure. This approach enhances lesson quality while adhering to the ideals of Ubuntu pedagogy, ensuring that teaching practices are inclusive, egalitarian, and successful.

Question 3: How can we improve the pedagogical strategies and the techno-educational outcomes?

Enhancing pedagogical strategies and techno-educational outcomes necessitates tackling the digital gap and fostering technological fairness. The literature indicates that the digital gap is not solely a technology concern but also a social and pedagogical difficulty (Mhlanga & Moloi, 2020). The ideals of Ubuntu pedagogy, which prioritise inclusivity and mutual support, provide a transformative framework for addressing these challenges.

Training and resource allocation are critical elements in closing the divide between accessible tools and their efficient utilisation. Pule (2020) asserts that the TPACK framework offers a holistic methodology for the integration of technology, pedagogy, and content knowledge. Educational institutions can ensure the proper utilisation of technological tools to improve teaching and learning outcomes by providing pre-service teachers with these competencies. Insufficient integration of ICT leads to limited access to functional technology, thereby exacerbating the digital divide and affecting lesson planning and delivery. Resolving this issue necessitates comprehensive training in the TPACK framework and improved resource management.

Furthermore, strategic planning and continuous professional development can rectify systemic inefficiencies that result in the underutilisation of resources, exemplified by laptops accumulating dust in principals' offices (Image 3.3). By promoting a culture of innovation, pre-service teachers can re-evaluate conventional teaching methods and adopt collaborative strategies that enhance technological integration. Utilising Ubuntu pedagogy to foster relationships among lecturers, students, and the wider community enables schools to establish a more inclusive and supportive educational atmosphere. This strategy not only meets current technology requirements but also fosters a sustained dedication to justice and excellence in education. Ngubane and Makua (2021)

contend that collaborative approaches are essential for closing the digital divide and fostering sustainable educational reform.

6. Conclusions

The challenges in online teaching practice originate from structural problems, such as insufficient resource distribution, mentorship, and ICT integration. Overcrowded classrooms and inadequate teaching aids significantly hinder the efficacy of the learning environment, impeding pre-service teachers' ability to implement pedagogical theories in practice. The lack of formal mentorship deprives pre-service teachers of crucial assistance, hindering their confidence and professional development.

The incorporation of ICT represents a significant deficiency, as unused technological resources intensify the digital divide and impede new pedagogical methods. In the absence of adequate training and access to functional instruments, both lecturers and pre-service instructors find it challenging to fulfil techno-educational requirements. These structural concerns illustrate wider disparities in educational infrastructure and planning, underscoring the pressing necessity for a comprehensive and cooperative reform strategy. By addressing these fundamental difficulties with frameworks like Ubuntu pedagogy and TPACK, educational institutions can establish an inclusive and supportive teaching practice environment that bridges these disparities.

The tenets of Ubuntu pedagogy, which prioritise collaboration and communal assistance, are insufficiently employed in tackling these issues. Ubuntu pedagogy promotes mutual support and interdependence, establishing a basis for inclusive and equitable educational practices (Ngubane & Makua, 2021). The absence of systematic implementation hinders the cultivation of a collaborative culture in educational practice. The lack of formal collaborations among lecturers, mentor teachers, and pre-service teachers is particularly noticeable, restricting opportunities for collaborative growth and problem-solving.

Moreover, Ubuntu's ideals promote respect and understanding among the educational community; nevertheless, resource limitations and institutional injustices hinder their full actualisation. To address these gaps, it is essential to intentionally include Ubuntu pedagogy in institutional policies and educational frameworks, ensuring that its principles influence both teaching practices and the overall learning atmosphere. Augmenting the TPACK framework and advancing technological fairness is essential for refining pedagogical practices and educational technology outcomes. The TPACK framework integrates technology with pedagogy and subject knowledge, addressing the complexities of contemporary teaching situations and ensuring that pre-service teachers are adequately equipped to utilise novel tools effectively.

Furthermore, advancing technical justice necessitates confronting systematic inequalities in access to technological resources, which frequently harm underprivileged schools and communities. This dual strategy not only improves lesson delivery but also fosters inclusive learning environments by closing the digital gap. Moreover, promoting technological equity cultivates collaborative behaviours grounded in Ubuntu pedagogy, highlighting mutual assistance and collective development. These tactics collectively enable educators and learners to utilise technology for enhanced educational outcomes while fostering an equitable and collaborative learning environment.

7. Implications for Ubuntu Pedagogy

The principles of Ubuntu pedagogy, which emphasise community, collaboration, and mutual support, can be effectively aligned with the findings of this study. The concepts of community and collaboration are manifested in the use of online supervision to cultivate a sense of belonging and facilitate collaborative learning. This approach resonates with Ubuntu's emphasis on

interconnectedness and collective growth, reinforcing the notion that knowledge is co-constructed through shared experiences. Furthermore, supportive mentoring plays a crucial role in this alignment, as effective pedagogical mentoring and the integration of domain knowledge with teaching practices reflect Ubuntu's values of guidance and shared wisdom. By fostering mentorship that prioritises mutual learning and knowledge exchange, educators can create a supportive environment that mirrors the communal ethos of Ubuntu. Lastly, the challenge of maintaining engagement and interaction in an online learning environment necessitates innovative communication strategies to compensate for the absence of face-to-face interaction. In accordance with Ubuntu's fundamental belief in human connection, leveraging digital tools to sustain meaningful dialogue and relational learning ensures that the essence of Ubuntu pedagogy remains intact, even in virtual spaces.

8. Declarations

References

Aguboshim, F. C. (2021). Adequacy of sample size in a qualitative case study and the dilemma of data saturation: A narrative review. *World Journal of Advanced Research and Reviews, 10*(3), 180–187. https://doi.org/10.30574/wjarr.2021.10.3.0277

Bhengu, M. J. (2006). *Ubuntu: The global philosophy for humankind*. Mowbray: Lotsha Publications.

Bhuda, M. T., Maditse, M., & Mgoduka, S. (2024). Students and transition from face-to-face to online learning in South African higher education institutions: Lessons from COVID-19. *Journal of Educational Studies*, 87-108. https://doi.org/10.59915/jes.2024.si2.5

Blackwood, A. (2018). Transformative learning: Improving teachers' cultural competency through knowledge and practice of Ubuntu. Unpublished PhD dissertation, University of Central Florida.

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

Cohen, L. (2018). *Research methods in education* (8th ed.). Routledge.

Creswell, J. W., & Creswell, J. D. (2018). *Research design*. Van Schaik.

Davids, M. N., Van Wyk, M., Jojo, Z. M., Taole, M. J., Sethusha, M., & Prins, K. (2023). The feasibility of digitalising teaching practice through mobile app development: Supervisors' reactions. *International Journal of Information and Communication Technology Education, 19*(1), 1-15. http://doi.org/10.4018/IJICTE.324717

Deci, E., & Ryan, R. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry, 11*, 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Douglas, H. (2022). Sampling techniques for qualitative research. In M. R. Islam, N. A. Khan, & R. Baikady (Eds.), *Principles of social research methodology*. Springer. https://doi.org/10.1007/978-981-19-5441-2_29

Fletcher, T., & Kosnik, C. (2016). Pre-service primary teachers negotiate physical education identities during the practicum. *Education*, 44, 556–565. https://doi.org/10.1080/03004279.2016.1169486

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*, 8410–8415. https://doi.org/10.1073/pnas.1319030111

Harju, A., & Åkerblom, A. (2017). Colliding collaboration in student-centred learning in higher education. *Studies in Higher Education*, 42, 1532–1544.

Kang, E., & Hwang, H. J. (2023). The importance of anonymity and confidentiality for conducting survey research. *Journal of Research and Publication Ethics*, *4*(1), 1-7.

Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centred learning: Beyond 'educational bulimia'? *Studies in Higher Education*, 28, 321–331. https://doi.org/10.1080/03075070309293

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Wiley.

Mhlanga, D., & Moloi, T. (2020). COVID-19 and the digital transformation of education: What are we learning on 4IR in South Africa? *Education Sciences, 10*(7), 180. https://doi.org/10.3390/educsci10070180

Moloi, T. J., & Matabane, M. E. (2020). Reimagining the sustainable and social justice mathematics classrooms in the fourth industrial revolution. *International Journal of Learning, Teaching and Educational Research, 19*(12),281-294. https://doi.org/10.26803/ijlter.19.12.15

Ngubane, N., & Makua, M. (2021). Ubuntu pedagogy–transforming educational practices in South Africa through an African philosophy: From theory to practice. *Inkanyiso: Journal of Humanities and Social Sciences, 13*(1), 1-12. https://www.ajol.info/index.php/ijhss/article/view/212332

O'Neill, G., & McMahon, T. (2005). Student-centred learning: What does it mean for students and lecturers? In *Emerging issues in the practice of university learning and teaching* (pp. 1–12*).* AISHE.

Phasha, N. (2016). Understanding inclusive education from an Afrocentric perspective. *Inclusive education: An African perspective*, 3–28.

Pule, K. G. (2020). *School effectiveness and effective mathematics teaching: Towards a model of improved learner outcomes* [Doctoral dissertation, North-West University].

Schmidt, H., Wagener, S., Smeets, G., Keemink, L., & Molen, H. (2015). On the use and misuse of lectures in higher education. *Health Professions Education*, *1*, 12–18. https://doi.org/10.1016/j.hpe.2015.11.010

Sethusha, M. J. (2014). Challenges experienced by teaching practice supervisors in an open and distance learning environment. *Mediterranean Journal of Social Sciences*, *5*(15), 409. https://doi.org/10.5901/mjss.2014.v5n15p409

Siedlecki, S. L. (2020). Understanding descriptive research designs and methods. *Clinical Nurse Specialist*,*34*(1), 8–12. https://doi.org/10.1097/NUR.000000000000049

Trinidad, J. (2015). Understanding student-centred learning in higher education: Students' and teachers' perceptions, challenges, and cognitive gaps. *Journal of Further and Higher Education*, *44*, 1013–1023. https://doi.org/10.1080/0309877X.2019.1636214

Ukpokodu, O. N. (2016). *You can't teach us if you don't know us and care about us: Becoming an ubuntu, responsive and responsible urban teacher*. New York: Peter Lang Publishing, Inc.

Wake, G. D., & Burkhardt, H. (2013). Understanding the European policy landscape and its impact on change in mathematics and science pedagogies. *ZDM Mathematics Education*, *45*, 851–861. https://doi.org/10.1007/s11858-013-0513-7

Whiting, J. (2001). *Student-centred learning by design*. ABC-CLIO.

Wilson, A. D., Onwuegbuzie, A. J., & Manning, L. P. (2016). Using paired-depth interviews to collect qualitative data. *The Qualitative Report*, *21*(9), 1549-1573.