

EXPLORING THE EFFECTIVENESS OF FORMATIVE ASSESSMENT IN TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

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ABSTRACT

This study examined the effectiveness of formative assessment in Technical and Vocational Education and Training (TVET). Given the growing emphasis on skills development and practical learning, the research investigated how formative assessment practices influence trainees' engagement, understanding, and skill acquisition. Guided by the Cognitive Design System (CDS) and Evidence-Centered Design (ECD) frameworks, the study adopted a pragmatist paradigm and employed a mixed-methods approach. Data were collected from 20 trainees and 5 trainers across three public and private TVET institutions using questionnaires and semi-structured interviews. Quantitative data were analysed using descriptive statistics, while qualitative data were examined through thematic analysis. Findings indicate that although trainers report using formative assessment, trainees experience it as infrequent and minimally impactful. Challenges in effective implementation were also identified. The study recommends targeted professional development to strengthen trainers' capacity to implement formative assessment practices effectively and calls for further longitudinal research on assessment practices and student outcomes in TVET.

Key words: *Assessment, Formative assessment, Summative assessment, Technical vocational education (TVE), Trainees, Trainees*

Introduction

Technical vocational education plays a critical responsibility in preparing individuals for the needs of the modern workforce, particularly in rapidly evolving sectors such as technology, engineering, and skilled trades. In Namibia, where technical vocational education is an integral component of the education system, the effectiveness of pedagogical practices, particularly formative assessment, becomes paramount. This study was carried out vocational training institutions in Windhoek, Khomas region. The TVET are in Windhoek and offer level 1 up to level 4 on the NQF. This research explores the efficacy of formative assessment in enhancing technical vocational education within the Khomas Region of Namibia. Formative assessment, characterized by its emphasis on offering continuous feedback and opportunities for improvement throughout the learning process, holds the potential to foster student engagement, deepen understanding, and promote skill development in technical and vocational disciplines. Technical vocational education prepares individuals possessing the necessary skills and competencies to thrive in various industries and contributes to economic development. Kumar and Singh (2018) indicated that Technical and Vocational Education (TVE) is a term that describes training and education that focuses on acquiring specialized information and skills connected to a given profession or trade. Instead of summative assessment, formative assessment aims to deliver continuous feedback and support to students during the learning process rather than solely evaluating their final performance. This approach has gained recognition for its potential to enhance learning outcomes by identifying areas for improvement, promoting student engagement, and nurturing a deeper understanding of the subject matter. According to Yan and Pastore (2022), formative assessment is a technique that uses data on learning progress to direct the learning processes of both instructors and trainees. European Center for the Development of Vocational Training (ECDVT) (2018), technical and vocational education is a significant component of education that provides students with the information and practical skills they will need for their future employment. Previous researchers such as Box and Vernikova (2019), and Brady, Fellenz, and Devitt (2020) have defined formative assessment, or assessment for learning (AFL), as an integral aspect of the daily routine for students, educators, and peers, involving the active engagement, contemplation, and response to information derived from conversations, demonstrations, and observations, to enrich continuous learning. Since most of the

continent's nations established vocational education, there has been a notable advancement in Africa's formative assessment of Technical Vocational Education (TVE) (Kapolo, 2023). Further, informal behaviour may be found in Indigenous education, which had methods for passing down wisdom and practical skills from one generation to the next through customary, unrecorded methods. The formal behaviour, though, happened in a classroom where there was interaction between trainers and trainees.

In Namibia, like many other countries, there has been a growing emphasis on enhancing the quality and relevance of technical vocational education to meet the demands of a rapidly evolving job market. However, Namibia created its policies and plans after attaining independence in 1990 to satisfy the population's demands for training and education (Josua et al., 2022). Saito (2020) illustrates that some instructors are oblivious to the appropriate assessment techniques for their trades. Therefore, researching the effectiveness of formative assessment in technical vocational education in the Khomas Region of Namibia is critical. This research aims to investigate the current practices of formative assessment, examine its impact on student learning outcomes and experiences, identify challenges and barriers to implementation, and propose recommendations for improvement.

Research questions

Based on this, the following research questions have been set to provide a focus for the study:

- 1. What are the current formative assessment practices in technical vocational institutions in the Khomas region?*
- 2. What challenges do trainers face when conducting formative assessments in technical vocational education and training?*
- 3. How do formative assessment practices enhance teaching practices in TVE in Khomas region*

Literature Review

Curriculum of TVET in Namibia

Namibia achieved independence from South African governance on March 21, 1990, inheriting an education system burdened by disparities and deficiencies. This legacy resulted in segments of the population lacking essential skills and literacy, ultimately contributing to high unemployment rates (Mořovská, 2018; Hailombe, 2011). As political administrations often shape educational structures, Namibia embarked on reforming its system to eliminate colonial and apartheid influences (Akala, 2021; Hutchinson, 2021). The government prioritized establishing inclusive education, integrating Technical and Vocational Education and Training (TVET) across primary to tertiary levels. While TVET was introduced to address human resource and economic needs, early implementation focused more on improving literacy rates than advancing technical skills (Kapolo, 2023). At schools, TVET emphasized pre-vocational subjects, later transitioning to Design and Technology at secondary levels—a change reversed after the 2011 National Conference on Education resolutions. Pre-independence TVET remained centralized and disconnected from labor market realities, predominantly focusing on blue-collar trades.

Post-independence, Namibia prioritized revamping its TVET system through policies like the National Vocational Training Act (NVTA) of 1994 and its 1996 revision (Kapolo, 2023; Steyn, 2020). These frameworks regulated apprenticeships, vocational training standards, and governing bodies. The formulation of a TVET Policy in 2005 led to establishing the Namibia Training Authority (NTA) to regulate and finance TVET education, outlined in key documents such as UNESCO's 2016 reports, the TVET Act of 2008, and the VET Policy of 2005 and its 2021 revision (Sifani, 2019). The NTA adopted Competency-Based Education and Training (CBET), yet faced resistance due to factors like limited technical subjects, unprepared trainers, and inadequate infrastructure (Gessler & Peters, 2020; Johnston, 2018). Challenges persist, including high dropout rates and low community acceptance, which impact workforce skill availability (Indiazi, 2023; Makochekanwa & Mahuyu, 2021; Ramadan & Xiaohui, 2019; Namibia Revised TVET Policy, 2021). Despite reforms, TVET strives to balance economic demands and societal expectations.

Assessment in TVET in SADC

Every student benefit from feedback on their academic performance, with inclusive practices proving advantageous for all learners. Research by Ramalige (2022) highlights those South African TVET colleges often assign assessments lacking content validity and real-life context. Joseph's (2023) study on formative assessments for students with disabilities found that tailored tasks integrated learning with professional preparedness, helping students identify strengths and improvement areas. Similarly, Cairns et al. (2024) noted in Malawi that Universal Design for Learning (UDL)-based assessments allow educators to tailor instruction and monitor progress, blending formative and summative approaches. Atukunda (2022) reported Zimbabwean TVET lecturers struggle with time and resources for continuous assessments, leading to low emphasis on feedback and varied methods. Recommendations include in-service training, infrastructure upgrades, and increased teaching time to support diverse needs. However, Sithole et al. (2021) and Van Staden et al. (2021) observed limited research into TVET assessments in the SADC region, with most focus on primary, secondary, and higher education contexts.

The current methods of assessment in TVET

Henriksen et al. (2010) highlight that formative assessment prioritizes the quality of the learning process rather than the outcomes. Traditional evaluation methods in Technical and Vocational Education and Training (TVET) have often focused on summative assessments, which solely measure results (Nofemela, 2019; Tian & Sun, 2018). However, there has been a shift towards integrating formative assessments to complement summative ones, as this approach advances learning and improves performance (Nsabayezu et al., 2023).

Yusop et al. (2022) note that assessments in TVET have transformed, transitioning from traditional exam-based practices to more authentic methods emphasizing problem-solving skills. Unlike conventional approaches, modern assessments are outcome-based, competency-driven, and tailored to workplace environments, promoting student-centered learning and ensuring employability (Yan & Pastore, 2022). This shift seeks to equip students with practical knowledge, critical thinking, and communication skills for success in vocational fields.

Implementation of Assessment Practices in TVET in Namibia

The implementation of assessment practices in Namibia's Technical and Vocational Education and Training (TVET) sector is centrally coordinated by the Namibia Training Authority (NTA). The NTA operates under the Vocational Education and Training Act, which mandates it to regulate, supervise, and ensure quality assurance within the TVET system. Through its Policy for Assessment and Certification within the TVET System, the NTA administers Competency-Based Assessment (CBA) and the National Trade Testing and Certification (NTTC) system, ensuring that assessments are aligned with occupational standards and the Namibia Qualifications Authority (NQA) framework (NTA, 2011; VET Act, 2008). These policies emphasize standardized procedures, assessment integrity, and national comparability of qualifications across accredited Vocational Training Providers (VTPs).

In practice, assessment implementation involves trained and registered assessors, moderators, and verifiers who must comply with NTA guidelines to ensure validity, reliability, fairness, and transparency. Accredited VTPs are responsible for developing assessment instruments based on unit standards, conducting formative and summative assessments, and maintaining proper documentation for moderation and verification. The NTA oversees external moderation and verification processes to safeguard quality and consistency nationwide (NTA, 2011). This structured quality assurance mechanism strengthens confidence in Namibia's TVET qualifications and supports learner progression within the National Qualifications Framework (NQF) administered by the NQA.

Despite these regulatory frameworks, challenges persist in the effective implementation of assessment practices. Studies on Namibia's TVET sector highlight capacity constraints, limited industry participation, and the need for continuous professional development for assessors and institutional managers (Afeti, 2018). Strengthening partnerships between training providers and industry remains critical to ensuring that assessments reflect real workplace competencies and evolving labour market demands. Continuous policy refinement, monitoring, and stakeholder engagement therefore remain essential to sustaining credible and industry-relevant assessment practices in Namibia's TVET system.

Benefits and Challenges of Formative Assessment in TVET

Formative assessment enables students to take ownership of their learning, fostering active participation and self-responsibility (Nicol & Macfarlane-Dick, 2017). Trainers can use this approach to identify areas where trainees face challenges and provide tailored support to address them (Sadler, 2015). Moreover, it motivates students and enhances learning outcomes by emphasizing continuous improvement rather than results (Harlen & Deakin-Crick, 2017; Baroody, 2023). Formative evaluations allow for the development of instructional programs that encourage active engagement and understanding (McCallum & Milner, 2021). Immediate feedback helps trainees identify their strengths and weaknesses while enabling trainers to adjust teaching strategies accordingly (Dejene, 2019). Regular assessments boost confidence and motivation, ensuring that trainees refine technical skills critical for employability (Muho & Taraj, 2022). This makes formative assessment a vital tool for developing workplace-relevant skills in TVET contexts.

Implementing formative assessment faces hurdles such as inadequate trainer training and lack of support, which limit its effectiveness in enhancing learning outcomes (Baroody, 2023; Linda, 2022). Trainers often struggle to provide timely feedback due to large class sizes or time constraints, further complicating the process (Hattie & Timperley, 2017). Cultural factors, including a focus on rote memorization, may also hinder the adoption of formative practices in some educational settings (Stobart, 2008). Additionally, the absence of integration between formative and summative assessment can lead to motivational issues, as students may view formative activities as less relevant to their success (Harlen & Deakin-Crick, 2017). Addressing these challenges requires investments in professional development, resources, and alignment with contextual needs to improve assessment practices and outcomes in TVET. Research on assessment practices in TVET reveals significant challenges and opportunities. For instance, Rahman et al. (2021) found that traditional methods still dominate Malaysian TVET, requiring improvement to meet Competency-Based Education and Training (CBET) standards. Similarly, Hondonga et al. (2022) identified issues with Work-Integrated Learning (WIL) assessments in Zimbabwe, where online methods faced difficulties, prompting reliance on conventional practices. Kumar and Singh (2018) demonstrated that formative assessments enhance learning

outcomes, while Dighe (2016) emphasized their role in fostering metacognitive skills essential for technical disciplines. However, Baroody et al. (2023) argue that the lack of formative assessments contributes to high dropout rates and unemployment among trainees. Effective assessment practices require investments in professional development, infrastructure, and alignment with industry needs to support student growth and ensure TVET remains relevant to labor market demands (Kapolo, 2023; UNESCO, 2017).

The Relationship Between Formative and Summative Assessment

Formative and summative assessments play complementary roles in education, particularly in TVET. While summative assessments evaluate final achievements, formative practices provide ongoing feedback to enhance learning and skill acquisition (Baldwin, 2021). The integration of both types allows for a more comprehensive understanding of student progress. Gezer et al. (2021) demonstrated a positive relationship between formative and summative assessments, emphasizing that formative practices benefit low-achieving students. Ismail et al. (2022) found that formative assessment significantly impacts motivation, self-regulation, and academic performance. Similarly, Svensäter and Rohlin (2023) highlighted the utility of blended models that use formative feedback to inform summative evaluations, offering insights into individual learner development. This dynamic approach ensures that assessments not only reflect performance but also guide future instruction, fostering a holistic learning experience.

Theoretical Framework

The Cognitive Design System (CDS) framework, established by Susan Embretson (1998), examines cognitive response mechanisms within assessments targeting fundamental cognitive skills such as spatial rotation and reasoning abilities (Li & Wang, 2021). Vilone and Longo (2021) emphasize that these diagnostic evaluation tasks are grounded in applied cognitive psychology. In this study, cognitive response processes focus on how trainees engage with formative assessments using basic cognitive abilities, such as attention, memory, and reasoning skills. These constructs helped analyze trainees' cognitive capabilities, allowing researchers to understand how trainees addressed and answered questions during assessments. Ultimately, the CDS framework provided insights into trainees' learning

processes and cognitive strategies, enabling more tailored and effective educational interventions.

The Evidence Centered Design (ECD) framework, developed by Robert Mislevy and colleagues, serves as a guide for designing diagnostic assessments, irrespective of the targeted constructs (Mislevy et al., 2020; Amukune et al., 2022). This framework outlines five integral components: student models that hypothesize proficiency structures, task models specifying task performance representations, and evidence models linking these two components psychometrically (Tenison & Sparks, 2023). Additional elements include the assembly model, which integrates the components, and the presentation model, detailing task delivery methods. These components help trainers design formative assessments that elicit behaviors indicative of trainees' latent abilities. By applying the ECD framework, trainers can develop assessments that align with trainees' cognitive profiles, enhancing diagnostic accuracy and effectiveness in skill development.

Assessment in TVET serves to evaluate instructional strategies, monitor student learning and skills, identify areas for improvement, and inform curriculum alignment with industry needs. These frameworks address critical questions, such as whether trainees are acquiring necessary competencies and how effectively TVET curricula meet labor market demands. Additionally, frameworks like ECD enable trainers to collect and utilize assessment data for feedback and continuous improvement (Kuhlmann & Guillén Olaya, 2020). Regular assessments help trainees identify misconceptions early and adjust, fostering active learning and improved performance. As TVET evolves, integrating comprehensive assessment frameworks ensures effective teaching and learning processes that prepare students for professional success.

Student models

This defines the knowledge, skills, and abilities students are expected to demonstrate (Uy, Kilag, & Arcilla Jr, 2023). This knowledge, skills, and abilities allowed the researchers to align the data analysis with the model to determine the extent to which students achieve the desired learning objectives. Through analysing such data, the researchers identified areas where students may be struggling or excelling so that guiding instructions can be provided.

Task models

This describes students' tasks or activities to demonstrate their knowledge and skills (Jivet et al., 2021). Analysing data for students' different functions or activities enabled the researchers to identify strengths and weaknesses in assessment design and make informed decisions about task selection and modification to improve the quality of evidence collected.

Evidence models

This specifies the types of evidence that can be collected to assess student learning, including observations, artefacts, performances, or responses to assessment items (Gitomer et al., 2021). During the data analysis, the researchers could only learn the type of evidence used to assess learning and not the content of such evidence to determine whether they aligned with the intended learning objectives and provide a comprehensive picture of student performance.

The assembly model

The assembly model involves synthesizing evidence from multiple sources to comprehensively understand. Students' performance, including combining evidence from different tasks, assessments, or data sources (Reynders et al., 2020). The model allowed the researchers to generate a holistic view of students' performance, identifying areas of strength and weakness and informing decisions about instructional planning and support.

Research methodology

This study adopted pragmatism as its research paradigm, which prioritizes the practical application of ideas, assessing their truth based on their effects and outcomes (Kaushik & Walsh, 2019). A mixed-methods approach was chosen, combining quantitative and qualitative research techniques to offer a more comprehensive understanding of the problem than single-method designs (Shikalepo, 2021). Quantitative data was represented in tables, graphs, and charts, while qualitative insights were drawn from explanatory quotes derived from interviews or open-ended questions (Kuckartz, 2019). Creswell (2009) supported mixed methods that enhance comprehension, making them highly effective for this study. By integrating these approaches, the research bridged numerical trends and rich descriptive narratives, ensuring robust analysis and findings.

Questionnaires and Semi-structured interviews

To collect data, questionnaires and semi-structured interviews were employed. Questionnaires are structured instruments designed to gather specific information about attitudes, opinions, and behaviors from respondents, offering both flexibility and scalability (Cheung, 2021; Ruslin et al., 2022). For this study, close-ended questionnaires were administered to level three trainees, and semi-structured interviews provided deeper insights through open-ended, exploratory questions for trainers (Naz et al., 2022). A total of twenty trainees submitted questionnaires, while five trainers were interviewed. This dual-method approach ensured diverse data collection, capturing both quantitative trends and qualitative experiences for a thorough analysis of formative assessment practices.

Population and sampling

The population for this study were level 3 trainees at TVET in Khomas region. This included both private and government TVET in Khomas Region. Three TVET were purposively chose because of the location and accessibility to the researchers. The participants were selected using purposive sampling from those three TVET. Twenty trainees and five trainers were involved in this study to obtain the needed data.

Data Analysis

Approach Quantitative data was analyzed using descriptive statistics, summarizing and evaluating patterns through frequency tables and graphs (Sharma, 2019). For qualitative data, thematic analysis was employed by coding and identifying patterns in interview transcripts to generate themes (Kuckartz, 2019). The researchers used open coding to assign descriptive labels to data segments and clustered related codes into broader categories, identifying recurring ideas and overarching themes (Clark & Clark, 2022). By integrating quantitative and qualitative data, findings were triangulated, ensuring credibility and reliability while addressing key research questions. This comprehensive approach clarified the effectiveness of formative assessment and offered actionable insights for improvement within TVET systems.

Data analysis and discussion

Data from the questionnaire

This section first presents the data for the trainees collected through a questionnaire. The questionnaire data is presented in tables, graphs, and charts for easy analysis and interpretation. On a scale of 1 to 5, on how frequently do trainers in their TVET program use formative assessments during classroom instruction, participants selected one of the following: a) 1 - Rarely b) 2 - Occasionally c) 3 - Sometimes d) 4 - Often e) 5 – Always, trainees responded as shown in Figure 1 below:

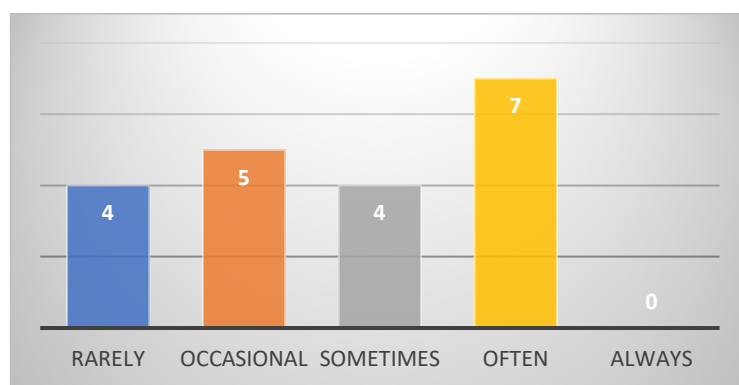


Figure 1: Frequency of formative assessment use in TVET

The data collected from questionnaires revealed variations in the frequency of formative assessments used in TVET programs. Among trainees, 35% indicated that trainers rarely employed formative assessments, highlighting gaps in integrating these practices into classroom instruction. Similarly, 15% reported occasional use, suggesting some trainers incorporate formative strategies infrequently. Notably, 20% stated that trainers used formative assessments sometimes or often, recognizing their value in monitoring progress and adapting teaching approaches. Interestingly, no respondents claimed trainers always utilized formative assessments, indicating opportunities for enhanced integration.

These findings underscore the need for professional development and sharing best practices to empower trainers and foster consistent use of formative assessments. The study affirmed that formative assessments improve learning outcomes and support VET processes, contradicting Menéndez et al.'s (2019) findings about continuous assessment. Regular integration of formative practices provides timely feedback, enabling adjustments to

instruction and learning strategies. This aligns with Mukhtar & Ahmad's (2015) research on vocational teachers practicing Assessment for Learning (AFL). Their work confirmed AFL's effectiveness in fostering skills like problem-solving and adaptability. Overall, formative assessment serves as a critical tool to refine teaching, enhance student progress, and address instructional gaps in TVET programs.

Impact of formative assessment

Regarding whether formative assessments help trainees understand their progress and identify areas for improvement in their TVET courses. Participants indicated yes or no, and their responses are displayed below:

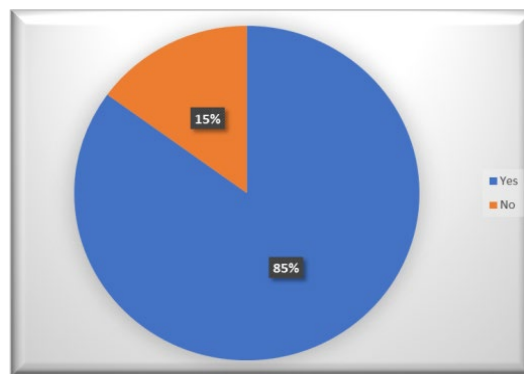


Figure 2: How formative assessment helps trainees

The responses from trainees revealed that 85% (17 out of 20) agreed formative assessments would assist them in understanding their progress and identifying areas for improvement in their TVET courses. This strong majority underscores how formative assessments act as vital tools for self-assessment, feedback, and reflection, empowering trainees to monitor their advancement and address weaknesses proactively. These assessments are perceived as enhancing learning experiences by fostering ownership of their educational journey. However, 15% (3 out of 20) of trainees indicated that formative assessments did not help them in these ways. Investigating the reasons behind these perceptions could unveil potential barriers or limitations in how these assessments are implemented, providing opportunities for refinement and support to ensure inclusivity and effectiveness.

The findings emphasize the essential role of formative assessments in supporting trainees' learning and development. Regular use of these assessments enables trainees to identify learning challenges and instructional gaps, facilitating timely interventions. This perspective aligns with Karahalil, Lützhöft, and Scanlan's (2023) study, which highlighted that formative assessments help uncover misconceptions or knowledge gaps, allowing instructors to address them before progressing to complex topics. By enabling trainees and trainers to work collaboratively to improve learning outcomes, formative assessments ensure a more adaptive and learner-centered approach in TVET courses.

Satisfaction with assessment feedback

Regarding the trainees' satisfaction with the feedback provided by trainers through formative assessments in their TVET courses, selecting from the following options, a) Very satisfied b) Satisfied c) Neutral d) Dissatisfied e) Very dissatisfied, participants stated:

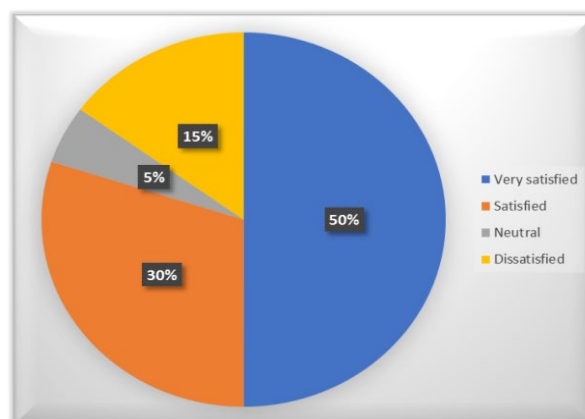


Figure 3: Trainees' satisfaction with assessment feedback

The analysis of trainees' satisfaction with feedback from formative assessments in TVET courses reveals diverse perspectives. Half of the respondents (50%) reported to be very satisfied with the feedback, reflecting trainers' effectiveness in offering constructive guidance to aid learning. Additionally, 30% of participants expressed satisfaction, demonstrating a substantial level of contentment with the feedback provided. Conversely, 15% indicated dissatisfaction, highlighting areas requiring improvement in feedback quality or delivery. A smaller group, 5%, felt neutral about the feedback, suggesting a need to explore their mixed views. Notably, no participants were very dissatisfied, indicating that extreme dissatisfaction is not an issue. Addressing concerns from dissatisfied and neutral trainees could foster greater inclusivity and overall satisfaction.

The findings emphasize the significance of feedback in enhancing learning outcomes. Participants who found feedback relevant likely benefited from actionable guidance, constructive criticism, and targeted support, aligning with Morris, et al. (2021) research highlighting feedback as a cornerstone of effective learning. Similarly, Schildkamp et al. (2020) emphasize that feedback allows educators to modify instructional approaches to better meet learners' needs. By addressing gaps and refining feedback practices, TVET programs can ensure that all trainees receive the necessary support to progress effectively, improving overall satisfaction and success rates.

Learning Experiences

To the extent that participants believe formative assessments enhance their learning experience in TVET, participants selected either, a) Significantly b) Moderately c) Slightly d) Not at all. Their responses are illustrated in Figure 4 below:

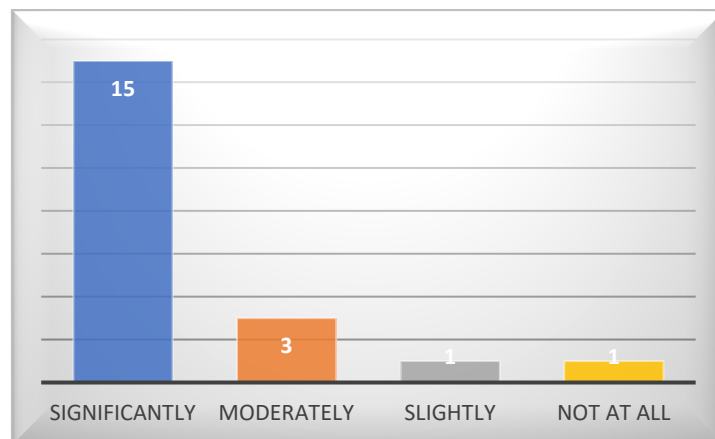


Figure 4: Formative assessment enhances learning experience.

The study revealed that formative assessments are widely perceived as enhancing the learning experience in TVET courses, with 75% (15 out of 20) of participants indicating a significant positive impact on their educational journey. This consensus underscores the effectiveness of formative assessments in improving learning outcomes, promoting self-assessment, and fostering student development. Meanwhile, 15% (3 out of 20) reported moderate enhancement, showcasing a favorable yet less pronounced appreciation of formative assessment practices. A minority 5% (1 out of 20) stated that formative assessments slightly improved their learning experience, and an equal percentage noted no impact. These findings emphasize the need to address the concerns of participants who feel

formative assessments have limited or have no effect on their learning. Overall, the results align with Broadbent et al. (2018), highlighting that formative assessments effectively track students' learning progress and provide diagnostic insights across various educational levels, enhancing teaching and learning strategies comprehensively.

Discussion of the Findings

Formative Assessment Understanding

Participants had diverse perspectives on formative assessment in vocational training education. TR1 and TR4 described it as monitoring student learning and providing feedback for improvement, while TR2 emphasized, "*This type of assessment takes place during the training process*". TR3 and TR5 highlighted their role in ongoing feedback during instruction to enhance learning. Participants demonstrated clear understanding of formative assessment, noting that it could be conducted daily, weekly, or at the end of modules, with TR2 stating, "*Assessment happens at the end of each module*". TR3 explained its frequency depended on the curriculum structure, saying, "*It should be conducted regularly, such as weekly or monthly, but it depends on the topic*", and TR4 added that assessments were vital to identifying learning gaps and improving performance. Findings revealed trainers grasped the concept of formative assessment, reflecting Schildkamp et al.'s (2020) view of it as assessment for learning (AFL), focusing on the process rather than outcomes. Trainers were found to use formative assessment regularly to track progress, pinpoint weaknesses, and provide timely feedback, aligning with Grover (2021). However, contrasts emerged with Tien et al.'s (2021) study, which emphasized the need for more engagement in formative methods among business students in developing countries.

Formative Assessment Methods Used

Trainers employed a variety of formative assessment methods in vocational training education. TR1 suggested using tests, topic tasks, and projects, while TR2 noted, "*It depends on the subject; for instance, in English, one can give theoretical assessments for students to read and write*". TR5 stated, "*Most assessments are practical because of the nature of the trade*", whereas TR3 listed practical, written, oral observations, and checklists. TR4 preferred peer and self-assessment, highlighting the importance of student involvement. The study found multiple methods such as competency-based, performance-based, criteria-based, and

school-based assessments, with Gyimah (2020) affirming their relevance to TVET. Competency-based assessments gauge specific skills (La Chimea et al., 2020), while performance-based assessments replicate job tasks (Long, 2021). Joseph (2023) confirmed formative assessment as a continuous process offering actionable feedback, while criteria-based methods used rubrics for transparency (Toukan et al., 2022). Additionally, school-based assessments integrated tasks, exams, and oral presentations into daily teaching (Williams-McBean, 2023). McCallum and Milner (2021) asserted that formative assessments encouraged deeper engagement, motivating students to learn and track their progress effectively.

Usefulness of Formative Assessment

Participants unanimously agreed that formative assessment is highly beneficial for both trainers and students. TR1 mentioned, *"I can know whether the students understood the topic. It also allows me to know whether the instructional method I have used is appropriate or suitable"*, while TR5 stated, *"Definitely, one cannot teach without assessing what was taught. It helps me identify students' strengths and weaknesses and find different strategies to improve"*. TR2 highlighted its importance in gauging students' readiness to progress, saying, *"It is to ensure students' readiness, meaning that I can see whether the students are ready to move on to the next topic or I should change the teaching strategy"*. The study suggests that formative assessment aids trainers in fostering creative and practical development of skills, shifting away from traditional approaches. TR3 emphasized the value of timely feedback, stating, *"I like formative assessment. I can monitor progress and provide timely feedback to the students"*, and TR4 noted its role in self-reflection, adding, *"One thing I like in teaching is knowing how I have done it. It promotes self-reflection"*. The findings align with Koka et al. (2021), who underscored the role of feedback in enhancing academic performance and proposed institutional plans for formative assessment implementation. However, contrary views from Curtis (2010) and later studies (Chen et al., 2021; Al Alawi, 2023) highlighted challenges in achieving these benefits consistently due to incomplete or mechanical application of formative assessment principles. Despite this, the study firmly establishes the usefulness of formative assessment in improving instructional methods, identifying strengths and weaknesses, ensuring readiness, monitoring progress, and fostering reflection among trainers and students.

Support Mechanisms for the Successful Implementation of Formative Assessment

All trainers emphasized the importance of support mechanisms, with professional development (PD) highlighted as a key solution. PD offers trainers a streamlined way to acquire knowledge and skills to conduct effective formative assessments. TR1 stressed the significance of institutional opportunities for PD, while TR2 preferred workshops and seminars, stating, *"We refresh our skills through professional development."* TR4 highlighted the benefits of staff development programs, explaining, *"Staff development is significant because trainers can enrol for courses in assessment or attend professional workshops."* TR3 noted that PD enhances teaching strategies, adding, *"It helps me choose methods that suit a specific topic."* Unlike others, TR5 pointed out the importance of mentoring and coaching, stating, *"Different support mechanisms would assist trainers in conducting assessment successfully."* Findings indicate that PD programs help trainers refresh knowledge, adopt new strategies, and align their methods with changing educational requirements. These results align with Wisshak and Hochholdinger (2018), who revealed that workshops and collaborative learning improve educators' proficiency in formative assessment techniques, while Saunders (2012) emphasized the role of coaching and seminars in fostering deeper integration of assessment principles into teaching.

Measuring the Effectiveness of Formative Assessment

Participants also provided insights into strategies for evaluating the effectiveness of formative assessment in vocational training. TR1 recommended peer moderation, stating, *"Other trainers moderate my activities before I assign them to learners. It's the best thing to do."* TR3 suggested monitoring improved student performance, while TR5 emphasized providing feedback to confirm correct answers, stating, *"Feedback ensures authenticity in responses."* TR2 and TR4 echoed the importance of peer moderation as a way to measure the impact of assessments on student learning. The study found that peer moderation enhances the quality and alignment of assessments, ensuring they achieve intended outcomes. Findings also identified feedback as a vital tool for recognizing areas for improvement. These results resonate with Arastoopour et al. (2020), who demonstrated improved learning outcomes through pre- and post-assessment models integrated with computational tools. Peer moderation, coupled with continuous feedback, helps educators measure how formative

assessments contribute to students' development and optimize their instructional approaches effectively.

Strategies to Ensure Validity and Reliability of Assessment

Ensuring the validity and reliability of formative assessment is critical for maintaining its quality. Li (2022) defines validity as the assurance that assessments measure their intended objectives and produce interpretable results, while reliability ensures consistent outcomes under similar conditions. Trainers identified moderation as a key mechanism, with TR1 advocating for *"giving colleagues to check over the assessments I have prepared and ensuring that the chosen assessment has been developed robustly."* Similarly, TR2 emphasized the role of expert trainers in moderating activities to ensure alignment with lesson objectives and competencies, stating, *"Other expert trainers must moderate our assessment activities."* TR3 highlighted the importance of clear criteria, rubrics, and marking grids, saying, *"Validity and reliability will not be compromised when these structures are in place."* The study found moderation to be the preferred method for ensuring validity and reliability, alongside mechanisms such as rubrics and marking grids. Findings suggest that rigid procedures improve assessment quality, supporting Gallardo (2020) and Junus et al. (2021), who emphasized the role of clear rubrics and assessment criteria in fostering transparency and reliability. Regular evaluation of assessment processes also aids in identifying areas for improvement. Thus, maintaining structured approaches, peer moderation, and standardized tools ensure assessments achieve desired outcomes and remain trustworthy over time.

Feedback Provision

Feedback, defined by Cho et al. (2021), is information provided by an agent (e.g., teacher, peer, or experience) regarding aspects of a person's performance or understanding. Its effectiveness depends on how it is structured, aligning with the Model and Seven Principles of Good Feedback Practice discussed in section 2.5. This model highlights that trainers initiate assessment activities and provide feedback—either self-generated, peer-reviewed, or trainer-guided to help students act upon it. Participating trainers shared varied responses on their feedback methods, often based on assessment completion. TR1 stated, *"I provide written feedback on the chalkboard on all activities I have given them, including tests, once I have graded them."* TR3 and TR4 emphasized giving feedback immediately after completing

and marking the assessment, with TR5 noting, *"It depends on the type of assessment... feedback could be immediate or after some time."* TR2 added, *"It is essential. I give feedback after recording students' grades."*

The study revealed that feedback delivery methods differ, including verbal and written approaches, as per Masantiah et al. (2020). Trainers agreed that feedback allows students to revisit and reflect on correct answers, enhancing their understanding. Johnson et al. (2020) supported this by asserting that feedback refines skills and adheres to standards, with its absence leading to missed opportunities and poorer job performance. Furthermore, findings align with Yen et al. (2024), emphasizing that feedback highlights weaknesses, encouraging efforts to improve. Constructivist feedback, when effectively crafted, can have motivational value, deepen comprehension and foster growth.

Conclusions and Recommendations

The findings of this study provide significant insights into formative assessment practices within vocational training education. The study underscores that formative assessment is understood as an ongoing process aimed at monitoring student learning and providing actionable feedback to enhance both teaching and learning outcomes. Participants demonstrated a solid grasp of its purpose and implementation, recognizing its benefits in identifying student readiness, strengths, and learning gaps, as well as enabling teachers to refine their instructional methods. A variety of formative assessment methods ranging from practical tasks and written tests to peer and self-assessments were noted, with their selection often depending on the subject matter and the nature of the trade being taught. Feedback was identified as a pivotal component of formative assessment, with its provision varying in method and timing but universally regarded as vital for fostering student improvement and comprehension. However, participants emphasized the need for support mechanisms such as professional development, mentoring, and coaching to effectively implement formative assessment strategies. Additionally, strategies for ensuring validity and reliability, such as peer moderation and the use of rubrics, were identified as crucial for maintaining the quality of assessments. The findings highlight that while formative assessment is widely recognized as beneficial, its successful implementation hinges on structured support systems, effective feedback practices, and consistent evaluation mechanisms.

Vocational training institutions should prioritize the integration of structured support mechanisms to enhance formative assessment practices. Professional development programs, including workshops, seminars, and staff development courses, should be offered regularly to equip trainers with advanced skills and knowledge necessary for effective formative assessments. Mentoring and coaching initiatives should be established to provide trainers with guidance and collaboration opportunities, fostering consistent application of assessment strategies. Additionally, clear assessment frameworks, such as rubrics, marking grids, and predefined criteria, should be implemented to maintain the validity and reliability of assessments. Institutions should encourage timely and constructive feedback practices tailored to the type of assessment conducted, ensuring students receive actionable insights to improve their performance. Regular monitoring and evaluation of assessment processes should be conducted to identify areas for improvement and optimize methods over time. Trainers should actively involve students in the assessment process through self-assessment and peer reviews to promote engagement and autonomy. Moreover, formative assessments should be designed to replicate real-world tasks to prepare students for professional scenarios. Institutional policies should support these initiatives by allocating resources and providing trainers with access to necessary tools and training. These strategies collectively aim to optimize formative assessment practices, benefiting both trainers and students while enhancing teaching effectiveness and learning outcomes.

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