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When Remote Working Reaches into Academic Staff Pockets: The Personal Costs of Online Teaching and Virtual Supervision and Their Influence on Job Satisfaction in Higher Education Institutions in Tanzania

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Abstract

This study examined how personal costs associated with online teaching (OT) and virtual student supervision (VSS) influence academic staff job satisfaction in Tanzanian higher education institutions (HEIs). Guided by Job Demands–Resources Theory, the study combined a systematic review of 28 peer-reviewed papers published between 2020 and 2024 with semi-structured interviews involving academic staff from selected HEIs until thematic saturation was reached. Although OT and VSS are increasingly embedded in HEIs, their influence on job satisfaction remains insufficiently understood where flexibility, workload, personal expenditure and institutional support have remained behind this transformation of cloud environment from camps cleating difficult not only to understand but even how it can be measured. Findings showed that OT and VSS support continuity and flexibility but may require academic staff to personally finance Internet connectivity, airtime, electricity, digital devices and maintenance, particularly when responsibilities extend beyond campus and normal working hours. Institutional practices also varied, with some staff subject to biometric or attendance-book controls while others faced fewer physical-presence requirements, potentially shaping perceptions of fairness and autonomy. Some HEIs further operated OT and VSS without explicit financing frameworks defining responsibility for recurrent remote-working costs. Consequently, resources intended to support academic work may become financial demands when personally financed, creating pressure and weakening perceived institutional support and job satisfaction. The study concludes that remote-working costs require institutional recognition and recommends explicit financing frameworks, equitable cost-sharing and reimbursement mechanisms, and consistent accountability practices that support sustainable OT, VSS and academic staff job satisfaction.

Keywords: *remote working, online teaching, virtual student supervision, personal costs, financing framework, job satisfaction, academic staff, HEIs.*

1. INTRODUCTION

Remote working is becoming fixed in contemporary higher education rather than remaining a temporary or optional working arrangement. Increasing digitalization has enabled academic staff to undertake online teaching (OT) and virtual student supervision (VSS) beyond the physical boundaries and conventional working hours of higher education institutions (HEIs). However, this does not imply that conventional campus-based academic work is disappearing or that HEIs in Sub-Saharan Africa will become fully remote within a short period. Although the International

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Telecommunication Union (ITU, 2025) reports substantial growth in digital connectivity across Africa, persistent inequalities in affordability, infrastructure, and service quality continue to constrain meaningful Internet use, limiting effective online teaching and potentially reducing academic staff job satisfaction. Similar concerns are reported by the World Bank (2024) and Chimbunde and Jakachira (2025), suggesting that African HEIs are likely to continue operating through a combination of conventional and remote working arrangements.

Despite the expansion of online teaching (OT) and virtual student supervision (VSS), their implications for academic staff job satisfaction remain insufficiently understood. Conventional indicators such as biometric attendance, departmental or HR attendance records, and task completion capture presence and outputs but may overlook the realities of digitally performed academic work, including personal expenditure, technostress, workload intensity, uneven flexibility, institutional support, and extended availability (International Labour Organization [ILO], 2021; Charalampous et al., 2022). OT and VSS frequently continue beyond normal working hours through WhatsApp, email, telephone calls, and other digital platforms, extending academic responsibilities into evenings, weekends, and holidays and further blurring work and personal boundaries (ILO, 2021). Academic staff may therefore fulfil remote responsibilities successfully while simultaneously experiencing conditions that weaken job satisfaction. Understanding job satisfaction in remote academic work consequently requires attention to the actual conditions and lived experiences under which OT and VSS are performed rather than relying solely on conventional campus-based measures (Charalampous et al., 2022).

Tanzania reflects this wider transition. Although the Tanzania Commission for Universities (TCU, 2022) formally recognizes online and blended delivery, Anasel and Swai (2023) found among academic and ICT staff from 19 Tanzanian universities that adoption remained constrained by technological, organisational, knowledge and environmental factors. Ambele et al. (2025) support this finding by showing continued weaknesses in connectivity, technological infrastructure, digital competence and institutional support despite growth in e-learning implementation. Baynit et al. (2025), from a performance perspective, demonstrate that effective use of ICT infrastructure remains important to learning outcomes. Thus, while Anasel and Swai emphasise adoption barriers, Ambele et al. highlight implementation conditions and Baynit et al. demonstrate the value of functional infrastructure; together, they show that expanding digital responsibilities have not always been matched by equally adequate institutional resources.

This mismatch becomes particularly important because OT and VSS can continue beyond institutional premises and normal working hours. Academic staff may teach online classes, interact with students, conduct assessments, supervise master's and PhD research, support field students, review documents and provide continuing guidance through digital platforms while relying on resources available outside campus. In some HEIs, academic staff undertaking substantial remote responsibilities may still be required to register physical attendance through biometric systems, departmental books or HR records, whereas others operate with fewer physical-presence controls. Such differences can create contrasting experiences of autonomy, fairness and institutional support. The central concern is therefore not only whether OT and VSS are performed, but how their resource demands, institutional controls and associated personal costs shape academic staff job satisfaction in Tanzanian HEIs.

Within this environment, the present study examines remote working through two principal academic activities: online teaching and virtual supervision. Activities such as master's classes, professional certification programmes, short courses, seminars, tutorials, presentations, lecturer–student discussions, online assessment and teaching-related clarification are located within online teaching. In contrast, master's dissertation and PhD thesis supervision, Bachelor's, Diploma and Certificate student supervision, field supervision, research consultations, progress monitoring, manuscript review, conference-paper support and continuing academic guidance are located within virtual supervision. The digital applications supporting these activities are similarly treated as mechanisms rather than separate constructs. While Kasim et al. (2023) identify communication, interaction and mentoring technologies as central to online supervision, Chigona and Sosibo (2024) demonstrate practically how Zoom, Google Meet, Microsoft Teams, WhatsApp and email facilitate supervisor–student interaction. Opesemowo et al. (2025) extend this argument by showing that these technologies increase flexibility but simultaneously create communication, technological and time-management demands. Their findings therefore converge on the enabling role of technology while qualifying any assumption that access to a digital platform is sufficient for effective remote working.

Online teaching, the first form of remote working examined, has increasingly become integrated into normal academic delivery. TCU (2022) formally recognizes technology-supported teaching, assessment and learning resources, while Kisanjara (2025) reports that e-learning can improve

teaching and learning performance through convenience, accessibility and instructional delivery. However, Ambele et al. (2025) qualify such technological optimism by showing that e-learning implementation continues to experience infrastructural and institutional constraints. Anasel and Swai (2023) reach a similar conclusion, finding that lecturers' willingness to teach online does not automatically overcome weak technological and organisational conditions. Thus, while Kisanjara emphasises the potential value of online delivery, Anasel and Swai and Ambele et al. demonstrate that the realisation of such value remains conditional on resource availability. The issue is therefore not whether online teaching can be beneficial but whether academic staff are adequately resourced to deliver it.

Online teaching can encompass master's programmes, professional certification programmes, short courses, tutorials, seminars, academic presentations and interactive lecturer–student discussions. Zoom, Google Meet and Microsoft Teams can facilitate synchronous delivery, presentations, screen sharing and discussions, while digital systems can support materials distribution, assignments, assessment and feedback. Google Forms may additionally be used for quizzes, responses or assessment where appropriate. Yet the capacity of these technologies to enable lecturer delivery should not be confused with the cost of using them. While Kisanjara (2025) emphasises convenience as an important advantage of e-learning, Muhihi (2024) demonstrates an important counter-condition by finding that Tanzanian university lecturers experienced Internet costs as a significant obstacle to remote working. Accordingly, what appears institutionally as technological convenience may appear individually as financial expenditure when the lecturer must personally purchase the connectivity required to use that technology.

Muhihi's (2024) findings therefore shift the online-teaching debate from technological availability towards cost allocation. Whereas Anasel and Swai (2023) identify inadequate Internet and infrastructure as barriers to online teaching, Muhihi shows that deficiencies in institutional resource provision can be transferred directly to lecturers when they purchase Internet bundles themselves. Ambele et al. (2025) reinforces the institutional side of this argument by identifying continuing infrastructure and support limitations. The studies consequently describe different levels of the same problem: Anasel and Swai identify the barrier, Ambele et al. demonstrate its persistence, while Muhihi reveals one way in which academic staff personally absorb its consequences. This interaction raises a question that the existing literature has insufficiently

answered: when institutional connectivity is unavailable outside the HEI, who finances the final connection required for academic work to continue?

The personal-cost issue is broader than Internet bundles alone. Online teaching conducted outside institutional premises may require household electricity, personally owned laptops, smartphones, routers, headphones, microphones, webcams, chargers and related accessories. While Baynit et al. (2025) demonstrate that effective ICT infrastructure contributes to learning outcomes and Ambele et al. (2025) identify the consequences of inadequate technological infrastructure, both examine resources predominantly from institutional or educational perspectives. Muhihi (2024), by focusing on lecturers' Internet expenditure, begins to reveal the employee-side economic consequence of inadequate support. The studies therefore converge on the importance of digital resources but diverge in their unit of analysis. This divergence leaves an important gap concerning whether electricity, device maintenance, equipment deterioration, airtime and other remotely consumed resources similarly shift from institutional expenditure to academic staff personal expenditure.

The circumstances under which such expenditure occur also qualify assumptions derived from Self-Determination Theory. Deci et al. (2017) propose that satisfaction of autonomy, competence and relatedness can enhance employee motivation and well-being. Applied to remote working, location flexibility may appear to increase academic staff autonomy. However, Muhihi's (2024) finding that lecturers personally finance Internet connectivity suggests that freedom to choose where work is performed does not necessarily provide freedom from the costs required to perform it. John (2026) similarly concludes that location flexibility contributes more positively to academic staff job satisfaction where resources and task–location fit are adequate. These findings qualify rather than reject Self-Determination Theory: remote working may provide spatial autonomy, but the motivational value of that autonomy may weaken where academic staff lack corresponding resource autonomy.

Online teaching also extends beyond formal virtual classes. Students may request clarification through WhatsApp, email and telephone calls, discuss assessments, request materials or seek additional explanation following Zoom, Google Meet or Microsoft Teams sessions. While Yang et al. (2025) show through a systematic review that continuing digital demands can contribute to

techno-overload and negatively affect educators' well-being, Nascimento et al. (2024) identify a contrasting pathway in which technology generates positive experiences when usefulness, competence and organisational resources are present. Their findings do not necessarily conflict; rather, they indicate that digital interaction can operate as either an enabling resource or an additional demand depending on the surrounding conditions. The financial dimension remains less explored because neither perspective adequately determines whether repeated emails, WhatsApp exchanges, calls, document downloads and follow-up interactions gradually become employee-financed teaching costs.

Virtual supervision presents an even stronger case of continuous digital work. Chigona and Sosibo (2024) show that postgraduate supervisors used Microsoft Teams, WhatsApp, email, Google Meet and Zoom to sustain communication, document exchange and feedback. Kasim et al. (2023), through a systematic review, similarly identify communication, interaction, mentoring and supervisor support as essential to effective online postgraduate supervision. Opesemowo et al. (2025), however, qualify the flexibility identified in this literature by showing that remote supervision creates technological, communication and time-management difficulties for lecturers. Thus, while Chigona and Sosibo demonstrate the practical usefulness of digital platforms and Kasim et al. establish their wider pedagogical importance, Opesemowo et al. reveal that sustaining such interaction imposes additional demands on supervisors.

Recent African evidence shows that these issues are not limited to a single HEI or national setting. Etomes and Aluko (2025) demonstrate that technology-assisted doctoral supervision has become incorporated into supervision practice in Cameroon, while Mireku et al. (2026), reviewing Sub-Saharan African research published between 2014 and 2024, identify growing digitally supported supervision alongside persistent weaknesses in infrastructure, supervisor accessibility, institutional support and supervisory capacity. These findings converge with Chigona and Sosibo (2024) regarding the increasing role of technology but broaden the argument by showing that digital supervision operates within structural constraints across Sub-Saharan Africa. Consequently, virtual supervision cannot be understood merely as an efficient technological replacement for physical meetings; it represents a continuing academic responsibility whose resource requirements remain unevenly supported.

Master's dissertation and PhD thesis supervision illustrates the cumulative character of those requirements. Supervision can extend from topic development and proposal preparation through literature review, methodology, data collection, analysis, writing, corrections, examination and final revision. While Chigona and Sosibo (2024) demonstrate the value of combining synchronous and asynchronous technologies for maintaining supervisor–student contact, Kasim et al. (2023) emphasise the importance of mentoring and continuing interaction. Mireku et al. (2026), however, show that excessive supervisory workloads remain a significant concern across Sub-Saharan African HEIs. These findings interact to reveal an important omission: although the literature acknowledges increasing digital communication and increasing supervisory workload, it rarely investigates whether the combination also increases supervisors' personal expenditure on data, electricity, airtime and devices.

This omission creates a financial-workload gap. One academic staff member may supervise several Master's candidates, PhD candidates and other students simultaneously, with each supervisee requiring repeated document exchange, virtual consultations, telephone calls, WhatsApp clarification and progress monitoring. While Mireku et al. (2026) conceptualise excessive supervision predominantly as a workload and capacity concern, Opesemowo et al. (2025) show that remote supervision intensifies communication and time-management requirements. Their findings together suggest that supervision volume should potentially be interpreted not only as time expenditure but also as resource consumption. Yet available studies do not establish whether increased numbers of digitally supervised students translate into proportionately greater personal financial costs for academic staff.

Virtual supervision can continue beyond thesis or dissertation preparation into research dissemination. Supervisors may review manuscripts derived from master's dissertations or PhD theses, support conversion of findings into journal papers, review conference abstracts and papers, discuss reviewers' comments and assist students with academic presentations. While Kasim et al. (2023) position mentoring and continuing support as fundamental to online supervision, Mireku et al. (2026) similarly portray postgraduate supervision as extending into research development and scholarly support. Chigona and Sosibo (2024) reinforce this relational interpretation by demonstrating the continuing role of supervisor feedback. These studies support treating thesis-related manuscript and conference support as part of virtual supervision, yet none sufficiently

explains the personal financial consequences of repeatedly downloading, reviewing, discussing and returning such materials using personally financed resources.

The supervision-cost question also extends beyond postgraduate students. Taole et al. (2024) show that Microsoft Teams can facilitate remote supervision of students undertaking teaching practice, thereby demonstrating that virtual supervision can operate in field-oriented environments. Opesemowo et al. (2025) similarly conceptualise remote supervision broadly as digitally mediated oversight and support. In the present study, this logic extends to Bachelor's, Diploma and Certificate students undertaking fieldwork, practical training or research activities. WhatsApp, email, telephone calls, Zoom and Google Meet may support clarification and communication, while Google Forms may facilitate progress reporting or assessment and KoboToolbox may support digital field data collection or monitoring where appropriately adopted. These tools remain examples of virtual supervision rather than additional study variables.

Nevertheless, digital field supervision again exposes the relationship between technological possibility and personal cost. While Taole et al. (2024) found that remotely supervising practical activities could be constrained by connectivity, feedback and communication difficulties, Ambele et al. (2025) independently demonstrate continuing Internet and technological limitations in Tanzanian HEIs. The findings converge on infrastructure as a constraint but leave open the question of who compensates when institutional infrastructure is insufficient. Where a supervisor responds through personal WhatsApp data, makes an academic telephone call using private airtime or accesses remotely submitted field information through a personal Internet bundle, an institutional technological constraint may effectively become an employee-financed solution.

A similar distinction applies to institutional supervision and progress-monitoring systems. While Chigona and Sosibo (2024) demonstrate that institutional digital arrangements can assist postgraduate supervision and Mireku et al. (2026) identify digital monitoring systems as potentially useful for improving supervision, these findings primarily concern functionality and academic accountability. They do not establish that institutional ownership of a system means institutional financing of its use from every location. An HEI may provide the supervision platform while a lecturer accessing it from home personally provides the connectivity, electricity and

device. Hence, institutional digitalisation and institutional financing of remote working are analytically different issues.

The continuous communication underlying supervision further complicates this relationship. While Chigona and Sosibo (2024) show that supervisors use different communication channels depending on urgency and interaction needs, Opesemowo et al. (2025) identify communication as essential for maintaining effective remote supervision. Mireku et al. (2026) approach the same issue from the opposite direction by showing that insufficient supervisor accessibility can adversely affect students' experiences and progress. These studies therefore converge on accessibility as academically desirable. However, the present study exposes a largely overlooked counter-question: when accessibility is sustained through privately financed WhatsApp data, email connectivity or telephone airtime, does improving student accessibility simultaneously increase academic staff personal expenditure?

The timing of virtual supervision intensifies this question. A master's student may submit a corrected chapter during a weekend, a PhD candidate may request clarification at night, a Bachelor's or Diploma student may experience an urgent field problem during a holiday, and conference or manuscript deadlines may require academic support outside institutional working hours. Online teaching can likewise extend into evenings, particularly for Master's programmes, professional certification programmes and short courses. While John (2026) finds that location flexibility can improve job satisfaction when resources and work-location fit are adequate, Yang et al. (2025) show that continued digital demands can generate overload. Nascimento et al. (2025), however, demonstrate that remote technology use can contribute positively where employees possess sufficient organisational and personal resources. Taken together, these findings indicate that extended digital work is not inherently beneficial or harmful; the adequacy and ownership of resources surrounding the work may determine the outcome.

These conditions qualify the assumptions of Boundary Theory. Ashforth et al. (2000) explain how individuals manage transitions between work and non-work roles, implying some capacity to segment or integrate the two domains. Yet the communication-intensive supervision described by Chigona and Sosibo (2024) and Opesemowo et al. (2025), together with the supervisor-accessibility pressures identified by Mireku et al. (2026), suggests that academic staff may not

always determine when work enters personal time. Receiving a thesis chapter on a weekend or a WhatsApp clarification during a holiday can extend the institutional role into the personal environment irrespective of the supervisor's preferred boundary arrangement. Thus, the Tanzanian HEI context does not reject Boundary Theory but indicates that digital supervision can reduce the employee's practical capacity to maintain clear temporal boundaries.

More importantly, this boundary crossing can also be financial. While work undertaken within the HEI may use institutional Internet, electricity, computers and offices, the same teaching or supervision activity undertaken at home may depend on household electricity, personal connectivity and personally owned devices. Muhihi (2024) provides direct Tanzanian evidence of this shift for Internet costs, while John (2026) shows that the effectiveness of location flexibility depends substantially on resource availability. The conventional work–home boundary may therefore function not only as a temporal or psychological boundary but also as an economic boundary: once institutional work moves into personal space, the source of financing its resources may also change.

This produces a location–resource mismatch. An academic responsibility can follow the lecturer beyond campus more easily than institutional infrastructure can. While Anasel and Swai (2023) and Ambele et al. (2025) identify weaknesses in institutional infrastructure and support, Muhihi (2024) demonstrates how one consequence of those weaknesses can be personally financed Internet access. John (2026), from a job-satisfaction perspective, similarly shows that flexibility produces stronger outcomes where resources fit the chosen work location. The studies therefore converge around the same structural problem from different directions: institutional studies reveal what resources may be insufficient, employee-level evidence reveals who may compensate for that insufficiency, and job-satisfaction evidence suggests that the manner in which this compensation occurs may influence employees' experience of remote working.

The broader Sub-Saharan African environment makes the mismatch particularly relevant. While ITU (2025) documents continuing growth in African digital connectivity, the same evidence identifies persistent affordability and usage gaps. The World Bank (2024) similarly recognises increasing digital access while emphasising infrastructural and affordability constraints, and Chimbunde and Jakachira (2025) show that these macro-level limitations are reflected in lecturers'

concerns about digital inequality. Tanzanian findings from Anasel and Swai (2023) and Ambele et al. (2025) fit this broader pattern. The studies therefore converge at regional and institutional levels: remote working is advancing more rapidly than universally affordable and adequately supported remote-working infrastructure. This means that postponing remote work until infrastructure becomes perfect is unrealistic, while assuming that all academic staff can privately sustain the transition is equally problematic.

The personal expenditure associated with this transition may include both direct and indirect costs. While Muhihi (2024) directly establishes personally borne Internet expenditure among Tanzanian lecturers, Anasel and Swai (2023), Ambele et al. (2025) and Baynit et al. (2025) demonstrate that digital delivery depends on connectivity, equipment and infrastructure more broadly. Their studies interact to establish the resource requirement but differ in what they measure. Consequently, Internet bundles are the best directly documented employee-side expense, whereas household Internet, electricity, airtime, device wear, repairs and replacement remain plausible but insufficiently investigated personal costs. This distinction is important because the study should establish whether these broader costs are borne by academic staff rather than presuming that they are.

The same resource relationship presents a contextual qualification to Job Demands–Resources Theory. Bakker and Demerouti (2017), subsequently extending the theory with Bakker et al. (2023), distinguish between job demands that consume effort and job resources that facilitate goal attainment and buffer demands. Applied to remote working, Internet connectivity, electricity, functional devices and technological support would normally operate as job resources. However, the infrastructure deficiencies reported by Anasel and Swai (2023) and Ambele et al. (2025), when read alongside Muhihi's (2024) direct evidence of personally financed Internet access, suggest a more complex reality. A resource can enable academic work while simultaneously creating a financial demand when the employee must personally finance it. Thus, rather than rejecting Job Demands–Resources Theory, the Tanzanian setting extends the question from whether resources exist to who bears the cost of creating or maintaining those resources.

Institutional remote-working policy consequently becomes important in determining whether such costs remain private or institutional. While TCU (2022) provides national standards for online and

blended delivery, Muhihi (2024) demonstrates that responsibility for lecturers' Internet costs remains a practical issue and reports lecturers' preference for greater employer support. John (2026) similarly finds that inadequate resources and personal costs can weaken the benefits of remote-work location flexibility. These studies therefore converge in moving the discussion beyond technological adoption to institutional responsibility: HEIs may formally embrace digital teaching and supervision while arrangements governing recurrent employee-side costs remain less clearly developed.

Policy neutrality should therefore not be interpreted as cost neutrality. If online teaching and virtual supervision are recognised institutionally but Internet, electricity, airtime, device-use and maintenance responsibilities are undefined, expenditure may fall on academic staff by default. Muhihi (2024) provides direct evidence for the Internet component of this argument, whereas the infrastructural limitations reported by Anasel and Swai (2023) and Ambele et al. (2025) suggest why wider resource transfers require investigation. The unanswered question is not simply whether HEIs provide digital platforms but whether their remote-working policies determine how the recurrent costs of accessing and using those platforms beyond campus should be shared.

The implications become particularly important when connected to job satisfaction. Nascimento et al. (2024) show that technology can generate positive experiences and greater job satisfaction where usefulness and organisational resources are sufficient, and their longitudinal findings in Nascimento et al. (2025) reinforce the positive potential of adequately supported remote technology use. Yan et al. (2025) similarly identify flexibility as a positive influence on satisfaction while showing that policy, incentives and institutional support remain important extrinsic conditions. Yang et al. (2025), in contrast, synthesise evidence showing that technological overload and inadequate workplace support can adversely affect educators' well-being. These studies do not provide competing conclusions so much as conditional ones: remote digital work can improve or reduce employee experience depending on the balance between demands and resources.

Tanzanian evidence adds personal financing to that balance. While John (2026) finds that flexibility can improve academic staff job satisfaction where resources and task–location fit are adequate, Muhihi (2024) demonstrates that personally financed Internet can create a burden for

lecturers. The findings imply that academic staff may simultaneously value the flexibility of remote working and dislike the financial conditions under which that flexibility is exercised. Consequently, online teaching and virtual supervision cannot be assumed to have a uniformly positive or negative influence on job satisfaction; the financial distribution of the resources sustaining those activities may be an important explanatory condition.

Several gaps emerge from this interaction of evidence. While Muhihi (2024) establishes a direct Internet-cost problem, Anasel and Swai (2023), Ambele et al. (2025) and Baynit et al. (2025) identify wider resource requirements without examining whether their costs are personally borne, leaving a financial gap around electricity, airtime, devices and maintenance. Although Kasim et al. (2023), Chigona and Sosibo (2024), Opesemowo et al. (2025) and Mireku et al. (2026) demonstrate intensive technology-mediated supervision, they largely examine communication, effectiveness, accessibility and workload rather than supervisor expenditure, leaving a virtual-supervision cost gap. Taole et al. (2024) extends digital supervision to field-oriented activity, but the financial implications for Bachelor's, Diploma and Certificate supervision remain insufficiently established. Similarly, existing supervision studies recognise continuing mentoring, yet personal expenditure associated with manuscript review, conference-paper support and research dissemination remains poorly documented.

Literature also leaves temporal, policy, theoretical and outcome gaps. Although John (2026), Yang et al. (2025) and Nascimento et al. (2025) demonstrate that work location, digital demands and organisational resources influence remote-working experiences, limited evidence establishes what academic staff spend when online teaching and virtual supervision continue during evenings, weekends and holidays. Although TCU (2022) legitimises digital academic delivery, Muhihi (2024) demonstrates that financing responsibility remains unresolved at employee level, exposing a policy gap. Theoretically, Self-Determination Theory explains autonomy benefits, Job Demands–Resources Theory explains the balancing of work demands and resources, and Boundary Theory explains work–non-work transitions, yet the realities of Tanzanian HEIs raise a combined theoretical question that these frameworks do not fully resolve: what happens when employees must personally finance the resources needed to exercise work autonomy, when a job resource simultaneously becomes a financial demand, and when movement across the work–home boundary also shifts work expenditure into the household?

Against these gaps, several questions remain unanswered. Who ultimately bears the recurrent costs when online teaching and virtual supervision move beyond HEI premises? To what extent do academic staff personally finance mobile data bundles, household Internet, airtime, electricity, digital devices and equipment maintenance? How do master's classes, professional certification programmes, short courses, tutorials, seminars, presentations, lecturer–student discussions, assessment and continuing clarification accumulate costs within online teaching? How do master's dissertation and PhD thesis supervision, Bachelor's, Diploma and Certificate student supervision, field supervision, research consultation, progress tracking, document review, manuscript development, conference-paper support and continuing academic guidance generate costs within virtual supervision? What costs are associated with repeated use of Zoom, Google Meet, Microsoft Teams, WhatsApp, email, telephone calls, Google Forms, KoboToolbox and institutional supervision systems? How does this burden change during evenings, weekends and holidays when institutional resources are less accessible? How clearly do institutional remote-working policies distinguish costs borne by HEIs from those borne by academic staff? Most importantly, how do personally financed costs of online teaching and virtual supervision influence academic staff job satisfaction in Tanzanian HEIs?

The study was therefore undertaken because existing scholarships explain important components of the problem without adequately connecting them. While Anasel and Swai (2023), Ambele et al. (2025) and Kisanjara (2025) establish the growth, benefits and resource limitations of online teaching in Tanzania, Muhihi (2024) reveals that some of those limitations can translate into direct lecturer expenditure. While Chigona and Sosibo (2024), Opesemowo et al. (2025), Etomes and Aluko (2025) and Mireku et al. (2026) demonstrate that virtual supervision is increasingly technology-dependent, their emphasis remains on communication, supervision quality, accessibility and workload rather than personal cost. Meanwhile, Nascimento et al. (2024, 2025), Yan et al. (2025) and Yang et al. (2025) collectively show that digital work produces positive or negative outcomes depending on the resources and institutional conditions surrounding it. What remains insufficiently established is how these strands interact within Tanzanian HEIs: whether online teaching and virtual supervision systematically move recurrent operating costs into academic staff pockets, whether institutional remote-working policies recognise or leave unresolved that cost transfer, and whether personally financing those responsibilities influences

academic staff job satisfaction. The study therefore approaches remote working not only as technological transformation but also as an employment, financing, fairness and institutional-governance issue.

Remote working is becoming fixed in contemporary higher education rather than remaining a temporary or optional working arrangement. Increasing digitalization has enabled academic staff to undertake online teaching (OT) and virtual student supervision (VSS) beyond the physical boundaries and conventional working hours of higher education institutions (HEIs). However, this does not imply that conventional campus-based academic work is disappearing or that HEIs in Sub-Saharan Africa will become fully remote within a short period. Although the International Telecommunication Union (ITU, 2025) reports substantial growth in digital connectivity across Africa, persistent inequalities in affordability, infrastructure, and service quality continue to constrain meaningful Internet use, limiting effective online teaching and potentially reducing academic staff job satisfaction. Similar concerns are reported by the World Bank (2024) and Chimbunde and Jakachira (2025), suggesting that African HEIs are likely to continue operating through a combination of conventional and remote working arrangements.

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facilitate supervisor–student interaction. Opesemowo et al. (2025) extend this argument by showing that these technologies increase flexibility but simultaneously create communication, technological and time-management demands. Their findings therefore converge on the enabling role of technology while qualifying any assumption that access to a digital platform is sufficient for effective remote working.

Online teaching, the first form of remote working examined, has increasingly become integrated into normal academic delivery. TCU (2022) formally recognizes technology-supported teaching, assessment and learning resources, while Kisanjara (2025) reports that e-learning can improve teaching and learning performance through convenience, accessibility and instructional delivery. However, Ambele et al. (2025) qualify such technological optimism by showing that e-learning implementation continues to experience infrastructural and institutional constraints. Anasel and Swai (2023) reach a similar conclusion, finding that lecturers' willingness to teach online does not automatically overcome weak technological and organizational conditions. Thus, while Kisanjara emphasizes the potential value of online delivery, Anasel and Swai and Ambele et al. demonstrate that the realization of such value remains conditional on resource availability. The issue is therefore not whether online teaching can be beneficial but whether academic staff are adequately resourced to deliver it.

Online teaching can encompass master's programmes, professional certification programmes, short courses, tutorials, seminars, academic presentations and interactive lecturer–student discussions. Zoom, Google Meet and Microsoft Teams can facilitate synchronous delivery, presentations, screen sharing and discussions, while digital systems can support materials distribution, assignments, assessment and feedback. Google Forms may additionally be used for quizzes, responses or assessment where appropriate. Yet the capacity of these technologies to enable lecturer delivery should not be confused with the cost of using them. While Kisanjara (2025) emphasizes convenience as an important advantage of e-learning, Muhihi (2024) demonstrates an important counter-condition by finding that Tanzanian university lecturers experienced Internet costs as a significant obstacle to remote working. Accordingly, what appears institutionally as technological convenience may appear individually as financial expenditure when the lecturer must personally purchase the connectivity required to use that technology.

Muhihi's (2024) findings therefore shift the online-teaching debate from technological availability towards cost allocation. Whereas Anasel and Swai (2023) identify inadequate Internet and infrastructure as barriers to online teaching, Muhihi shows that deficiencies in institutional resource provision can be transferred directly to lecturers when they purchase Internet bundles themselves. Ambele et al. (2025) reinforces the institutional side of this argument by identifying continuing infrastructure and support limitations. The studies consequently describe different levels of the same problem: Anasel and Swai identify the barrier, Ambele et al. demonstrate its persistence, while Muhihi reveals one way in which academic staff personally absorb its consequences. This interaction raises a question that the existing literature has insufficiently answered: when institutional connectivity is unavailable outside the HEI, who finances the final connection required for academic work to continue?

The personal-cost issue is broader than Internet bundles alone. Online teaching conducted outside institutional premises may require household electricity, personally owned laptops, smartphones, routers, headphones, microphones, webcams, chargers and related accessories. While Baynit et al. (2025) demonstrate that effective ICT infrastructure contributes to learning outcomes and Ambele et al. (2025) identify the consequences of inadequate technological infrastructure, both examine resources predominantly from institutional or educational perspectives. Muhihi (2024), by focusing on lecturers' Internet expenditure, begins to reveal the employee-side economic consequence of inadequate support. The studies therefore converge on the importance of digital resources but diverge in their unit of analysis. This divergence leaves an important gap concerning whether electricity, device maintenance, equipment deterioration, airtime and other remotely consumed resources similarly shift from institutional expenditure to academic staff personal expenditure.

The circumstances under which such expenditure occur also qualify assumptions derived from Self-Determination Theory. Deci et al. (2017) propose that satisfaction of autonomy, competence and relatedness can enhance employee motivation and well-being. Applied to remote working, location flexibility may appear to increase academic staff autonomy. However, Muhihi's (2024) finding that lecturers personally finance Internet connectivity suggests that freedom to choose where work is performed does not necessarily provide freedom from the costs required to perform it. John (2026) similarly concludes that location flexibility contributes more positively to academic

staff job satisfaction where resources and task–location fit are adequate. These findings qualify rather than reject Self-Determination Theory: remote working may provide spatial autonomy, but the motivational value of that autonomy may weaken where academic staff lack corresponding resource autonomy.

Online teaching also extends beyond formal virtual classes. Students may request clarification through WhatsApp, email and telephone calls, discuss assessments, request materials or seek additional explanation following Zoom, Google Meet or Microsoft Teams sessions. While Yang et al. (2025) show through a systematic review that continuing digital demands can contribute to techno-overload and negatively affect educators' well-being, Nascimento et al. (2024) identify a contrasting pathway in which technology generates positive experiences when usefulness, competence and organizational resources are present. Their findings do not necessarily conflict; rather, they indicate that digital interaction can operate as either an enabling resource or an additional demand depending on the surrounding conditions. The financial dimension remains less explored because neither perspective adequately determines whether repeated emails, WhatsApp exchanges, calls, document downloads and follow-up interactions gradually become employee-financed teaching costs.

Virtual supervision presents an even stronger case of continuous digital work. Chigona and Sosibo (2024) show that postgraduate supervisors used Microsoft Teams, WhatsApp, email, Google Meet and Zoom to sustain communication, document exchange and feedback. Kasim et al. (2023), through a systematic review, similarly identify communication, interaction, mentoring and supervisor support as essential to effective online postgraduate supervision. Opesemowo et al. (2025), however, qualify the flexibility identified in this literature by showing that remote supervision creates technological, communication and time-management difficulties for lecturers. Thus, while Chigona and Sosibo demonstrate the practical usefulness of digital platforms and Kasim et al. establish their wider pedagogical importance, Opesemowo et al. reveal that sustaining such interaction imposes additional demands on supervisors.

Recent African evidence shows that these issues are not limited to a single HEI or national setting. Etomes and Aluko (2025) demonstrate that technology-assisted doctoral supervision has become incorporated into supervision practice in Cameroon, while Mireku et al. (2026), reviewing Sub-

Saharan African research published between 2014 and 2024, identify growing digitally supported supervision alongside persistent weaknesses in infrastructure, supervisor accessibility, institutional support and supervisory capacity. These findings converge with Chigona and Sosibo (2024) regarding the increasing role of technology but broaden the argument by showing that digital supervision operates within structural constraints across Sub-Saharan Africa. Consequently, virtual supervision cannot be understood merely as an efficient technological replacement for physical meetings; it represents a continuing academic responsibility whose resource requirements remain unevenly supported.

Master's dissertation and PhD thesis supervision illustrates the cumulative character of those requirements. Supervision can extend from topic development and proposal preparation through literature review, methodology, data collection, analysis, writing, corrections, examination and final revision. While Chigona and Sosibo (2024) demonstrate the value of combining synchronous and asynchronous technologies for maintaining supervisor–student contact, Kasim et al. (2023) emphasize the importance of mentoring and continuing interaction. Mireku et al. (2026), however, show that excessive supervisory workloads remain a significant concern across Sub-Saharan African HEIs. These findings interact to reveal an important omission: although the literature acknowledges increasing digital communication and increasing supervisory workload, it rarely investigates whether the combination also increases supervisors' personal expenditure on data, electricity, airtime and devices.

This omission creates a financial-workload gap. One academic staff member may supervise several master's candidates, PhD candidates and other students simultaneously, with each supervisee requiring repeated document exchange, virtual consultations, telephone calls, WhatsApp clarification and progress monitoring. While Mireku et al. (2026) conceptualize excessive supervision predominantly as a workload and capacity concern, Opesemowo et al. (2025) show that remote supervision intensifies communication and time-management requirements. Their findings together suggest that supervision volume should potentially be interpreted not only as time expenditure but also as resource consumption. Yet available studies do not establish whether increased numbers of digitally supervised students translate into proportionately greater personal financial costs for academic staff.

Virtual supervision can continue beyond thesis or dissertation preparation into research dissemination. Supervisors may review manuscripts derived from master's dissertations or PhD theses, support conversion of findings into journal papers, review conference abstracts and papers, discuss reviewers' comments and assist students with academic presentations. While Kasim et al. (2023) position mentoring and continuing support as fundamental to online supervision, Mireku et al. (2026) similarly portray postgraduate supervision as extending into research development and scholarly support. Chigona and Sosibo (2024) reinforce this relational interpretation by demonstrating the continuing role of supervisor feedback. These studies support treating thesis-related manuscript and conference support as part of virtual supervision, yet none sufficiently explains the personal financial consequences of repeatedly downloading, reviewing, discussing and returning such materials using personally financed resources.

The supervision-cost question also extends beyond postgraduate students. Taole et al. (2024) show that Microsoft Teams can facilitate remote supervision of students undertaking teaching practice, thereby demonstrating that virtual supervision can operate in field-oriented environments. Opesemowo et al. (2025) similarly conceptualize remote supervision broadly as digitally mediated oversight and support. In the present study, this logic extends to Bachelor's, Diploma and Certificate students undertaking fieldwork, practical training or research activities. WhatsApp, email, telephone calls, Zoom and Google Meet may support clarification and communication, while Google Forms may facilitate progress reporting or assessment and KoboToolbox may support digital field data collection or monitoring where appropriately adopted. These tools remain examples of virtual supervision rather than additional study variables.

Nevertheless, digital field supervision again exposes the relationship between technological possibility and personal cost. While Taole et al. (2024) found that remotely supervising practical activities could be constrained by connectivity, feedback and communication difficulties, Ambele et al. (2025) independently demonstrate continuing Internet and technological limitations in Tanzanian HEIs. The findings converge on infrastructure as a constraint but leave open the question of who compensates when institutional infrastructure is insufficient. Where a supervisor responds through personal WhatsApp data, makes an academic telephone call using private airtime or accesses remotely submitted field information through a personal Internet bundle, an institutional technological constraint may effectively become an employee-financed solution.

A similar distinction applies to institutional supervision and progress-monitoring systems. While Chigona and Sosibo (2024) demonstrate that institutional digital arrangements can assist postgraduate supervision and Mireku et al. (2026) identify digital monitoring systems as potentially useful for improving supervision, these findings primarily concern functionality and academic accountability. They do not establish that institutional ownership of a system means institutional financing of its use from every location. An HEI may provide the supervision platform while a lecturer accessing it from home personally provides the connectivity, electricity and device. Hence, institutional digitalization and institutional financing of remote working are analytically different issues.

The continuous communication underlying supervision further complicates this relationship. While Chigona and Sosibo (2024) show that supervisors use different communication channels depending on urgency and interaction needs, Opesemowo et al. (2025) identify communication as essential for maintaining effective remote supervision. Mireku et al. (2026) approach the same issue from the opposite direction by showing that insufficient supervisor accessibility can adversely affect students' experiences and progress. These studies therefore converge on accessibility as academically desirable. However, the present study exposes a largely overlooked counter-question: when accessibility is sustained through privately financed WhatsApp data, email connectivity or telephone airtime, does improving student accessibility simultaneously increase academic staff personal expenditure?

The timing of virtual supervision intensifies this question. A master's student may submit a corrected chapter during a weekend, a PhD candidate may request clarification at night, a Bachelor's or Diploma student may experience an urgent field problem during a holiday, and conference or manuscript deadlines may require academic support outside institutional working hours. Online teaching can likewise extend into evenings, particularly for master's programmes, professional certification programmes and short courses. While John (2026) finds that location flexibility can improve job satisfaction when resources and work-location fit are adequate, Yang et al. (2025) show that continued digital demands can generate overload. Nascimento et al. (2025), however, demonstrate that remote technology use can contribute positively where employees possess sufficient organizational and personal resources. Taken together, these findings indicate

that extended digital work is not inherently beneficial or harmful; the adequacy and ownership of resources surrounding the work may determine the outcome.

These conditions qualify the assumptions of Boundary Theory. Ashforth et al. (2000) explain how individuals manage transitions between work and non-work roles, implying some capacity to segment or integrate the two domains. Yet the communication-intensive supervision described by Chigona and Sosibo (2024) and Opesemowo et al. (2025), together with the supervisor-accessibility pressures identified by Mireku et al. (2026), suggests that academic staff may not always determine when work enters personal time. Receiving a thesis chapter on a weekend or a WhatsApp clarification during a holiday can extend the institutional role into the personal environment irrespective of the supervisor's preferred boundary arrangement. Thus, the Tanzanian HEI context does not reject Boundary Theory but indicates that digital supervision can reduce the employee's practical capacity to maintain clear temporal boundaries.

More importantly, this boundary crossing can also be financial. While work undertaken within the HEI may use institutional Internet, electricity, computers and offices, the same teaching or supervision activity undertaken at home may depend on household electricity, personal connectivity and personally owned devices. Muhihi (2024) provides direct Tanzanian evidence of this shift for Internet costs, while John (2026) shows that the effectiveness of location flexibility depends substantially on resource availability. The conventional work–home boundary may therefore function not only as a temporal or psychological boundary but also as an economic boundary: once institutional work moves into personal space, the source of financing its resources may also change.

This produces a location–resource mismatch. An academic responsibility can follow the lecturer beyond campus more easily than institutional infrastructure can. While Anasel and Swai (2023) and Ambele et al. (2025) identify weaknesses in institutional infrastructure and support, Muhihi (2024) demonstrates how one consequence of those weaknesses can be personally financed Internet access. John (2026), from a job-satisfaction perspective, similarly shows that flexibility produces stronger outcomes where resources fit the chosen work location. The studies therefore converge around the same structural problem from different directions: institutional studies reveal what resources may be insufficient, employee-level evidence reveals who may compensate for that

insufficiency, and job-satisfaction evidence suggests that the manner in which this compensation occurs may influence employees' experience of remote working.

The broader Sub-Saharan African environment makes the mismatch particularly relevant. While ITU (2025) documents continuing growth in African digital connectivity, the same evidence identifies persistent affordability and usage gaps. The World Bank (2024) similarly recognizes increasing digital access while emphasizing infrastructural and affordability constraints, and Chimbunde and Jakachira (2025) show that these macro-level limitations are reflected in lecturers' concerns about digital inequality. Tanzanian findings from Anasel and Swai (2023) and Ambele et al. (2025) fit this broader pattern. The studies therefore converge at regional and institutional levels: remote working is advancing more rapidly than universally affordable and adequately supported remote-working infrastructure. This means that postponing remote working until infrastructure becomes perfect is unrealistic, while assuming that all academic staff can privately sustain the transition is equally problematic.

The personal expenditure associated with this transition may include both direct and indirect costs. While Muhihi (2024) directly establishes personally borne Internet expenditure among Tanzanian lecturers, Anasel and Swai (2023), Ambele et al. (2025) and Baynit et al. (2025) demonstrate that digital delivery depends on connectivity, equipment and infrastructure more broadly. Their studies interact to establish the resource requirement but differ in what they measure. Consequently, Internet bundles are the best directly documented employee-side expense, whereas household Internet, electricity, airtime, device wear, repairs and replacement remain plausible but insufficiently investigated personal costs. This distinction is important because the study should establish whether these broader costs are borne by academic staff rather than presuming that they are.

The same resource relationship presents a contextual qualification to Job Demands–Resources Theory. Bakker and Demerouti (2017), subsequently extending the theory with Bakker et al. (2023), distinguish between job demands that consume effort and job resources that facilitate goal attainment and buffer demands. Applied to remote working, Internet connectivity, electricity, functional devices and technological support would normally operate as job resources. However, the infrastructure deficiencies reported by Anasel and Swai (2023) and Ambele et al. (2025), when

read alongside Muhihi's (2024) direct evidence of personally financed Internet access, suggest a more complex reality. A resource can enable academic work while simultaneously creating a financial demand when the employee must personally finance it. Thus, rather than rejecting Job Demands–Resources Theory, the Tanzanian setting extends the question from whether resources exist to who bears the cost of creating or maintaining those resources.

Institutional remote-working policy consequently becomes important in determining whether such costs remain private or institutional. While TCU (2022) provides national standards for online and blended delivery, Muhihi (2024) demonstrates that responsibility for lecturers' Internet costs remains a practical issue and reports lecturers' preference for greater employer support. John (2026) similarly finds that inadequate resources and personal costs can weaken the benefits of remote-work location flexibility. These studies therefore converge in moving the discussion beyond technological adoption to institutional responsibility: HEIs may formally embrace digital teaching and supervision while arrangements governing recurrent employee-side costs remain less clearly developed.

Policy neutrality should therefore not be interpreted as cost neutrality. If online teaching and virtual supervision are recognized institutionally but Internet, electricity, airtime, device-use and maintenance responsibilities are undefined, expenditure may fall on academic staff by default. Muhihi (2024) provides direct evidence for the Internet component of this argument, whereas the infrastructural limitations reported by Anasel and Swai (2023) and Ambele et al. (2025) suggest why wider resource transfers require investigation. The unanswered question is not simply whether HEIs provide digital platforms but whether their remote-working policies determine how the recurrent costs of accessing and using those platforms beyond campus should be shared.

The implications become particularly important when connected to job satisfaction. Nascimento et al. (2024) show that technology can generate positive experiences and greater job satisfaction where usefulness and organizational resources are sufficient, and their longitudinal findings in Nascimento et al. (2025) reinforce the positive potential of adequately supported remote technology use. Yan et al. (2025) similarly identify flexibility as a positive influence on satisfaction while showing that policy, incentives and institutional support remain important extrinsic conditions. Yang et al. (2025), in contrast, synthesize evidence showing that

technological overload and inadequate workplace support can adversely affect educators' well-being. These studies do not provide competing conclusions so much as conditional ones: remote digital work can improve or reduce employee experience depending on the balance between demands and resources.

Tanzanian evidence adds personal financing to that balance. While John (2026) finds that flexibility can improve academic staff job satisfaction where resources and task–location fit are adequate, Muhihi (2024) demonstrates that personally financed Internet can create a burden for lecturers. The findings imply that academic staff may simultaneously value the flexibility of remote working and dislike the financial conditions under which that flexibility is exercised. Consequently, online teaching and virtual supervision cannot be assumed to have a uniformly positive or negative influence on job satisfaction; the financial distribution of the resources sustaining those activities may be an important explanatory condition.

Several gaps emerge from this interaction of evidence. While Muhihi (2024) establishes a direct Internet-cost problem, Anasel and Swai (2023), Ambele et al. (2025) and Baynit et al. (2025) identify wider resource requirements without examining whether their costs are personally borne, leaving a financial gap around electricity, airtime, devices and maintenance. Although Kasim et al. (2023), Chigona and Sosibo (2024), Opesemowo et al. (2025) and Mireku et al. (2026) demonstrate intensive technology-mediated supervision, they largely examine communication, effectiveness, accessibility and workload rather than supervisor expenditure, leaving a virtual-supervision cost gap. Taole et al. (2024) extends digital supervision to field-oriented activity, but the financial implications for Bachelor's, Diploma and Certificate supervision remain insufficiently established. Similarly, existing supervision studies recognize continuing mentoring, yet personal expenditure associated with manuscript review, conference-paper support and research dissemination remains poorly documented.

Literature also leaves temporal, policy, theoretical and outcome gaps. Although John (2026), Yang et al. (2025) and Nascimento et al. (2025) demonstrate that work location, digital demands and organizational resources influence remote-working experiences, limited evidence establishes what academic staff spend when online teaching and virtual supervision continue during evenings, weekends and holidays. Although TCU (2022) legitimizes digital academic delivery, Muhihi

(2024) demonstrates that financing responsibility remains unresolved at employee level, exposing a policy gap. Theoretically, Self-Determination Theory explains autonomy benefits, Job Demands–Resources Theory explains the balancing of work demands and resources, and Boundary Theory explains work–non-work transitions, yet the realities of Tanzanian HEIs raise a combined theoretical question that these frameworks do not fully resolve: what happens when employees must personally finance the resources needed to exercise work autonomy, when a job resource simultaneously becomes a financial demand, and when movement across the work–home boundary also shifts work expenditure into the household?

Against these gaps, several questions remain unanswered. Who ultimately bears the recurrent costs when online teaching and virtual supervision move beyond HEI premises? To what extent do academic staff personally finance mobile data bundles, household Internet, airtime, electricity, digital devices and equipment maintenance? How do master's classes, professional certification programmes, short courses, tutorials, seminars, presentations, lecturer–student discussions, assessment and continuing clarification accumulate costs within online teaching? How do master's dissertation and PhD thesis supervision, Bachelor's, Diploma and Certificate student supervision, field supervision, research consultation, progress tracking, document review, manuscript development, conference-paper support and continuing academic guidance generate costs within virtual supervision? What costs are associated with repeated use of Zoom, Google Meet, Microsoft Teams, WhatsApp, email, telephone calls, Google Forms, KoboToolbox and institutional supervision systems? How does this burden change during evenings, weekends and holidays when institutional resources are less accessible? How clearly do institutional remote-working policies distinguish costs borne by HEIs from those borne by academic staff? Most importantly, how do personally financed costs of online teaching and virtual supervision influence academic staff job satisfaction in Tanzanian HEIs?

The study was therefore undertaken because existing scholarships explain important components of the problem without adequately connecting them. While Anasel and Swai (2023), Ambele et al. (2025) and Kisanjara (2025) establish the growth, benefits and resource limitations of online teaching in Tanzania, Muhihi (2024) reveals that some of those limitations can translate into direct lecturer expenditure. While Chigona and Sosibo (2024), Opesemowo et al. (2025), Etomes and Aluko (2025) and Mireku et al. (2026) demonstrate that virtual supervision is increasingly

technology-dependent, their emphasis remains on communication, supervision quality, accessibility and workload rather than personal cost. Meanwhile, Nascimento et al. (2024, 2025), Yan et al. (2025) and Yang et al. (2025) collectively show that digital work produces positive or negative outcomes depending on the resources and institutional conditions surrounding it. What remains insufficiently established is how these strands interact within Tanzanian HEIs: whether online teaching and virtual supervision systematically move recurrent operating costs into academic staff pockets, whether institutional remote-working policies recognize or leave unresolved that cost transfer, and whether personally financing those responsibilities influences academic staff job satisfaction. The study therefore approaches remote working not only as technological transformation but also as an employment, financing, fairness and institutional-governance issue.

2. METHODOLOGY

2.1 Research Design

This study adopted a qualitative evidence integration design that combined a systematic literature review with semi structured interviews. The systematic review was used to identify and synthesise existing evidence on online teaching, virtual student supervision, remote working conditions and academic staff job satisfaction, while the interviews were used to capture context specific experiences that may not be adequately represented in published studies. This design was appropriate because the review established what is already known, whereas the interviews provided deeper explanations of how academic staff experience remote work in practice, including extended availability, personal costs, technostress, flexibility, institutional support and work life boundary issues. Combining the two sources strengthened the study by allowing convergence, divergence and contextual interpretation between published evidence and lived experience, which is particularly useful when investigating complex work phenomena that are both organizational and experiential (Creswell and Plano Clark, 2018; Braun and Clarke, 2006).

2.2 Review Approach

The study combined a systematic literature review with semi-structured interviews to examine how online teaching (OT) and virtual student supervision (VSS) influence academic staff job

satisfaction. The systematic review synthesized existing global, Sub-Saharan African and Tanzanian evidence, while the interviews provided first-hand experiences from academic staff in selected Tanzanian HEIs. Snyder (2019) supports systematic reviews for integrating fragmented evidence, whereas Creswell and Poth (2018) emphasize interviews for obtaining detailed accounts of participants' experiences and meanings. Combining the two approaches was appropriate because it enabled the study to compare existing knowledge with lived experiences and identify issues not adequately explained in literature.

2.3 Data Sources

The study used two complementary data sources: peer-reviewed literature and semi-structured interviews. The systematic review drew on 28 peer-reviewed papers published between 2020 and 2024, covering global, Sub-Saharan African and Tanzanian evidence on online teaching (OT), virtual student supervision (VSS), remote-working costs and job satisfaction. Primary data were obtained through interviews with academic staff from selected Tanzanian HEIs to capture their lived experiences of OT and VSS, personal expenditure, institutional flexibility, attendance practices and perceived job satisfaction. Using both sources was appropriate because the literature established existing knowledge, while the interviews provided context-specific evidence from Tanzanian HEIs.

2.4 Inclusion and Exclusion Criteria

Studies were included if they:

Studies were included if they: (i) were peer-reviewed papers published between 2020 and 2024; (ii) examined online teaching (OT), virtual student supervision (VSS), remote working, academic staff job satisfaction, personal remote-working costs, flexibility or institutional support; (iii) focused on higher education settings; and (iv) provided evidence relevant to global, Sub-Saharan African or Tanzanian HEIs. Studies were excluded if they focused solely on students, primary or secondary education, non-academic employees, unrelated forms of digitalization, or lacked sufficient relevance to OT, VSS or job satisfaction. For the interview component, participants were included if they were academic staff from selected Tanzanian HEIs with direct experience of OT and/or VSS, while those without such experience were excluded.

2.5 Data Analysis and Synthesis

Data from the systematic review and interviews were analyzed thematically. Review findings were organized around online teaching (OT), virtual student supervision (VSS), personal remote-working costs, institutional flexibility, financing arrangements and job satisfaction, with attention to areas of agreement, difference and unresolved gaps across global, Sub-Saharan African and Tanzanian evidence. Interview transcripts were coded and grouped into recurring themes reflecting academic staff experiences in Tanzanian HEIs. Braun and Clarke (2021) support thematic analysis for identifying and interpreting patterned meanings within qualitative data. The final synthesis integrated the literature and interview themes to determine how the demands, resources and personal costs associated with OT and VSS shape academic staff job satisfaction.

2.6 Methodological Rigor

Methodological rigor was ensured through credibility, dependability, confirmability and transferability. Credibility was strengthened by comparing evidence from the systematic review with interview findings, while thematic saturation ensured that data collection continued until no substantially new themes emerged. Dependability was supported through consistent procedures for study selection, interviewing, coding and theme development, whereas confirmability was enhanced by grounding interpretations in the reviewed evidence and participants' accounts rather than researcher assumptions. Transferability was supported by clearly describing the Tanzanian HEI context and participant experiences. These procedures are consistent with Lincoln and Guba's (1985) criteria for trustworthiness in qualitative research.

2.7 Contribution of Methodology

The methodological contribution of the study lies in combining a systematic literature review with semi-structured interviews to connect existing evidence with the lived experiences of academic staff in Tanzanian HEIs. The review established what is already known about online teaching (OT), virtual student supervision (VSS), personal remote-working costs and job satisfaction, while the interviews revealed how these issues are experienced within specific institutional settings. This combination enabled the study to identify where published evidence converges with, differs from or fails to explain academic staff experiences. It also strengthened understanding of personal costs,

institutional flexibility, attendance practices and financing arrangements jointly shape job satisfaction under OT and VSS.

3. RESULTS

The findings integrated evidence generated through the systematic literature review with evidence obtained from semi-structured interviews with academic staff from selected Tanzanian higher education institutions (HEIs) in 2026. Interview participants represented experiences occurring across departments, faculties, colleges, institutes, main campuses, regional centres and coordination centres. Consistent with the study objectives, the findings focus on personal costs associated with online teaching (OT), personal costs associated with virtual student supervision (VSS), institutional support and financing arrangements, and how these conditions influence academic staff job satisfaction.

3.1 Personal Costs Associated with Online Teaching

The systematic review established that OT has become an increasingly important part of contemporary academic delivery, although its implementation involves technological, communication and workload demand. Watermeyer et al. (2021) found that online teaching intensified less-visible academic labour through continuous digital interaction and monitoring, while Anasel and Swai (2023) identified technological and organisational constraints affecting online teaching in Tanzanian universities. Muhihi (2024) further demonstrated that Internet costs associated with remote academic work could be personally borne by university lecturers in Tanzania. Interviews conducted in August 2026 strongly reflected these conditions.

The interviews showed that OT in Tanzanian HEIs did not necessarily mean that an entire programme was delivered remotely. Instead, participants commonly described blended arrangements in which conventional face-to-face teaching continued alongside selected online modules or academic activities. This occurred in ordinary degree programmes, master's programmes, short courses, tutorials, seminars, presentations and professional programmes. In some programmes, particularly those involving practical or apprenticeship components, students could undertake practical activities physically while theoretical components were delivered online.

For HEI-E all programmes were conducted online while retaining face to face indicating hybrid model of work.

Participants also identified situations in which modules in programmes such as tourism and other practically oriented programmes could be offered online while practical components remained face-to-face as noted in for HEI-A. This demonstrated that remote working and conventional teaching were not mutually exclusive. Rather, the two approaches operated together according to the nature of the module, programme requirements, student location and institutional arrangements.

Professional programmes such as CPB and CPSP provided another example. Participants in these programmes could already be employed during normal working hours, making evening or weekend delivery more practical. Academic staff could therefore complete their normal departmental or institutional activities during the day and later conduct a professional class remotely from home or another location. The ability to move teaching beyond the conventional classroom increased flexibility but also transferred some resource requirements to the location from which the lecturer actually taught as reported by HEI-A-AS09.

Evidence collected in September 2026 showed that lecturers rarely depended on one digital application. Zoom, Microsoft Teams and Google Meet were used for live classes, presentations, tutorials and discussions. WhatsApp was extensively used for class groups, notices, links, reminders, brief explanations and follow-up. Email facilitated more formal sharing of learning materials, assignments and assessment documents. Ordinary telephone calls and WhatsApp calls were used where immediate clarification was necessary or where students could not maintain stable connections to video-based platforms.

A single teaching activity could therefore involve several tools. A lecturer might send a Microsoft Teams or Zoom link through a WhatsApp group, deliver the formal class through the virtual platform, distribute presentation materials through email and subsequently respond to students through WhatsApp messages or calls. The interviews consequently showed that the formal online session represented only one element of the actual teaching process.

HEI-A-AS01 explained the broader workload involved:

> *"Online teaching is not just teaching; you prepare notes, upload them, answer students, and still follow up those who fail to connect. Sometimes, honestly, it feels like the work has no closing time."* (HEI-A-AS01, Interview, August 2026)

The account showed that preparation, uploading learning materials, resolving connectivity problems and responding to students continued beyond the scheduled teaching period. The finding reflects Watermeyer et al. (2021), who similarly identified continuous digital engagement as an important source of hidden academic labour.

HEI-A-AS02 described what occurred after the formal online class:

> *"Eeh… sometimes you finish teaching, but students continue sending questions through WhatsApp or email. You cannot ignore them, but it becomes too much because it enters your personal time."* (HEI-B-AS03, Interview, September 2026)

The experience demonstrated the dual role of digital communication. WhatsApp and email improved lecturer student accessibility while simultaneously extending academic work into personal time. Therefore, the costs associated with OT were not exclusively financial. Academic staff also contributed additional time through continuous communication before and after scheduled sessions.

Class size intensified the hidden workload. HEI-E-AS06 explained:

> *"When the class is large, online teaching becomes heavier. You have many assignments to mark, many messages to answer, and many students needing guidance, but the workload is counted as if it is normal teaching."* (HEI-E-AS06, Interview, August 2026)

Similarly, HEI-A-AS017 observed:

> *"Mmmh… the challenge is that online teaching looks simple from outside, but inside there is a lot of hidden work, especially when the class is big."* (HEI-A-AS017, Interview, September 2026)

These accounts demonstrated that a departmental workload allocation showing one online module might not adequately reflect electronic marking, WhatsApp communication, individual consultations, assessment feedback and follow-up generated by large student numbers. Thus, what appeared administratively as one teaching assignment could involve considerable additional digital labour.

The personal financial dimension became particularly visible when institutional Internet connectivity was unstable. HEI-A-AS09 explained:

> *"Sometimes the internet fails, and you are forced to use your own bundle. The institution expects the class to continue, but support is limited."* (HEI-A-AS09, Interview, August 2026)

The experience reflected a practical situation occurring across different HEI settings. An academic staff member could be teaching from home, a department, another campus or a regional centre when institutional connectivity failed. Rather than terminating the session, the lecturer could activate a personal mobile hotspot, tether a laptop to a smartphone or purchase additional mobile data to ensure that teaching continued. The institutional responsibility therefore remained uninterrupted because a personal resource filled the institutional connectivity gap.

The interviews further showed that this situation could occur even when the academic staff member was physically present at an HEI. For example, a lecturer at a regional centre could have institutional responsibilities and institutional premises available but still depend on personal mobile data where local connectivity was unreliable. This finding demonstrated that personally financed digital academic work was not synonymous with simply "working from home."

The interviews also revealed that Internet bundles represented only one component of the personal cost. A Senior Lecturer explained:

> *"I buy bundles myself; I use my electricity, laptop and phone. If the laptop gets a problem, I repair it myself. If the phone has a problem, again it is me. These things may look small when you mention them one by one, but when you add data, electricity, repairs and all the*

time you spend struggling with the network, you realise you are paying just to be able to teach." (Senior Lecturer HEI-E-AS013, Interview, August 2026)

The account extended Muhihi's (2024) Internet-cost finding by showing how Internet connectivity interacted with household electricity, use of personal laptops and smartphones, equipment repairs and maintenance. These expenses were particularly important because they recurred across classes, semesters and other academic activities rather than representing isolated payments.

Another Lecturer distinguished institutional provision of a digital platform from institutional financing of the resources needed to use that platform:

"The platform may be there, but the platform does not buy my data. It does not pay the electricity at home, it does not replace my laptop, and it does not repair my phone." (Lecturer HEI-C-AS02, Interview, September 2026)

She further explained:

"My laptop and phone are teaching tools now, but they are still my personal property. If I use them every day and something happens, the maintenance is mine." (Lecturer HEI-C-AS02, Interview, September 2026)

These experiences revealed a location–resource mismatch. Academic responsibilities could move easily from the department, faculty or institute to an employee's home, another campus or a regional centre, while institutional Internet, electricity and equipment remained predominantly located at institutional premises. Academic staff therefore sometimes used personal resources to bridge the difference between the location where work was assigned and the location where it was undertaken. This distinction between institutional platforms and the personally financed resources needed to access them is also reflected in the wider study material.

The interviews nevertheless showed that personally incurred expenditure was not interpreted identically by all academic staff. A Senior Lecturer and Head of Department who received institutional equipment, a workspace allowance and support from other staff explained:

"I cannot say online teaching is free for me. When I am at home, the internet is mine, electricity is from my house, the phone is mine, and I am using my own space. Sometimes even the small things, like maintaining a phone or another device, come back to me. The

> *difference is that I have support, so I do not feel as if the whole university work has been pushed into my pocket."* (Senior Lecturer/Head of Department HEI-E-AS21, Interview, August 2026)

His experience indicated that the issue was not necessarily complete elimination of personal expenditure. Instead, academic staff evaluated whether institutional responsibility and personal contribution were reasonably balanced. Where HEIs provided equipment, financial support or workload assistance, remaining personal expenditure was perceived differently from circumstances in which employees largely financed the entire remote-working arrangement themselves. This statement is the reflection of job dissatisfaction when it comes to cost incurred due to online teaching.

Overall, the findings showed that personal costs associated with OT included mobile data, household Internet, airtime, household electricity, personal laptops, smartphones and maintenance or repair of devices. These costs accumulated through blended modules, master's classes, CPB and CPSP programmes, short courses, assessments, student communication, virtual meetings and other digital teaching activities have implication on their job satisfaction.

3.2 Personal Costs Associated with Virtual Student Supervision

The systematic review showed that VSS improves continuity and geographical accessibility but depends on sustained communication, mentoring, document exchange, feedback and progress monitoring. Kasim et al. (2023) emphasised communication and mentoring as essential to effective online postgraduate supervision, while Chigona and Sosibo (2024) demonstrated that supervisors relied on several digital platforms to sustain interactions with students. Opesemowo et al. (2025) similarly found that remote supervision provided flexibility while creating communication and time-management demands. Interviews conducted in August 2026 supported these findings and showed that VSS generated both temporal and financial personal costs.

The interviews by Senior Lecturers HEI-C-AS011 and HEI-E-AS06, August 2026 demonstrated that VSS in Tanzanian HEIs was substantially broader than occasionally holding a Zoom meeting with a master's or PhD student. Supervision involved topic development, research proposal preparation, research design, development of research instruments, data collection, analysis,

repeated chapter review, correction of drafts, progress monitoring, preparation for proposal defence or viva voce examination and final submission.

Supervision also extended beyond master's and PhD programmes. Bachelor's, Diploma and Certificate students undertaking research, field attachment, apprenticeship or other practical activities could require continuing academic guidance while geographically separated from their supervisors. Field students in different districts or regions could communicate when they encountered problems, required clarification or needed supervisors to review reports or presentations.

The interviews collected in September 2026 at HEI-E-013, 2026 further revealed that the supervisory relationship could continue after substantial completion of the dissertation or thesis. Academic staff supported students in converting research into journal manuscripts, preparing conference abstracts and conference papers, responding to scholarly or reviewer comments and preparing conference or academic presentations. VSS therefore continued as part of broader research mentoring rather than terminating immediately after submission of a thesis or dissertation. Different tools served different supervisory purposes. Email was commonly used for proposals, dissertation chapters, PhD thesis chapters, research instruments, field reports, manuscripts and conference papers. WhatsApp was useful for progress updates, short questions, reminders and clarification. Zoom, Microsoft Teams and Google Meet supported longer research discussions, presentations and detailed supervisory meetings. WhatsApp calls and ordinary telephone calls became useful when urgent communication was required.

The interviews showed that supervisors regularly moved between these technologies during one supervisory cycle. A master's student might submit a dissertation chapter through email, send a WhatsApp notification. While other supervisors preferred their supervisee to use the university system for thesis submissions, participate in a Zoom meeting to discuss comments and subsequently make a WhatsApp call to clarify a particular methodological correction. A revised chapter could later arrive through email, beginning another cycle of review.

HEI-D-AS05 described one difficulty arising from repeated electronic submissions:

> *"Sometimes students send different versions of the same work, and you spend time checking which one is the latest. It becomes additional work."* (HEI-D-AS05, Interview, August 2026)

This experience demonstrated that VSS involved document-management work in addition to intellectual supervision. Academic staff had to identify the latest document, download different versions, compare corrections and ensure that feedback was provided on the correct version.

HEI-E-AS06 explained the repeated nature of this supervisory work:

> *"Eeh… supervision online is helpful, but when students are many, you keep reading, correcting, downloading, and sending comments again and again. It takes more time than people see."* (HEI-E-AS06, Interview, September 2026)

The finding demonstrated that accessibility was only one dimension of virtual supervision. Improved access for students was partly achieved through repeated document review, digital communication and continuing follow-up performed by academic staff.

Supervision became particularly demanding where one academic staff member simultaneously handled different categories of students. A supervisor could have several master's dissertations, PhD candidates, undergraduate research projects and students undertaking field activities while also supporting manuscript preparation, conference papers and presentations. Every supervisee potentially generated multiple emails, downloads, telephone calls, WhatsApp messages, virtual meetings and document corrections.

A detailed interview experience involved an Associate Professor HEI-C-AS019 supervising four PhD candidates through weekly Zoom meetings of approximately 45 minutes while student progress was also submitted electronically. She explained:

> "*People sometimes talk about online Supervision as if once you have a platform everything is solved. But I still need data, electricity, a laptop, sometimes my phone, software, and a place where I can sit and work. My devices are being used for academic work, so even maintenance is part of the cost."* (Associate Professor HEI-C-019, Interview, August 2026)

This experience demonstrated that even organised and scheduled VSS depended on a package of resources. The existence of Zoom, Microsoft Teams or an institutional supervision platform did

not eliminate the need for Internet, electricity, appropriate devices, software and suitable working space reflects negative implication on job satisfaction.

The interviews also indicated that supervisors used digital tools to track student progress. Institutional supervision systems could record submissions, feedback, corrections and completion of milestones. Google Forms could assist with progress reporting or assessment, while KoboToolbox could be applied where appropriate to field-related data collection from students who are onsite HEI-E-021 and HEI-D-012, progress monitoring or other research activities. Such applications increased supervisors' ability to monitor students located away from campus.

However, providing a free or institutionally licensed system did not make VSS financially cost-free. A supervisor accessing a supervision portal from home still required Internet connectivity, electricity and a suitable device. Similarly, reviewing field information through KoboToolbox or Google Forms still depended on connectivity and equipment. This finding supports the broader study argument that institutional provision of a platform should be distinguished from financing the employee-side resources required to access it (HEI-F-AS04, 2026).

Field supervision illustrated this particularly clearly. A Bachelor's, Diploma or Certificate student stationed in another region might call a supervisor to clarify an urgent requirement. Another might send pictures, reports or progress information through WhatsApp. A supervisor might subsequently conduct an online consultation through Microsoft Teams or Zoom. These digital tools reduced geographical barriers but potentially shifted communication costs to the individual supervisor where institutional airtime or connectivity was not provided.

The temporal cost of VSS was particularly evident in HEI-F-AS04's interview:

> *"Students can send messages at night or during weekends, and because you are their supervisor, you feel responsible to respond. But it affects your personal time."* (HEI-F-AS04, Interview, September 2026)

This experience showed that greater student accessibility could simultaneously produce continuous accessibility expectations for academic staff. A Masters candidate might submit a

chapter on Saturday, a master's student might require methodological clarification in the evening, a field student might encounter an urgent difficulty on a public holiday, or a conference deadline might require rapid review of a paper outside normal institutional hours (HEI-B-AS010, 2026).

The cost of VSS was therefore simultaneously temporal and financial. Responding to a student through WhatsApp at night involved supervisory work, personal Internet or airtime, electricity, a privately owned smartphone and personal time. One such interaction might be inexpensive, but repeated interactions involving several supervisees over months or years could generate substantial cumulative demands.

Overall, the interviews demonstrated that VSS extended across dissertations, theses, bachelor's research, Diploma and Certificate field supervision, manuscripts, conference papers, presentations, research consultations and progress monitoring. The associated personal costs emerged through repeated connectivity use, airtime, electricity, personal devices and extended working time.

3.3 Institutional Support and Financing of OT and VSS

The systematic review also established the combined of OT and VSS influence that digital academic work depends heavily on organisational resources and institutional support. Anasel and Swai (2023) showed that technological and organisational conditions affected the adoption of online teaching in Tanzanian universities, while Ambele et al. (2025) identified continuing limitations in technological infrastructure, connectivity and support. Muhihi (2024) added the employee-financing perspective by demonstrating the importance of personally borne Internet expenditure among lecturers.

Interviews conducted with academic staff participants HEI-E-AS013, HEI-D-AS020 and HEI-F-AS014 in the Dar es Salaam Region in August 2026 revealed that institutional support varied considerably across departments, faculties, colleges, institutes, main campuses, regional centres and coordination centres. These variations had implications for academic staff Job Satisfaction (JS), as staff working within the same higher education institution could experience different levels of technological support, administrative assistance and flexibility in work arrangements. Academic staff receiving adequate support could experience greater autonomy, reduced work-related difficulties and higher Job Satisfaction, whereas those receiving limited support could experience

increased workload pressures, frustration and dissatisfaction. The findings therefore suggested that Job Satisfaction under remote working arrangements depended not only on the existence of institution-wide policies but also on how consistently institutional support was implemented and experienced across different organisational and geographical settings.

Illustrative interview:

"Although we work under the same institution, the support we receive differs from one department or campus to another. Some academic staff have reliable internet, technical assistance and flexible working arrangements, while others must manage these responsibilities using their own resources. Such differences affect how comfortably we perform our academic duties and how satisfied we feel with our work.

For example, strong institutional Internet could be available at the main campus but become inaccessible when an academic staff member conducted an evening class from home. A regional centre might have more limited connectivity than the main campus. Similarly, a faculty could assign a lecturer an online master's class or postgraduate supervision responsibility while the resources required to undertake that activity outside campus remained personally provided.

This distinction was strongly expressed by one Lecturer:

> *"The platform may be there, but the platform does not buy my data."* (Lecturer, Interview, September 2026).

The statement captured the difference between digitalisation and financing. An HEI could provide an LMS, Microsoft Teams account, supervision system, Zoom access or institutional email, while the academic staff member continued paying for Internet, electricity and personal equipment required to access those systems from another location.

The interviews showed that greater institutional support altered how academic staff experienced the same remote-working costs. One Senior Lecturer and Head of Department explained:

> *"Working without presence imenipa uhuru. Lakini ni kwa sababu nina team. Bila Personal Assistant (PA) and Tutorial Assistant (TA) ningekufa. If I had to answer every student,*

upload everything, supervise, attend meetings, and still pay for internet and electricity alone, I would not call that flexibility." (Senior Lecturer/Head of Department, Interview, August 2026).

The experience revealed that institutional support was not exclusively financial. A laptop or financial allowance could reduce direct personal costs, while a Teaching Assistant, Personal Assistant or other administrative support could reduce the communication and workload demands associated with remote academic responsibilities.

An Associate Professor receiving financial support similarly explained:

"The TSh 400,000 does not remove everything, but it changes how I feel about those costs." (Associate Professor HEI-D-AS12, Interview, September 2026)

This finding indicated that institutional support did not necessarily need to eliminate every personally incurred cost. Rather, recognition and partial sharing of the financial burden influenced whether academic staff interpreted personal expenditure as reasonable professional contribution or unfair cost transfer.

The interviews also exposed differences in physical attendance and accountability systems. Some academic staff worked under biometric attendance arrangements, while other settings relied on departmental, faculty or institutional attendance books. Such arrangements could continue even where academic staff undertook substantial OT and VSS remotely.

HEI-B-AS03 explained:

"Sometimes you are working remotely, but the issue of biometric attendance still comes in. It becomes confusing because remote work means you are not always physically at the office." (HEI-B-AS03, Interview, August 2026)

The concern was not necessarily that accountability should be removed. Instead, participants questioned whether physical attendance fully represented contemporary academic work. A lecturer could record biometric or departmental attendance during the day and subsequently conduct a CPB, CPSP or master's class online during the evening. A supervisor could fulfil daytime attendance requirements and later spend Saturday reviewing a thesis or conference paper.

The same issue occurred in virtual academic meetings. Departments, faculties, colleges, institutes, campuses and regional or coordination centres could conduct meetings through Microsoft Teams, Zoom or Google Meet. An academic staff member attending such a meeting from home might use personal Internet, household electricity, a private smartphone or laptop and personal working space for an institutional activity.

The institutional-support findings therefore revealed a wider financing problem. Adoption of OT and VSS did not necessarily mean that HEIs had developed explicit remote-working financing frameworks covering Internet, airtime, household electricity, personal-device use, equipment maintenance or reimbursement. Where policies were unclear or silent, academic staff could become default financiers of resources required for institutional work.

This situation was especially important because remote academic responsibilities occurred across organisational boundaries. The responsibility might originate in a department, be coordinated by a faculty, involve students attached to a regional centre and be completed by an academic staff member working from home. Digital academic responsibilities therefore moved easily across institutional locations, whereas responsibility for financing the resources supporting that work remained less clearly defined.

The evidence consequently showed that sustainable institutional support required more than simply purchasing digital platforms. It involved consideration of connectivity, equipment, employee-side expenditure, workload allocation, technical assistance, flexibility and accountability arrangements appropriate to work undertaken beyond conventional institutional premises.

3.4 Influence of Personal Costs of OT and VSS on Academic Staff Job Satisfaction

The systematic review demonstrated that remote academic work could produce both positive and negative employee experiences depending on available job resources and work demands. Nascimento et al. (2024) found that digital technologies could generate positive outcomes when teachers possessed adequate resources, while Yang et al. (2025) demonstrated that excessive

technological demands could contribute to techno-overload. Watermeyer et al. (2021) similarly highlighted workload and extended digital accessibility among academic staff undertaking online work.

Interviews conducted in August 2026 showed that the effect of OT and VSS on job satisfaction was similarly conditional. Academic staff valued flexibility, continuity and the ability to undertake academic responsibilities irrespective of geographical location. However, these benefits were weakened where remote working generated recurrent personal expenditure, extended working time, continuous accessibility or inadequate institutional support.

Remote working provided clear professional benefits in some cases. Academic staff could organise teaching around other academic responsibilities, supervise students situated in other locations and obtain uninterrupted time for research and writing. One Associate Professor explained:

> *"Nisingeweza kumaliza kitabu changu kama ningekaa chuoni kila siku. Flexibility imeniokoa. I am still using my own electricity and internet, but I also gain something important: uninterrupted time. So, I do not look at the money I spend only as a loss."* (Associate Professor HEI-F-AS014, Interview, September 2026)

Her account demonstrated that personally borne costs did not automatically lead to dissatisfaction. Although she still used household electricity and personal Internet, the flexibility generated meaningful professional benefits, and some institutional support was available. The costs were therefore interpreted as part of a broader exchange rather than solely as a personal loss.

The Senior Lecturer and Head of Department described a comparable experience. His use of *uhuru* reflected the autonomy created by flexible working, but he explicitly related this positive experience to institutional equipment, financial assistance and workload support. This suggests that flexibility becomes more likely to enhance job satisfaction where adequate job resources accompany it.

A different pattern emerged where support was more limited. One Lecturer explained:

> *"Sometimes a student writes at night, and you answer because you feel responsible. You are using your phone, your bundles and electricity, but you are also giving your private time."* (Lecturer HEI-D-AS20, Interview, August 2026)

The quotation demonstrated that personal remote-working costs were multidimensional. Financial expenditure on Internet and electricity occurred alongside use of personal devices and private time. Thus, a WhatsApp message could be financially inexpensive when considered individually but become significant when such interactions occurred repeatedly across many students and extended periods.

The most negative experience was reported by a Senior Lecturer who repeatedly financed data, household electricity, equipment and repairs while also experiencing weak connectivity and technological stress. He explained:

> *"Students can send WhatsApp messages at night. You are still using your phone, bundles and electricity after working hours. Nobody sees that as a cost because there is no receipt that says, 'night teaching', but the money is still leaving my pocket."* (Senior Lecturer HEI-C-AS011, Interview, September 2026)

He subsequently expressed a preference for conventional teaching:

> *"Mimi ni mwalimu wa darasani. Hii online ni ya vijana. Nipe chumba changu nirudi kufundisha."* (Senior Lecturer HEI-C-AS011, Interview, September 2026)

The contrasting experiences showed that use of technology alone could not explain job satisfaction. The important issue was the balance between flexibility and the resources, workload and financial responsibilities accompanying it.

The VSS interviews showed the same pattern. Supervisors valued being able to guide master's students, PhD candidates, field students and research students irrespective of location. Digital technologies allowed supervisors to review dissertations and theses, monitor field activities, assist with conference papers and support presentations without requiring every interaction to occur physically.

However, the same accessibility produced repeated document review, WhatsApp communication, calls, evening consultations and weekend work. HEI-E-AS06, HEI-E-AS013 and HEI-F-AS022 demonstrated that flexibility for the student could become continuous accessibility for the academic staff member. Where such demands were not sufficiently recognised, they weakened the satisfaction associated with VSS.

The findings therefore showed that successful completion of an academic task should not automatically be interpreted as evidence of job satisfaction. A lecturer might successfully deliver a CPB or CPSP class using a personally purchased data bundle. A supervisor might return a corrected PhD chapter after spending part of a weekend reviewing it. A field supervisor might successfully resolve a student's problem through a personally financed WhatsApp call. In each situation the institutional responsibility was fulfilled, but the employee could remain dissatisfied with the conditions under which it was completed (HEI-A-AS017, September 2026)

This pattern is consistent with Job Demands–Resources Theory. Bakker and Demerouti (2017) and Bakker et al, 2023 explain that job resources facilitate employees' achievement of work goals, whereas job demands consume sustained physical, psychological or other resources. In this study, Internet connectivity, digital devices, WhatsApp, email, Microsoft Teams, Zoom, Google Meet, flexibility and institutional support operated as job resources because they enabled OT and VSS.

However, the interviews demonstrated that the same resources could acquire demand characteristics. Internet connectivity became a financial demand when employees repeatedly purchased bundles. Personal laptops enabled flexibility but became financial demands where maintenance and replacement remained personally financed. WhatsApp facilitated supervision but became a temporal demand when student communication extended into evenings and weekends. Flexibility provided autonomy but became less valuable where employees simultaneously faced recurrent personal expenditure and physical-attendance requirements.

Bakker et al. (2023) emphasize that the effect of job demands and resources depend on the context in which work is undertaken. The Tanzanian HEI evidence particularly illustrates this contextual relationship: the same technology or flexible arrangement could contribute to satisfaction for one academic staff member while generating dissatisfaction for another depending on financing, connectivity, workload, managerial support and institutional arrangements.

Overall, interview evidence collected in September 2026 showed that personal remote-working costs influenced academic staff satisfaction through the balance between individual contribution and institutional support. Where OT and VSS were accompanied by financial assistance, institutional equipment, workload support and meaningful flexibility, academic staff were more likely to regard personal expenditure as manageable. Where Internet, household electricity, personal devices, repairs, continuing communication and additional working time were predominantly absorbed by employees, remote work was more likely to be experienced as an additional job demand.

The central finding was therefore that OT and VSS were neither inherently satisfying nor inherently dissatisfying. Their influence on academic staff job satisfaction depended on whether institutional resources, financing arrangements, workload recognition, flexibility and accountability corresponded with the actual conditions under which academic staff performed teaching and supervision across departments, faculties, colleges, institutes, campuses, regional centres and coordination centres.

4. DISCUSSION

The combined evidence from the systematic review and interviews shows that online teaching (OT) has become part of normal academic work in Tanzanian HEIs, mainly through blended delivery rather than as a complete replacement for face-to-face teaching. Anasel and Swai (2023) found that technological and organisational conditions continue to shape online teaching in Tanzanian universities, while Watermeyer et al. (2021) showed that digital teaching can increase preparation, communication and less-visible academic workload. The interview findings converged with these studies, as academic staff described blended modules, postgraduate classes, short courses and professional programmes delivered through Microsoft Teams, Zoom, Google Meet, WhatsApp and email. However, the interviews extended the existing evidence by showing how institutional resource limitations may become personal expenses. Muhihi (2024) directly supports the finding that Tanzanian lecturers can personally bear Internet costs, but the interviews additionally revealed expenditure on electricity, airtime, personal devices and maintenance. This study therefore argues that the expansion of OT has not only changed the location of teaching; in

some circumstances, but it has also shifted part of the resources required to sustain teaching from the institution to individual academic staff.

Virtual student supervision (VSS) revealed a related but more continuous pattern. Kasim et al. (2023) emphasise communication, mentoring and interaction as essential to effective online supervision, while Chigona and Sosibo (2024) demonstrate how digital platforms can sustain postgraduate supervision across geographical distance. Opesemowo et al. (2025), however, qualify these benefits by identifying communication and time-management pressures associated with remote supervision. The interview evidence agreed with both perspectives. Academic staff valued the ability to supervise students regardless of location, yet VSS involved repeated downloading, reading, correction, follow-up and online consultation. It also extended beyond master's dissertations and PhD theses to field students, research presentations, manuscripts and conference papers. These findings suggest that digital supervision reduces geographical separation but can increase the frequency and duration of contact between students and supervisors. In this study's interpretation, VSS is therefore valuable for academic continuity, but its effectiveness should not be judged only by easier student access; the additional time and resources required from supervisors must also be recognised.

Institutional support emerged as the clearest explanation for why similar remote-working activities produced different experiences among academic staff. Anasel and Swai (2023) and Ambele et al. (2025) emphasise infrastructure and organisational support as important conditions for digital academic work, while Muhihi (2024) draws attention specifically to the financing of Internet access. The interviews largely converged with these findings but revealed important differences between academic staff. Those who received laptops, allowances, administrative assistance or meaningful flexibility still incurred some personal expenditure, yet they tended to regard it as more manageable than those who depended mainly on personal resources. This pattern is consistent with Nascimento et al. (2024), who found that technology can contribute to positive work experiences when appropriate organisational resources are available. In contrast, Yang et al. (2025) shows that excessive technological demands can contribute to technostress. Rather than contradicting one another, these studies suggest that the outcome depends on the balance between support and demand. The present study therefore maintains that providing an LMS, Microsoft Teams account

or other digital platform is not sufficient evidence of institutional support if academic staff must still personally finance the connectivity, electricity and equipment required to use it.

The interviews also introduced an institutional issue that receives comparatively less attention in the reviewed empirical studies: the relationship between remote academic work and conventional physical-attendance systems. Academic staff could satisfy biometric or attendance-book requirements during normal institutional hours and subsequently continue teaching, thesis review, student consultation or academic meetings remotely. Much of the existing literature concentrates on digital adoption, effectiveness and technological challenges, whereas this finding draws attention to how digitally performed work is recognised by institutions. Watermeyer et al. (2021) demonstrated that digital academic work can extend workload beyond conventional arrangements, and the present findings show why attendance alone may not represent that workload adequately. This study does not suggest abandoning institutional accountability; rather, it argues for accountability mechanisms that acknowledge academic work performed both within and beyond the campus. Otherwise, an HEI may record successful attendance and task completion while overlooking the additional employee time and personal resources through which those outcomes were achieved.

In summary, the study concludes that online teaching (OT) and virtual student supervision (VSS) have become integral to academic work in Tanzanian HEIs, offering flexibility and continuity but also creating personal financial and time-related demands. Academic staff may personally meet costs for Internet, electricity, airtime, devices and maintenance while also remaining accessible beyond normal working hours. The effect on job satisfaction therefore depends on the level of institutional support, financing, workload recognition and flexibility available. Sustainable OT and VSS require HEIs to align digital responsibilities with adequate resources, fair cost-sharing arrangements and accountability systems that recognise work performed both within and beyond campus.

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