



## OPEN ACCESS

EDITED BY  
Clifford A. Shaffer,  
Virginia Tech, United States

REVIEWED BY  
Emma Edstrand,  
Halmstad University, Sweden  
Mira Hajj Hassan,  
Université Claude Bernard Lyon 1, France

\*CORRESPONDENCE  
James Ojochenemi David  
✉ ojochenemidavid@gmail.com  
✉ davidjo@unisa.ac.za

RECEIVED 31 December 2024

ACCEPTED 25 April 2025

PUBLISHED 14 May 2025

CITATION  
David JO (2025) Redefining assessment  
for sustainability: a reflective approach  
to curriculum transformation  
in environmental education.  
*Front. Educ.* 10:1553999.  
doi: 10.3389/feduc.2025.1553999

COPYRIGHT  
© 2025 David. This is an open-access article  
distributed under the terms of the [Creative  
Commons Attribution License \(CC BY\)](#). The  
use, distribution or reproduction in other  
forums is permitted, provided the original  
author(s) and the copyright owner(s) are  
credited and that the original publication in  
this journal is cited, in accordance with  
accepted academic practice. No use,  
distribution or reproduction is permitted  
which does not comply with these terms.

# Redefining assessment for sustainability: a reflective approach to curriculum transformation in environmental education

James Ojochenemi David\*

Department of Police Practice, University of South Africa, Pretoria, South Africa

**Background:** The urgency of sustainability challenges has reinforced the need for effective environmental education in higher education. However, certain assessment methods often fail to balance theoretical depth with individual accountability. The shift toward digital and hybrid learning post-COVID-19 further necessitates adaptive, student-centered assessment models.

**Objectives:** This study critically evaluates assessment practices within the Environmental Sustainability (EVST) module at a University of Technology in South Africa. It identifies key limitations in project-based assessments and proposes a revised framework integrating diverse formative and summative strategies to enhance engagement and real-world application.

**Methods:** Using Schön's reflective practitioner model, the study draws on teaching experiences, collegial discussions, and professional development insights. It critiques past assessment methods and introduces an alternative approach based on formative and summative assessment theories, constructive alignment, and student-centered learning. The revised model incorporates technology-driven quizzes, individual essays, and structured group projects to provide a more balanced evaluation that takes cognizance of modern digital realities.

**Results:** The findings indicate that technology-driven quizzes enhance digital literacy and real-time feedback, individual essays improve research and analytical skills, and structured group projects foster collaboration while ensuring equitable participation. The revised model aligns with the university's graduate attributes by promoting problem-solving, self-directed learning, and environmental responsibility.

**Conclusion:** This study underscores the need for continuous assessment refinement in environmental education, particularly in digital learning environments. By integrating adaptive assessment methods, educators can bridge the gap between theoretical knowledge and practical sustainability action, fostering critical thinking and engagement. The proposed framework offers a model for curriculum transformation and future research on assessment strategies

## KEYWORDS

curriculum transformation, environmental sustainability education (ESD), formative and summative assessment, digital literacy, student engagement, higher education

# 1 Introduction

Assessment practices are integral to pedagogy and learning outcomes (Vahed et al., 2023). Effective curriculum design requires the integration of assessment, teaching, and feedback to enhance student achievement (Ali, 2018). Thus, assessment tasks provide students with opportunities to reflect on their learning experiences, develop theoretical knowledge, and apply their understanding to real-world contexts. The two common types of assessment are formative and summative. Formative assessment (FA) is an ongoing process that monitors student progress to guide teaching and enhance learning (Pat-El et al., 2015; Veugen et al., 2021). While FA promotes student autonomy (Birenbaum, 2016), its impact on learning lacks a universally recognized theoretical framework (Cookson, 2018). Summative assessment (SA), on the other hand, often serves purposes such as accountability, ranking, and certifying competence (Schellekens et al., 2021). The interplay between formative and summative assessments underscores the importance of continuous assessment (CA) in guiding students toward the ultimate demonstration of knowledge (Hernández, 2012). Accordingly, in environmental education (EE), formative assessment strategies such as reflective journals, peer feedback, and iterative project submissions enhance students' capacity to engage with sustainability challenges by continuously improving their understanding and skills (Lozano et al., 2019).

Relatedly, the concepts of Assessment as Learning (AaL), Assessment for Learning (AfL), and Assessment of Learning (AoL) provide a comprehensive framework for understanding assessment's role in teaching and learning. AoL focuses on measuring and evaluating performance at the end of learning and is commonly linked to teaching practices. Both AfL and AaL prioritize the learning process, emphasizing assessment's role in supporting learning (Yang and Xin, 2022). However, AaL uniquely centers on the learner's active engagement, promoting a "learning to learn" paradigm, while AfL emphasizes the teacher's role in facilitating learning, representing an "assessment in support of learning" approach (Berry, 2013). For instance, in project-based learning (PbL), wherein learners' autonomy, metacognition skills, and self-directed learning are promoted, AoL summatively evaluates performance after formal learning, AfL adopts a formative approach, and AaL emphasizes self-assessment and self-directed learning (Lozano et al., 2019; Schellekens et al., 2021). Hence, scholars like van der Vleuten et al. (2017) advocate for integrating these approaches into a cohesive model to optimize learning outcomes.

The relative scarcity of scholarship on assessment methods for environmental education (Lowan-Trudeau, 2023), necessitates a critical reflection on practices and forward-looking strategies, especially considering the evolving dynamics of digitalization since the COVID-19 pandemic. Such reflection is essential for aligning assessment approaches with the evolving demands of environmental sustainability education in an increasingly digital teaching and learning environment. This need is further underscored by the growing global concerns surrounding climate change and environmental degradation, which have positioned sustainability discussions at the forefront of both academic and policy discourse. Consequently, there has been a noticeable increase in demand for sustainability-related

courses, such as Environmental Sustainability (EVST), in higher education. Drawing from my teaching experience at a university in South Africa, this trend highlights the importance of critically reflecting on assessment practices and exploring potential enhancement strategies that can contribute to scholarship in environmental education assessment methods.

This practitioner-based reflection critically evaluates the assessment strategies employed during that period (2019–2022), drawing on central concepts and theories such as formative and summative assessment, constructive alignment, and student-centered learning. It highlights the unique nature of assessment practices in EVST, which differed from traditional approaches while identifying areas for improvement. For Instance, the incorporation of Traditional and Indigenous Knowledge into the curriculum, especially allows students to connect their learning to their lived realities, making the teaching and learning contextually relevant. This is evident in the practical orientation of the course, aligning with key curriculum conceptions: product, process, praxis, and content (Smith, 2000; Rossouw and Frick, 2023). Hence, as a necessary point of departure, I will commence by offering a concise overview of the assessment methods utilized in the Environmental Sustainability (EVST) module, setting the stage for a reflective exploration of my journey as a "reflective practitioner" (Asfeldt and Stonehouse, 2021), especially within the context of EVST. This will serve to contextualize my experiences and provide a foundation for critically evaluating the effectiveness of these assessment strategies in fostering student engagement and learning outcomes in sustainability. The second section highlights the research design for this reflection. In the subsequent section, I will provide a critical review of the assessment strategy used within the module, with the view to introduce potential enhancement. Afterward, I will propose three potential assessments characterized by increasing complexity: two formative and one summative, to demonstrate how these proposed assessments could improve the existing assessment strategies. In the fifth section, I will discuss lessons learned, addressing key questions such as: What support will be provided to students for these assignments? What possible limitations might arise, and how can they be overcome? The study concludes with a take-home message.

## 1.1 Assessment in EVST

EVST is an 8-credit elective module offered by the Centre for General Education at the university under consideration. This undergraduate module demands roughly 80 h of study and has broad relevance across various fields due to its multidisciplinary environmental content. I was part of the facilitating team for this module from 2019 to 2022. The Centre caters to students from various departments, with a focus on first-year students, although second and third-year students could also take the module. Its pedagogical approach differs from traditional methods by emphasizing holistic student development through active, practical engagement beyond discipline-specific theoretical knowledge. This is exemplified in other offerings of the Centre, which require continuous assessment through reflections, assignments, and projects, all aimed at fostering practical skills and societal competence. Hence, in EVST, students are encouraged to engage

critically with environmental issues, applying Bloom's Taxonomy to develop from basic understanding to advanced skills like evaluation and creation (Krathwohl, 2002).

Accordingly, the principal mode of assessment in the module, besides the non-graded question-and-answer sessions conducted in various lectures/tutorials, is a long-term group project. Designed to serve both formative and summative goals of assessment, this project aligns with constructivist learning theory by encouraging active participation, collaboration, and real-world application of knowledge (Vygotsky, 1978). Running through the semester, the project serves as a comprehensive assessment of students' understanding of the module. According to the course guide, upon completion, learners are expected to be able to: A. Demonstrate a critical understanding of the relationship between humans, and the cultural and physical landscape. B. Critically evaluate the importance of nature in sustaining life. C. Participate in promoting environmental awareness, especially in the areas where they live. D. Show a critical understanding of global environmental debates and initiatives to curb the effects of environmental degradation. E. Suggest possible solutions to environmental problems in the areas where they live.

These outcomes ensure that students not only gain relevant knowledge but also actively contribute to environmental sustainability in their locality. Through practical involvement in environmental actions, they acquire project management skills and provide critical reflections on such projects. The Center's program aims to promote the university's graduate attributes: critical thinking, problem-solving, effective communication, lifelong learning, and global citizenship. These attributes are integrated into the curriculum, including the EVST 101 module, to foster self-discovery, essential skills, and job readiness among students. Consequently, facilitators emphasize reflecting these graduate attributes in both project execution and presentations. Meanwhile, as described in the subsequent critique, the presentation, usually completed and graded toward the end of the semester, reveals some theoretical and practical issues regarding the overall learning outcomes. These challenges were further exacerbated by the COVID-19 pandemic, which caused unprecedented disruptions to teaching and learning on a global scale. This shift not only highlighted existing limitations but also unveiled new challenges and opportunities, particularly in the realm of digital assessment. Consequently, this study seeks to explore the insights emerging from this dynamic landscape, to inform and enhance the practice of teaching and learning in the context of environmental sustainability education. By examining the implications of these changes, the study contributes to the development of more adaptive and effective assessment strategies that align with the evolving demands of higher education in a post-pandemic world.

## 2 Research methods and design

This study employs a qualitative method to examine and reflect on the assessment strategies used within the Environmental Sustainability module. Following Schön's (1983) reflective practitioner model, the study uses cycles of reflection on action to iteratively evaluate and enhance student engagement and learning outcomes in sustainability education. The model which

encompasses three interrelated phases, namely, knowing-in-action, reflection-in-action, and reflection-on-action (Schön, 1983; Asfeldt and Stonehouse, 2021), provides a lens through which to better understand and improve assessment practices in EVST. Ecclestone (1996) observed that reflection can broadly include using Kolb's learning cycle to solve classroom issues, evaluating professional practice against external standards, conducting thorough inquiries to implement changes, discussing practices and problems with peers for support, venting frustrations, and sharing practical teaching tips.

Driven both by a critical review of relevant sources as well as experiences and insights from the author's further professional development, the reflection herein leans toward a self-evaluation of professional practice to inform the potential enhancement of assessment strategies used in EVST. According to Louden (1991), the interests and goals of reflective practice can encompass adhering to a theory or practice, deepening or clarifying personal understanding, solving professional problems, and critiquing the conditions of professional action. As a course facilitator and primary researcher, I draw on insights from my engagement with students during the first semester of each year from 2019 to 2022, supplemented by insights gained through more recent formal professional development experiences. Accordingly, this study seeks to identify and respond to observable challenges inherent in the assessment methods used in EVST in order to achieve some of the above goals.

Hence, data sources include personal reflective journals, which document observed challenges and evaluate the effectiveness of existing assessment strategies, as well as collegial interactions at the Center—typically held weekly to reflect on the previous week's experiences, address emerging challenges, and plan for upcoming sessions. Additionally, insights derived from recent professional development activities further inform both the reflective evaluation of previous assessment strategies and the proposed alternative approaches. While it was not immediately possible to incorporate student perspectives due to the retroactive nature of this reflection—despite acknowledging the merit of such viewpoints—engaging with relevant scholarly sources and exchanging insights with other practitioners during the professional development sessions helped mitigate potential author bias. This process contributed meaningfully to enhancing objectivity, albeit within the inherent limitations of reflective practice.

## 3 Critique of assessment strategies

### 3.1 Description of assessment strategy

At the beginning of the semester, after the general introduction to the module, students are organized into small groups of four to six members and provided with a range of environmental issues or practical project topics to choose from. This collaborative structure is informed by social learning theory, which underscores the importance of interaction and shared experiences in the construction of knowledge (Bandura, 1986). Each group selects a specific topic and proceeds to organize and execute their project, documenting their progress and outcomes through diverse forms of evidence, including videos, photographs, and other relevant

materials. This documentation serves to substantiate the project's implementation and effectiveness, providing tangible proof of the group's engagement with the chosen environmental issue. By engaging in group work, students are encouraged to learn from one another, fostering a deeper understanding of environmental sustainability through collective problem-solving and dialogue. The grouping system, besides mitigating the challenge of low teacher-student ratio due to massification in the university also cultivates essential skills such as teamwork, communication, and critical thinking necessary for addressing real-world environmental challenges.

The group project unfolds in several phases, each of which is reviewed by the course facilitator. Initially, groups propose their chosen topics, which are vetted to ensure a diverse range of projects and to prevent overlap among groups. Subsequently, each group develops a detailed project plan, including a Gantt chart outlining the timeline and milestones, from project inception to presentation. Scaffolded learning is incorporated through continuous facilitator support, where participation in group meetings addresses issues, clarifies questions, and assists with logistical challenges. This iterative process is designed to align with the module's content, thus deepening students' understanding of the environmental themes covered.

At the end of the semester, each group presents their projects in a PowerPoint format to a panel of facilitators. This authentic assessment approach (Wiggins, 1998), allows students to demonstrate applied knowledge in a real-world context. The presentation encompasses the project's evidence and is assessed to evaluate the overall group achievement, content, and group dynamics. Additionally, individual contributions are evaluated through targeted questions posed by the panel, ensuring accountability and fairness (Sluijsmans et al., 2004). Both group performance and individual contributions are assessed using distinct rubrics, which are then consolidated to determine the final grade for the project. This dual-purpose assessment strategy evaluates both the collective achievement and each student's engagement and critical reflection as they respond to individual questions. Students are graded on the spot, reflecting elements of performance-based assessment (Darling-Hammond and Snyder, 2000).

## 3.2 Strengths and limitations of the assessment strategy

The assessment strategy has several strengths, including strong alignment with the module's learning outcomes by fostering a critical understanding of "human-environment relationships" and promoting environmental awareness through practical actions (David, 2024). The group project encourages collaboration, real-world problem-solving, and social learning, in line with constructivist and experiential learning theories (Kilvington, 2010; Kolb, 2014). Furthermore, the formative components, though non-graded, allow for continuous feedback, which strengthens learning through reflection and improvement (Schellekens et al., 2021). The inclusion of diverse forms of evidence like videos and photographs enhances creativity and ensures a practical application

of knowledge, thus aligning with multimodal learning theory (Kress and Selander, 2012).

However, the assessment strategy has notable limitations. One major concern is the potential for unequal participation in group projects. Some students may engage minimally due to time constraints or lack of motivation, indicating some critiques of cooperative learning theory that group assessments may obscure individual understanding (Slavin, 2012). Due to such "social loafing" by some members, group work also tends to limit the scope of assessing individual critical thinking skills and a broader engagement with global environmental debates (Premo et al., 2022; Mrema et al., 2023). This issue was sometimes discernible during group presentations, as evidenced by students' inability to respond to questions posed to them individually, suggesting their lack of full participation.

Furthermore, the narrow focus on environmental action projects restricts assessment diversity, undermining the evaluation of fairness and comprehension at the individual level. Despite the educators' efforts, ensuring equal participation was not always feasible due to time constraints within the presentations. Although students were allowed to create group rules and interventions to address the lack of participation throughout the semester, there was only a limited way to ensure transparency and accountability in attendance and contribution, as students could cover for each other. If these were followed honestly, it could help distinguish different levels of participation.

Another key weakness identified through reflection on practice is the absence of essay writing, which limits the facilitator's ability to assess students' theoretical knowledge and writing skills, an essential component of cognitive assessment theories (Deane et al., 2008). As often noticeable in the project presentation by groups, the absence of such writing also reveals insufficient engagement with relevant literature by the students to better appreciate the theoretical underpinnings of the project carried out. This gap indicates a lack of balanced assessment types, which is necessary for a comprehensive evaluation of learning outcomes. Furthermore, the reliance on presentation skills sometimes disadvantaged students with public speaking anxiety, aligning with critiques of performance-based assessments that do not account for diverse learning preferences (Chu et al., 2024).

The transition to online learning in 2020 due to the COVID-19 pandemic further exposed limitations in this assessment strategy. Group work became challenging in a remote setting, affecting the quality and reliability of the content being presented. The shift also highlighted technological and accessibility barriers, raising concerns related to educational equity (Czerniewicz et al., 2020).

While the group project assessment strategy aligns well with constructivist, social learning, and authentic assessment theories, further reflection suggests that it could benefit from greater assessment diversity to enhance fairness and comprehensiveness. For instance, incorporating individual essays, self-reflections, and peer evaluations could provide a more balanced approach, ensuring both theoretical depth and applied knowledge. Upon further reflection during personal and professional development, it became even clearer that the assessment should also accommodate diverse student needs. This will ensure that oral presentations are not the sole determinant of individual performance, while also catering to the new demands for technology integration in education.



### 3.3 Motivation for an alternative new set of assessment strategies

Given the identified weaknesses, including the implications of the transition from a predominantly face-to-face class to a hybrid, technology-integrated environment, it would be beneficial to incorporate technological tools and provide more opportunities for individual evaluation. This is consistent with the constructivist learning perspective that values students' autonomy, emphasizing active student engagement and adaptability in response to shifting educational landscapes (Vygotsky, 1978). Integrating technology-enhanced assessment methods can deepen the theoretical rigor of the module while balancing the practical application of knowledge in EVST. Considering that curriculum is not just a product but a dynamic process, it must adapt to the shifts brought about by the COVID-19-induced "new normal" (Rossouw and Frick, 2023). Hence, alternative assessment strategies should reflect these changes, fostering both theoretical understanding and real-world engagement through innovative, technology-driven approaches. Drawing from the principles of formative and summative assessment theories, I propose three alternative ways to increase the effectiveness of the assessment strategies used in EVST. While this may not exhaustively address the weaknesses identified, it has the potential to improve assessment quality and experiences for both staff and students.

## 4 Potential interventions

As an intervention to improve the module's assessment procedures, three assessments will be deployed, incorporating both formative and summative evaluations. These assessments not only evaluate theoretical knowledge but also incorporate problem-based learning (PBL) pedagogies, equipping students with lifelong learning skills essential for professional success (Biggs et al., 2022). The formative assessment is broken down as follows:

### 4.1 Formative assignment 1: engagement and participation (20%)

The transition to the online learning environment affected the delivery of EVST and how assessments were conducted. Recent studies have observed that the COVID pandemic forced education institutions globally to rely heavily on digital technology for teaching and learning (Dlamini, 2023; Hajj-Hassan et al., 2024). Various changes were necessary in the assessment method, in keeping with behaviorist assessment principles that emphasize reinforcement and frequent feedback (Gresham et al., 2001; Omomia and Omomia, 2014). Accordingly, the proposed first assignment will consist of multiple-choice questions and quizzes designed to assess students' understanding of the concepts and theories related to environmental sustainability as discussed in lectures and tutorials. The assignment will include short quizzes featuring true/false questions, short answer questions, and definitions and critical explanations of key terms on selected topics on designated dates within the first 5 weeks of the semester.

The assessment will use various technology-integrated platforms such as Mentimeter, Socrative, and Kahoot within the lectures. A study by Silva et al. (2025) demonstrates that these tools effectively create a more interactive and engaging learning environment, as students responded positively to these innovative strategies, with most expressing a desire for more similar activities. This 5–10-min exercise is conducted toward the end of selected lectures through any of the above educational technological tools, which students will be taught how to use. The incorporation of these tools can potentially improve digital literacy for students and teachers, especially given the growing digitalization that deepened with the COVID-19 pandemic.

Subsequently, students will submit screenshots of their results and a one-page reflection on what they have learned from this graded exercise, consisting of 20 percent of the overall weighting. This reflection component aligns with Schön's (1983) theory of reflective practice, fostering deeper student engagement and metacognition. Feedback on this reflection will be provided in subsequent lectures and tutorials. The reflective piece assesses students' ability to self-reflect on their learning process as well as the content of the module. The assessment questions will involve concepts discussed in class, with examples drawn directly from the lectures. These examples are designed to test students' attentiveness, as correct answers will not be easily found through online searches. The purpose is not only to assess understanding but also to highlight active participation and engagement in class, highlighting the goal of AoL, AaL and AfL, as the overall objectives include:

- To test Students' understanding of environmental sustainability concepts through quizzes and reflection.
- To assess what students, think about their learning, helping them recognize areas for improvement.
- To motivate students' attentiveness in class.
- To enhance students' digital literacy, using platforms like Mentimeter, Socrative, and Kahoot.
- To highlight and respond to areas where students may need more support.
- To encourage students to take responsibility for their learning by staying engaged and completing tasks.

### 4.2 Formative assignment 2: short essay (30%)

To foster a comprehensive development of students' cognitive and analytical skills in the context of environmental sustainability, a formative assessment is deemed necessary to strategically align learning outcomes with Bloom's Taxonomy. Thus, a written essay assessment is given, requiring students to *Discuss the primary sources of pollution in South Africa, and how these intersect with socioeconomic factors to impact the environment and the health of vulnerable populations in your locality*. The main objective of this essay is to assess students' research, analytical, and writing skills while encouraging critical thinking on environmental sustainability in their locality and South Africa in general. At the foundational level of *remembering* and *understanding*, students are required to research and identify the primary sources of pollution

in South Africa, demonstrating their grasp of key environmental concepts. Moving to the *application* level, they must analyze how these pollution sources intersect with socioeconomic factors and impact their locality, using concrete examples and scholarly evidence. At the higher levels of *analysis* and *evaluation*, students critically assess the severity of pollution issues, their implications for ecosystems and human health, and the effectiveness of existing policies. Finally, at the *creation* level, they propose innovative solutions and mitigation strategies, showcasing their ability to synthesize knowledge and think creatively about sustainable development. This structured approach ensures that students not only acquire theoretical knowledge but also develop the critical thinking, problem-solving, and practical skills necessary to address complex environmental challenges, preparing them to become informed and proactive contributors to environmental sustainability (Krathwohl, 2002). As a pedagogical tool, essay writing has been shown to develop critical thinking skills by requiring students to analyze, evaluate, and synthesize information into coherent arguments (Wingate, 2012).

#### General Instructions:

- **Word count:** 2500
- **Weight:** 30% of the total grade
- **Submission Deadline:** Mid-semester (Date to be specified)
- **Format:** Typed, single-spaced, 12-point Arial font, and submitted to Moodle

#### Research and Understanding:

- Thoroughly research the primary sources of pollution in South Africa, considering various environmental factors, including air, water, and soil pollution.
- Investigate how these sources of pollution specifically impact your locality. Provide concrete examples and evidence to support your claims. Identify and discuss at least three primary sources of pollution in South Africa.
- Consider the implications for both natural ecosystems and human communities, especially health, supported by relevant scholarly data, statistics, or case studies.
- Demonstrate critical thinking by evaluating the severity and urgency of the pollution issues discussed.
- Discuss potential solutions or mitigation strategies to address these pollution challenges.
- Consider the role of government policies, community involvement, or technological advancements in combating pollution.
- Demonstrate evidence that you consulted at least 10 recent scholarly materials on the topic. Provide an appropriate reference list at the end of the essay.

**Structure of Essay:** Begin with a clear introduction that outlines the purpose and scope of the essay. Organize the essay into well-defined paragraphs with a clear introduction, body, and conclusion. Use sub-headings where necessary. Ensure a logical flow of ideas, using transitions to connect paragraphs. The total of 100 marks will be allocated as follows:

- **Introduction:** 10 marks
- **Primary Sources of Pollution:** 20 marks
- **Socioeconomic Factors:** 20 marks
- **Impact on Environment and Health:** 25 marks
- **Policy Responses and Recommendations:** 15 marks
- **Conclusion:** 5 marks
- **Referencing and Citations:** 5 marks

#### Language and Style:

- Use clear and concise language, avoiding unnecessary jargon.
- Students have the flexibility to use either US or British English, but it is crucial to maintain consistency throughout the essay.
- Ensure proper grammar, punctuation, and spelling.

#### Submission and Evaluation:

- Submit your essay by the specified deadline through the designated online platform.
- Plagiarism is prohibited.
- Ensure that all sources are appropriately cited based on APA 7 style.
- This essay is a formative assessment, providing an opportunity for learning and improvement. Students scoring below 50% will have the chance for a makeup assignment.

## 4.3 Summative assessment

The summative assessment serves as a capstone learning experience, requiring students to translate theoretical knowledge into practical environmental sustainability solutions. Aligned with Kolb's (2014) experiential learning theory, this assessment emphasizes active engagement in problem-solving, reflection, and application of concepts to real-world contexts. The constructivist learning approach (Vygotsky, 1978) further supports this by promoting collaborative knowledge construction through group-based inquiry. Additionally, Bloom's Taxonomy (1956) informs the assessment criteria by evaluating students' higher-order cognitive skills, including analysis, synthesis, and evaluation of environmental challenges.

This assessment comprises two key components: a major group project (30%) and an individual class presentation (20%). Groups of 4–6 students (depending on class size), established at the beginning of the semester, will be reassessed during assignment allocation to ensure equitable participation. Group projects are widely recognized for enhancing students' collaborative problem-solving skills, particularly in sustainability education where interdisciplinary teamwork mirrors real-world practice. For instance, Brundiers and Wiek (2011) have observed that project-based learning in groups cultivates students' abilities to collectively diagnose sustainability problems, develop shared solutions, and implement action plans.

#### Assessment Task: Environmental Sustainability Action

**Task Description:**

Students will engage in a structured, inquiry-based learning process to develop an *Environmental Sustainability Action Plan* addressing a real-world environmental issue of their choice. This task aligns with the module's intended learning outcomes by integrating theoretical knowledge with applied problem-solving and decision-making strategies. Students will be assessed on their ability to critically analyze environmental issues, propose evidence-based solutions, and articulate the socio-economic and ecological implications of their chosen intervention.

**Instruction for Presentation (Individual):**

**Presentation Format:** An audio-visual presentation on a chosen topic, followed by a Q&A session (maximum of 10 min per member in a group/peer). Marks will be allocated as follows:

Component	Total Marks	Weighting (out of 50%)
Project Execution	60	30%
Presentation	40	20%
Total	100	50%

**Presentation Content (Maximum 10 Slides):**

1. Project Title and Overview
2. Methodology
3. Findings
4. Challenges
5. Lessons Learned
6. Conclusion

**Contribution and Proof:** Provide photographs, flyers, props, petitions, etc., showcasing the individual's role in project implementation. The PowerPoint presentation should include voiceovers and pictorial/video evidence. Students are welcome to present additional supporting materials. They must carefully observe correct language usage (vocabulary, terminology, sentence structure) and ensure a professional appearance with a suitable font size and a legible color scheme. Time management for presentations and Q&A sessions is critical and will be assessed.

**Project Execution criteria:**

1. Clarity of the identified environmental sustainability issue and how well the project objectives align with it (10 marks).
2. Use of research, data, and evidence to support the project approach, as well as the depth of background research (10 marks).
3. The clarity and feasibility of the action plan, and the use of appropriate sustainability methods and tools (10 marks).
4. The successful implementation of the action and its effectiveness in addressing the identified sustainability issue, as well as the level of innovation and creativity displayed (20 marks in total - 10 for effectiveness and 10 for innovation and creativity).

5. How well the project's outcomes were monitored, measured, and evaluated, including a reflection on both successes and challenges (10 marks).

**Presentation:** The following criteria will guide the assessment:

1. Clarity, logical flow, and coherence in the presentation structure, including the introduction, body, and conclusion (10 marks).
2. Demonstration of understanding of sustainability concepts, depth of analysis, and engagement with the project's topic (10 marks).
3. Use of visual aids, such as slides, graphs, charts, or videos, to enhance the presentation, as well as creativity and clarity (5 marks).
4. Verbal delivery, including clarity, confidence, and engagement with the audience, as well as the ability to answer questions effectively (10 marks).
5. Sticking to the allocated time, professionalism, and overall presentation style (5 marks).

This summative assessment ensures a comprehensive evaluation of both individual and group contributions by fostering collaborative learning (Kilvington, 2010) and encouraging students to demonstrate accountability (Schellekens et al., 2021). Through this multi-faceted approach, students enhance not only their environmental literacy but also their competencies in critical thinking, teamwork, and professional communication—essential skills in the field of environmental sustainability.

5 Discussion

The assessment strategies outlined in this study are grounded in the principles of active engagement, problem-based learning, and real-world application, which have been recognized as effective approaches for fostering environmental sustainability knowledge and promoting responsible citizenship (Lehtonen et al., 2019). These approaches align with the desired attributes of the university's graduates, promoting environmental awareness, critical independent thinking, and teamwork for collaborative problem-solving. By integrating formative and summative assessments, the proposed model not only evaluates students' theoretical understanding but also encourages them to apply this knowledge in practical, meaningful ways, thereby bridging the gap between academic learning and real-world environmental action. The outlined assessment strategies reinforce these attributes while supporting student-centered pedagogy and benefiting from social constructivist learning theories, including situated and collaborative learning (Arman, 2018; Moura et al., 2021). As Zimba et al. (2021) have argued, "Through social constructivism, students take ownership of their learning, as learning is based on students' questions and explorations, and often they have a hand in designing the assessments." This aligns with the Center's philosophy, which emphasizes practical engagement for transformative learning.

Several studies, including Chawla and Cushing (2007), Corcoran et al. (2017), Lehtonen et al. (2019) underscore the importance of environmental action competence in

sustainability education, arguing that action competence is crucial for effective environmental management. Unlike behavior-modification or science-oriented approaches, action competence prioritizes knowledge, willingness, and commitment to addressing environmental issues at both individual and societal levels (Jensen and Schnack, 1997). This approach to Education for Sustainable Development (ESD) emphasizes "learner-led activities mediated by deliberative co-engagement that highlight respect for difference (plural dispositions) in democratic societies" (O'Donoghue, 2007). Implementing a project-based learning approach, as seen in the summative assessment, is well-placed to stimulate such actions among students.

Assessing these aspects through class presentations further contributes to the improvement of student's communication skills and confidence (Van Ginkel et al., 2017; Sugeng and Suryani, 2018). This presentation experience inherently enhances students' digital literacy, a crucial skill in the post-COVID era. It not only addresses the issue of social loafing in group assessments but also provides students with the opportunity to develop essential digital competencies individually. By integrating these skills into their learning environment, students are better equipped to thrive in an increasingly digital world. This is also achieved through the short question-and-answer sessions. Moreover, the incorporation of individual assessments including essay writing in the proposed methods will help in ensuring *equity and accountability* in evaluating each student's contribution.

A key feature of formative assessment is its socio-constructivist foundation, allowing learning to be "co-constructed by teachers and students" (Moura et al., 2021). For Assignments 2 and 3, students are encouraged to consult relevant studies with assistance provided through institutional access, where they are limited for students. To ensure students use quality academic materials instead of relying on random Internet searches, initial scholarly resources (e.g., Matooane et al., 2004; Boggiano et al., 2020; Tomita et al., 2020; Ajibade et al., 2021; Ayejoto et al., 2023; Khine and Langkulsen, 2023; Alshaboul et al., 2024) (details in the reference list) are provided as guides. However, this list is not exhaustive, and students are expected to explore additional references. The reference lists of these sources offer a further pool of resources.

Recognizing the significance of constructive alignment in effective module delivery (Ali, 2018), the adopted assessment strategies are designed to achieve the module's outcomes while aligning with the University's graduate attributes. This is reflected in a diverse range of formative and summative assessments aimed at fostering both AfL and AoL and assessment of learning (Schellekens et al., 2021). These strategies develop students with subject-specific knowledge as well as effective communication, critical thinking, and ethical decision-making skills. This aligns with the university's mission to produce graduates who are not only knowledgeable practitioners but also culturally, environmentally, and socially aware individuals capable of contributing to global sustainability challenges.

The shift toward a more balanced assessment model, which incorporates both theoretical and practical components, reflects the evolving demands of higher education in the post-COVID-19 era. The revised strategies prepare students to become informed and proactive contributors to sustainability efforts in their local and global contexts by fostering digital literacy, critical thinking, and environmental awareness. Consistent with my experience during

the professional development program, gamified applications, such as Kahoot, have proven to significantly contribute to students' study motivation and foster a positive psychological atmosphere (Ponomarenko et al., 2023). By integrating game-based learning, these educational technologies not only make learning more engaging but also enhance digital literacy. They familiarize students with online platforms, improve their ability to navigate digital interfaces and promote critical thinking through interactive quizzes and activities.

As a result, such tools play a vital role in preparing students for the increasingly digital world while making the learning process more dynamic and effective. In addition, digital technologies, like video conferencing, mobile apps, virtual reality, and augmented reality, can engage students in environmental stewardship by capturing experiences, collecting data, and sharing findings. These tools develop sustainability awareness on SDG 15 issues, such as eco-citizenship, climate change, and environmental sustainability, thereby captivating students and enhancing their understanding (Lay, 2019; Hajj-Hassan et al., 2024). For instance, Queiroz et al. (2023), demonstrate that VR can enhance climate change behavior by improving risk perception, as it can simulate future scenarios and evoke emotions, making the significant long-term effects of climate change more tangible and psychologically close. While these infrastructures are yet to be incorporated, this reflection acknowledges their potential for improving environmental education.

Furthermore, the emphasis on reflective practice and continuous feedback aligns with the principles of Assessment as Learning (AaL) and Assessment for Learning (AfL), ensuring students take ownership of their learning journey. These elements reflect the broader understanding of curriculum as more than just content or a syllabus but also encompassing the processes involved in its construction, development, and delivery, as well as its praxis—the values and actions that shape learning outcomes (Smith, 2000). Thus, the design and execution of the proposed assessment strategies are intentional in cultivating ethically conscious graduates who are equipped to advocate for and contribute to a greener, more sustainable future amidst the ongoing climate crisis.

Meanwhile, the implementation of these strategies is not without challenges. Technological barriers, potential plagiarism, and group dynamics issues may arise, particularly in the context of hybrid and online learning environments. To mitigate these challenges, proactive measures such as prior training on digital tools, clear guidelines on academic integrity, and structured support for group collaboration are essential. Additionally, while the integration of diverse assessment methods ensures that students with varying learning preferences and strengths are adequately supported, promoting equity and inclusivity in the learning process, the implementation thereof remains a challenge due to resource constraints.

## 6 Conclusion and take-home message

Against the backdrop of the growing importance of sustainability discourse, this study represents a critical examination



of the assessment strategies used in environmental sustainability, aiming to review and improve practices. The study demonstrates the importance of adaptive and student-centered learning and assessment strategies that align with the demands of digitalization in sustainability education generally, with particular reference to assessment in environmental education. Following a critical review of extant assessment practices in EVST at a University in South Africa, the study proposes potential interventions for enhancing assessment strategies for better impact. The findings reveal that by integrating formative and summative assessments—such as technology-driven quizzes, individual essays, and structured group projects—the proposed framework not only addresses key limitations identified in the traditional methods, but also fosters deeper engagement, accountability, and real-world application of knowledge among students. This reality is particularly reinforced by the transition to hybrid and online learning post-COVID-19, which accentuates the importance of innovative assessment tools that cater to diverse learning preferences and dynamics among learners. The reflective practitioner model, grounded in Schön's theory, has provided a valuable lens for iteratively refining learning strategies, ensuring that assessment methods remain responsive to both pedagogical goals and evolving educational landscapes. In so doing, the study underscores the importance of balancing theoretical rigor with practical skills to ensure that students develop not only environmental literacy but also critical competencies such as digital literacy, collaboration, and problem-solving. Indeed, by bridging conceptual understanding with real-world application, the proposed assessment methods can foster critical thinking, digital literacy, and environmental stewardship, which are crucial to addressing contemporary sustainability challenges.

Accordingly, the key take-home message is that effective assessment in environmental education must be adaptive, reflective, and inclusive. To achieve these, educators must continuously evaluate and refine their strategies to accommodate technological advancements, diverse learning styles, and evolving environmental imperatives. As universities strive to develop graduates equipped for sustainability leadership, assessment must go beyond rote evaluation to cultivate action-oriented, critically engaged learners. Through the thoughtful integration of innovative and reflective assessment approaches, environmental education can better prepare students to become informed, proactive contributors to sustainability solutions in their communities and beyond. Meanwhile, given the inherent limitations of reflective practice in ensuring objectivity, future empirical studies could investigate the practical challenges of implementing these revised assessment strategies, their long-term impact on students' environmental awareness and civic engagement, and the potential of emerging technologies—such as virtual reality and artificial

intelligence—to enhance assessment and learning experiences in sustainability education.

## Data availability statement

The original contributions presented in this study are included in this article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

JD: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review and editing.

## Funding

The author(s) declare that no financial support was received for the research and/or publication of this article.

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

The authors declare that no Generative AI was used in the creation of this manuscript.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

## References

- Ajibade, F. O., Adelodun, B., Lasisi, K. H., Fadare, O. O., Ajibade, T. F., Nwogwu, N. A., et al. (2021). "Environmental pollution and their socioeconomic impacts," in *Microbe Mediated Remediation of Environmental Contaminants*, eds A. Kumar, V. K. Singh, and P. Singh (Amsterdam: Elsevier), 321–354.
- Ali, L. (2018). The design of curriculum, assessment and evaluation in higher education with constructive alignment. *J. Educ. E-Learning Res.* 5, 72–78. doi: 10.20448/journal.509.2018.51.72.78

- Alshaboul, Y., Alazaizeh, M., Abu-Tineh, A., Ghamrawi, N., and Shal, T. (2024). Distance education challenges: Insight from a nationwide teacher-centric study post-COVID-19 for informed advancements. *Front. Educ.* 9:1374641. doi: 10.3389/feduc.2024.1374641
- Arman, M. S. (2018). Student-centered approach to teaching: It takes two to tango. *Ahfad J.* 35, 64–71.
- Asfeldt, M., and Stonehouse, P. (2021). “On becoming a reflective practitioner,” in *Outdoor Environmental Education in Higher Education: International Perspectives*, eds G. Thomas, J. Dymont, and H. Prince (Cham: Springer International Publishing), 337–348.
- Ayejoto, D. A., Agbasi, J. C., Nwazelib, V. E., Egbueri, J. C., and Alao, J. O. (2023). Understanding the connections between climate change, air pollution, and human health in Africa: Insights from a literature review. *J. Environ. Sci. Health Part C* 41, 77–120. doi: 10.1080/26896583.2023.2267332
- Bandura, A. (1986). *Social Foundations of Thought and Action*. Englewood Cliffs, NJ: Prentice-Hall.
- Berry, R. (2013). The assessment as learning (AaL) framework for teaching and learning: The AaL wheel. *Assess. Learn.* 2, 51–70.
- Biggs, J., Tang, C., and Kennedy, G. (2022). *Ebook: Teaching for Quality Learning at University*, 5 Edn. New York, NY: McGraw-hill education.
- Birenbaum, M. (2016). “Assessment culture versus testing culture: The impact on assessment for learning,” in *Assessment for Learning: Meeting the Challenge of Implementation*, eds D. Laveault and L. Allal (Cham: Springer International Publishing), 275–292.
- Boggiano, N., Lattanzi, O., McCoole, M., Bursten, B., and Hansen, P. (2020). *Transitioning During COVID-19: Student Perspectives*. Worcester: Worcester Polytechnic Institute.
- Brundiers, K., and Wiek, A. (2011). Educating students in real-world sustainability research: Vision and implementation. *Innov. High. Educ.* 36, 107–124. doi: 10.1007/s10755-010-9161-9
- Chawla, L., and Cushing, D. F. (2007). Education for strategic environmental behavior. *Environ. Educ. Res.* 13, 437–452. doi: 10.1080/13504620701581539
- Chu, M.-W., Craig, H., and Hoey, F. (2024). Student perceptions of performance-based assessments for in-person and online courses. *Alberta J. Educ. Res.* 70, 165–181. doi: 10.55016/ojs/ajer.v70i2.73401
- Cookson, C. J. (2018). Assessment terms half a century in the making and unmaking: From conceptual ingenuity to definitional anarchy. *Assess. Eval. High. Educ.* 43, 930–942. doi: 10.1080/02602938.2017.1420138
- Corcoran, P. B., Weakland, J. P., and Wals, A. E. J. (2017). *Envisioning Futures for Environmental and Sustainability Education*. The Netherlands: Wageningen Academic Publishers.
- Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., et al. (2020). A wake-up call: Equity, inequality and Covid-19 emergency remote teaching and learning. *Postdigital Sci. Educ.* 2, 946–967. doi: 10.1007/s42438-020-00187-4
- Darling-Hammond, L., and Snyder, J. (2000). Authentic assessment of teaching in context. *Teach. Teach. Educ.* 16, 523–545. doi: 10.1016/S0742-051X(00)00015-9
- David, J. O. (2024). Decolonizing climate change response: African indigenous knowledge and sustainable development. *Front. Sociol.* 9:1456871. doi: 10.3389/fsoc.2024.1456871
- Deane, P., Odendahl, N., Quinlan, T., Fowles, M., Welsh, C., and Bivens-Tatum, J. (2008). Cognitive models of writing: Writing proficiency as a complex integrated skill. *ETS Res. Rep. Ser.* 2008, i–36. doi: 10.1002/j.2333-8504.2008.tb02141.x
- Dlamini, R. (2023). “Digital revolution in higher education in the Covid-19 and post Covid-19 Era,” in *Online Teaching and Learning in the COVID-19 Era: Perspectives on Equity and Epistemic Justice*, eds F. Maringe and O. Chiramba (Berlin: Springer), 115–132.
- Ecclestone, K. (1996). The reflective practitioner: Mantra or a model for emancipation? *Stud. Educ. Adults* 28, 146–161. doi: 10.1080/02660830.1996.11730637
- Gresham, F. M., Watson, T. S., and Skinner, C. H. (2001). Functional behavioral assessment: Principles, procedures. *School Psychol. Rev.* 30, 156–172. doi: 10.1080/02796015.2001.12086106
- Hajj-Hassan, M., Chaker, R., and Cederqvist, A.-M. (2024). Environmental education: A systematic review on the use of digital tools for fostering sustainability awareness. *Sustainability* 16:3733. doi: 10.3390/su16093733
- Hernández, R. (2012). Does continuous assessment in higher education support student learning? *High. Educ.* 64, 489–502. doi: 10.1007/s10734-012-9506-7
- Jensen, B. B., and Schnack, K. (1997). The action competence approach in environmental education. *Environ. Educ. Res.* 3, 163–178. doi: 10.1080/1350462970030205
- Khine, M. M., and Langkulsen, U. (2023). The implications of climate change on health among vulnerable populations in South Africa: A systematic review. *Int. J. Environ. Res. Public Health* 20:3425. doi: 10.3390/ijerph20043425
- Kilvington, M. J. (2010). *Building Capacity for Social Learning in Environmental Management*. Doctoral thesis. Lincoln: Lincoln University.
- Kolb, D. A. (2014). *Experiential Learning: Experience as the Source of Learning and Development*. New York: Prentice Hall.
- Krathwohl, D. R. (2002). A Revision of Bloom’s Taxonomy: An Overview. *Theory Into Pract.* 41, 212–218. doi: 10.1207/s15430421tip4104\_2
- Kress, G., and Selander, S. (2012). Multimodal design, learning and cultures of recognition. *Int. High. Educ.* 15, 265–268. doi: 10.1016/j.iheduc.2011.12.003
- Lay, Y.-F. (2019). Integrating environmental education and ICT. *Eurasia J. Math. Sci. Technol. Educ.* 15:em1707. doi: 10.29333/ejmste/105686
- Lehtonen, A., Salonen, A. O., and Cantell, H. (2019). “Climate change education: A new approach for a world of wicked problems,” in *Sustainability, Human Well-Being, and the Future of Education*, ed. J. W. Cook (Cham: Springer International Publishing), 339–374.
- Louden, W. (1991). *Understanding Teaching: Continuity and Change in Teachers’ Knowledge*. London: Cassell.
- Lowan-Trudeau, G. (2023). Digital technologies and environmental education. *J. Environ. Educ.* 54, 1–7. doi: 10.1080/00958964.2022.2152413
- Lozano, R., Barreiro-Gen, M., Lozano, F. J., and Sammalisto, K. (2019). Teaching sustainability in European higher education institutions: Assessing the connections between competences and pedagogical approaches. *Sustainability* 11:1602. doi: 10.3390/su11061602
- Matooane, M., John, J., Oosthuizen, R., and Binedell, M. (2004). “Vulnerability of South African communities to air pollution,” in *8th World Congress on Environmental Health, Durban, South Africa*. doi: 10.1016/S0140-6736(20)30752-2
- Moura, A., Graça, A., MacPhail, A., and Batista, P. (2021). Aligning the principles of assessment for learning to learning in physical education: A review of literature. *Phys. Educ. Sport Pedagogy* 26, 388–401. doi: 10.1080/17408989.2020.1834528
- Mrema, D., Ndayambaje, I., Ntawih, P., and Ndabaga, E. (2023). Challenges facing enforcement of university quality assurance standards in fostering compliance in Tanzania. *Int. J. Learn. Teach. Educ. Res.* 22, 36–58. doi: 10.26803/ijlter.22.11.3
- O’Donoghue, R. (2007). Environment and sustainability education in a changing South Africa: A critical historical analysis of outline schemes for defining and guiding learning interactions. *S. Afr. J. Environ. Educ.* 24, 141–157.
- Omomia, O. A., and Omomia, T. (2014). Relevance of skinner’s theory of reinforcement on effective school evaluation and management. *Eur. J. Psychol. Stud.* 4, 174–180. doi: 10.13187/ejps.2014.4.174
- Pat-El, R. J., Tillema, H., Segers, M., and Vedder, P. (2015). Multilevel predictors of differing perceptions of assessment for learning practices between teachers and students. *Assess. Educ. Principles Policy Pract.* 22, 282–298. doi: 10.1080/0969594X.2014.975675
- Ponomarenko, T., Kovalenko, O., Shynkar, T., Harashchenko, L., and Holovatenko, T. (2023). *Development of the Professional Competence of Bachelors in Preschool Education Through Online Interaction*. Berlin: Springer, 114–127.
- Premo, J., Wyatt, B. N., Horn, M., and Wilson-Ashworth, H. (2022). Which group dynamics matter: Social predictors of student achievement in team-based undergraduate science classrooms. *CBE—Life Sci. Educ.* 21:ar51. doi: 10.1187/cbe.21-06-0164
- Queiroz, A. C., Fauville, G., Abeles, A. T., Levett, A., and Bailenson, J. N. (2023). The efficacy of virtual reality in climate change education increases with amount of body movement and message specificity. *Sustainability* 15:5814. doi: 10.3390/su15075814
- Rossouw, N., and Frick, L. (2023). A conceptual framework for uncovering the hidden curriculum in private higher education. *Cogent Educ.* 10:2191409. doi: 10.1080/2331186X.2023.2191409
- Schellekens, L. H., Bok, H. G. J., de Jong, L. H., van der Schaaf, M. F., Kremer, W. D. J., and van der Vleuten, C. P. M. (2021). A scoping review on the notions of Assessment as learning (AaL), Assessment for learning (AfL), and Assessment of learning (AoL). *Stud. Educ. Eval.* 71:101094. doi: 10.1016/j.stueduc.2021.101094
- Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. Milton Park: Routledge.
- Silva, P., Vieira, I., Babo, L., and Torres, C. (2025). “Integrating digital tools to enhance learning experiences in higher education,” in *International Conference in Information Technology and Education*, eds A. Abreu, J. V. Carvalho, A. Mesquita, A. Sousa Pinto, and M. Mendonça Teixeira (Berlin: Springer Nature Switzerland), 410–417.
- Slavin, R. E. (2012). “Classroom applications of cooperative learning,” in *APA Educational Psychology Handbook, Vol 3: Application to Learning and Teaching*, eds K. R. Harris, S. Graham, T. Urdan, A. G. Bus, S. Major, and H. L. Swanson (Washington, DC: American Psychological Association), 359–378. doi: 10.1037/13275-014
- Sluijsmans, D. M. A., Brand-Gruwel, S., van Merriënboer, J. J. G., and Martens, R. L. (2004). Training teachers in peer-assessment skills: Effects on performance and perceptions. *Innov. Educ. Teach. Int.* 41, 59–78. doi: 10.1080/1470329032000172720
- Smith, M. K. (2000). *Curriculum Theory and Practice. The Encyclopedia of Informal Education [Online]*. Available online at: www.infed.org/biblio/b-curric.htm

- Sugeng, B., and Suryani, A. W. (2018). Presentation-based learning and peer evaluation to enhance active learning and self-confidence in financial management classroom. *Malaysian J. Learn. Instruct.* 15, 173–201. doi: 10.32890/mjli2018.15.1.7
- Tomita, A., Cuadros, D. F., Burns, J. K., Tanser, F., and Slotow, R. (2020). Exposure to waste sites and their impact on health: A panel and geospatial analysis of nationally representative data from South Africa, 2008–2015. *Lancet Planetary Health* 4, e223–e234. doi: 10.1016/s2542-5196(20)30101-7
- Vahed, A., Walters, M. M., and Ross, A. H. A. (2023). Continuous assessment fit for purpose? Analysing the experiences of academics from a South African university of technology. *Educ. Inquiry* 14, 267–283. doi: 10.1080/20004508.2021.1994687
- van der Vleuten, C., Sluijsmans, D., and Joosten-ten Brinke, D. (2017). *Competence Assessment as Learner Support in Education*. Cham: Springer.
- Van Ginkel, S., Laurentzen, R., Mulder, M., Mononen, A., Kytä, J., and Kortelainen, M. J. (2017). Assessing oral presentation performance: Designing a rubric and testing its validity with an expert group. *J. Appl. Res. High. Educ.* 9, 474–486. doi: 0.1108/jarhe-02-2016-0012
- Veugen, M., Gulikers, J., and Den Brok, P. (2021). We agree on what we see: Teacher and student perceptions of formative assessment practice. *Stud. Educ. Eval.* 70:101027. doi: 10.1016/j.stueduc.2021.101027
- Vygotsky, L. S. (1978). *Mind in Society: Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.
- Wiggins, G. (1998). *Educative Assessment. Designing Assessments To Inform and Improve Student Performance*. San Francisco: Jossey-Bass Publishers.
- Wingate, U. (2012). Using Academic Literacies and genre-based models for academic writing instruction: A 'literacy' journey. *J. Engl. Acad. Purposes* 11, 26–37. doi: 10.1016/j.jeap.2011.11.006
- Yang, L. P., and Xin, T. (2022). Changing educational assessments in the post-COVID-19 era: From assessment of learning (AoL) to assessment as learning (AaL). *Educ. Meas. Issues Pract.* 41, 54–60. doi: 10.1111/emip.12492
- Zimba, Z. F., Khosa, P., and Pillay, R. (2021). Using blended learning in South African social work education to facilitate student engagement. *Soc. Work Educ.* 40, 263–278. doi: 10.1080/02615479.2020.1746261