



Onfarm Oral Test as a Miniature Formative Assessment to Foster Student Development in an Agriculture Course from a Rural-based University

* Fon, F.N.¹ * Ndou, Z.L.¹ and Sibanda, M.¹

¹ Department of Agriculture, University of Zululand, P. Bag X1001, KwaDlangezwa 3886, South Africa

*Corresponding author: FonF@unizulu.ac.za

Abstract. While there is always an ongoing debate on the use of summative assessments over formative assessment especially when student development is prioritized, summative assessments continue to prevail in many higher education institutions, especially in developing countries. Different reasons have been associated with its high application including ease of standardization and comparability both locally and internationally, efficiency and ease of use, policy alignment by many government institutions, and resource constraints, especially in rural-based Universities. Continuous assessments (tests and assignments) often viewed by many as formative assessments can be misleading sometimes because many educators especially those with limited pedagogical knowledge give summative tests. Because of the dominance of summative assessments, oral assessments are considered here as an alternative to assessments with characteristics similar to that of formative assessments since they provide opportunities for real-time interaction and immediate feedback, practical application and verbal communication skills, and critical thinking, especially for students in previously disadvantaged universities surrounded by rural communities with limited opportunity to read and write English. An on-farm oral test is a type of assessment in which students are evaluated in an actual agricultural farm setting. The study, therefore, engaged in a more practical and on-farm assessment of students of concepts learned in a plant science course. This study compared student performances in an oral test to a written test in a plant science module from 2021 to 2024. The third-year course (internally moderated) was taught by the same lecturer for four years. Two tests (T1 and T2) were used to evaluate taught concepts while a field practical testing of the same concepts was used to interview (one-on-one) the students on what they did, how, and why to maintain plant health as an oral test (OT). The recorded marks were subjected to Chi-square of Crosstab analysis and ANOVA using SPSS for student performance percentages and mean performance scores, respectively, where differences were considered at $P < 0.05$. The results showed that students performed best ($P < 0.05$) in mean classmarks for OT (74%, 85%, 82%, and 62%) than in T1 (57%, 49%, 40%, and 31%) and T2 (31%, 50%, 41%, and 30%) from 2021 to 2024, respectively. In T1 only 7.4% of the class scored distinction in 2021 while 0% was observed in 2022 to 2024. For T2, there was no student with a distinction for four years. OT showed the highest ($P < 0.05$) number of students with distinctions (63%, 84%, 88%, and 20%) from 2021 to 2024, respectively. It was also noticed that the student cohort of 2024, was a bit weaker than the rest. These findings indicated the need to factor in more on-farm tests in the field of Agriculture, as students demonstrated improved performance when engaged in a one-on-one discussion.

Keywords: Student assessments, oral tests, formative and summative, higher education, pedagogy.

1. Introduction

One of the UN's Sustainable Development Goals 2030 (SDG2030 goal number 4) is education for all to educate the world, not only by making education available to all but by providing quality education (Kopnina, 2020). This is because education has been seen as an important asset that can unlock the potential of every human being hence the pushing of the knowledge-based economy by many different countries. The Africa Agenda 2063 also highlighted quality education and healthcare, gender equality, and empowering youth and women in Africa under the pillar of social development (DeGhetto, Gray, & Kiggundu, 2016). This has even been aggravated by the

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fourth and potential fifth industrial revolutions where machines are reducing the number of unskilled jobs hence the need for reskilling. Therefore, most countries are now striving to push their economy more toward a knowledge-based economy (DeGhetto et al., 2016). This is also not different in South Africa as the national strategic goals have been developed with one eye on the SDG2030, hence emphasizing the need for a knowledge-based economy. This has put more pressure on the higher education sector to produce more graduates, especially Master's and doctorate candidates. This has been a mammoth task because the number of dropouts is very high for both undergraduate and postgraduate studies in South Africa (Ramchander, 2021; Sosibo, 2024). Although difficulties in teaching and learning have been associated with these dropouts, student assessment is said to be the tool used for cutting off these students. Therefore, it will be helpful to start by defining what an assessment is.

While going through the literature, it was very difficult to find a simple definition that covers the entirety of an assessment. However, it was defined as “a systematic collection, review, and use of information about educational programmes for the purpose of improving students learning and development (Heywood, 2000)”. Assessment in higher education is multipurpose which includes; measuring learning outcomes of a particular module, providing feedback, informing instructors on the effectiveness of teaching methods, grading and certification, student motivation, identifying student needs, program evaluation and improvement and accountability, just to name a few. For many especially administrators, assessments is all about gaining marks for vertical articulation into the next programme. As the years go by, many students especially at the lower levels see assessment as a means to gaining marks to validate a course or a programme leading to what is known as summative assessments. However, advocates of formative assessments see these differently, where assessment is not about the marks but students' development. Today, many scholars believe that formative assessment is the way to go if students' development were to be prioritized. However, the summative assessment would continue to thrive because of its application in the grading of students for certification and vertical articulation. In the section below, summative and formative assessments will be briefly described. Therefore, assessment in higher education would continue to serve as an essential tool for measuring student learning, providing feedback, and guiding instructional decisions (Guàrdia, Crisp, & Alsina, 2020). They can broadly be categorized into two main types: formative and summative assessments (Svensäter & Rohlin, 2023; Yüksel & Gündüz, 2017). Each type plays a unique role in the educational process, offering distinct benefits and posing particular challenges, especially in historically disadvantaged universities with limited resources (Cross and Atinde, 2015). Although the resources are part of the primary problem, the uniqueness of these students is also important to consider the type of assessment as encouraged by transformational pedagogy (Yacek, Rödel, & Karcher, 2021).

1.1 Formative assessments

In higher education, formative assessments are ongoing assessments designed to monitor student learning and provide continuous feedback to both students and instructors. It has been referred to by many as an assessment for students for learning unlike summative which has been labelled as an assessment of learning. Formative assessment aims to identify areas where students are struggling and to inform necessary adjustments in teaching strategies or study habits. The practices have been a nightmare, especially in large classes with limited staff members but technology seems to have lessened the pressure with more and more classes now engaged with online assessments with instant feedback (McCarthy, 2017).

1.1.1 Formative assessments characteristics

One of the primary goals is to provide actionable feedback that helps students understand their strengths and weaknesses. This type of feedback allows a student or a group of students to reflect and stimulate critical thinking while interaction and collaboration between students and staff in the processes of learning turns out to be very high. Formative assessment also helps in identifying specific areas where students need improvement and this is sometimes called diagnostic assessments. Sometimes, time is wasted in areas where students are already doing great hence such testing can easily identify such shortfalls and improve students' pass rate as well as development. It is also said to be the type of assessment where students and lecturers are more relaxed because grading is often the least cards on the table. More time is spent on honest reflection on their learning progress while the lecturer becomes a facilitator, hence, promoting the co-creation of knowledge with students. Formative assessments are also said to have diverse formats which include; quizzes, class discussions, peer reviews, and other interactive activities that are often frequent and ongoing. They are administered regularly throughout the learning process for student development and sustainability. These characteristics show that the lecturer needs to carefully plan the type of assessment right from the curriculum development as well as considering the type of students.

1.2 Summative assessment characteristics

Summative assessments, on the other hand, are evaluations that occur at the end of an instructional period. These could be after a lesson, module, or at the end of a course in the form of an exam. The aim is to measure the extent to which students have achieved the learning outcomes and are usually more formal and high-stakes than formative assessments. Often, there is no chance for feedback and even when there is feedback, it is often not used, e.g. standard exam feedbacks.

1.2.1 Summative assessments characteristics

It provides an overall assessment of student learning at the conclusion of a course or program. Therefore is often no feedback hence limiting student learning and interactions. Student pressure here is often much higher because the outcomes or results have an impact on final grades, degrees, or certifications. The standardized nature of these exams ensures consistency and fairness across all students even when it comes to internationalization (Ji & Teaching, 2020). Unlike formative assessments, feedback from summative assessments is often less detailed, as the primary focus is on evaluating final learning outcomes. Summative assessments are very important for the determination of at-risk students but poor in development. The different analyses may include final exams, major projects, standardized tests, or cumulative assignments.

1.3 Assessment challenges in historically disadvantaged universities

Designing valid and reliable assessments poses particular challenges in historically disadvantaged universities, where limited resources can impact the quality and fairness of these evaluations. Limited access to technology can hinder the use of diverse assessment tools, such as online quizzes, digital reports, or online discussion groups. Sometimes the hardwares are available but no network or even data. The scarcity of textbooks, laboratory equipment, and other educational materials can constrain the types of assessments that can be implemented, particularly in fields that require hands-on learning. However, most Universities are now buying online books and making them accessible to students even on data-free apps. Limited training opportunities for faculty to receive training in modern assessment techniques, may impact their ability to design effective and innovative assessments.

There is an urgent need for training because the type of students may vary hence requiring flexibility and preparedness for higher education assessments, necessitating additional support and remediation. Validity and reliability of a summative assessment is also very important because it needs to be accurate and consistent not to disadvantage others while reliability is measured in terms of its ability to measure the outcome that it is intended to.

1.4 Assessment in Teaching and learning conceptual framework

Based on the above discussions, there is a need to investigate more assessments with the potential to be transformative which is one of the current trends in Higher Education to speak to the current issues in our environments. The conceptual framework below (Figure 1) was developed and modified from the work of Bourke and Mentis (2014) is going to be used to modify the use of oral test assessment from summative assessment into formative assessment as demonstrated in Figure 1 below. While the main oral test is often used to evaluate the outcome of the module, the formative oral test would seek to evaluate competencies which are real-life skills based on the on-farm interaction with the lecturer and instant feedback allowing students to think freely through observation. During an assessment, Boom’s and Solo’s thinking pyramids guide the setting of the oral test which involves remember, understand, apply, analyze and evaluate while in the field, greenhouse, or lecture room setting. Besides curricula outcomes, competencies were interrogated as well as shown in Figure 1.

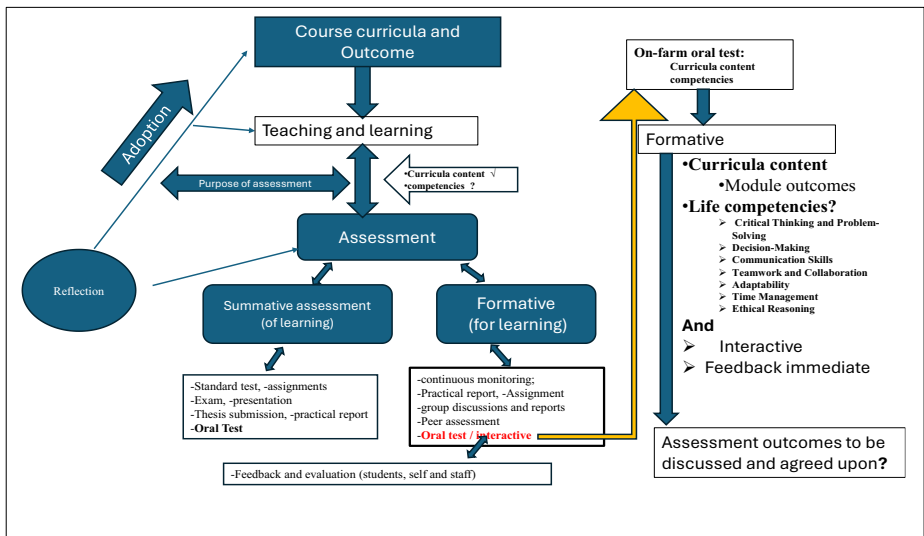


Figure 1: Assessment framework for Teaching and learning outcome and potential competencies testing modified from Bourke and Mentis (2014)

The summative outcomes were used to grade the students and compare them with other summative assessments like standardized tests. An on-farm oral test is a type of assessment in which students are evaluated for their understanding of actual agricultural farm management practices. The study, therefore, engages students in a more practical and on-farm assessment of concepts learned in plant science practical and theoretical learning activities in contrast with that of standardized written tests. This study compared student performances in an oral test to a written test in a plant science module from 2021 to 2024. The key questions where; how does oral test impacts

student performances compared to traditional summative assessments like test (overall student pass rate)? How effectively can oral tests capture students' higher-order cognitive skills, such as synthesis and evaluation, compare to written tests (measured in number of students with merits or distinctions in the assessments)? Is summative assessment the most reliable test of students understanding compared to oral tests?

2. Materials and Methods

Student development is often prioritized in the ongoing debate over the use of formative versus summative assessments (Yacek et al., 2021). Summative assessments are widely used in higher education, particularly in countries with limited resources, due to their policy alignment, comparability, efficiency, and ease of standardization especially in rural-based universities. Continuous assessments, such as assignments, tests, and practicals are sometimes mistakenly regarded as formative. The present study glances at oral assessments as a substitute for summative examinations. These kinds of assessments offer immediate feedback, real-time interaction, verbal communication skills, practical application, and critical thinking, especially for students in underprivileged universities.

2.1 Study area

The study was carried out from 2021 to 2024 at a rural-based university in the Department of Agriculture at the University of Zululand in KwaDlangezwa, KwaZulu-Natal Province, Republic of South Africa. The university serves a large number of students from surrounding rural communities in KwaDlangezwa with limited English literacy skills.

2.2 Students assessments

The participants were third-year plant science students enrolled in a crop protection module. The module was taught by the same lecturer for four years (2021-2024) to ensure consistency in teaching methods and content

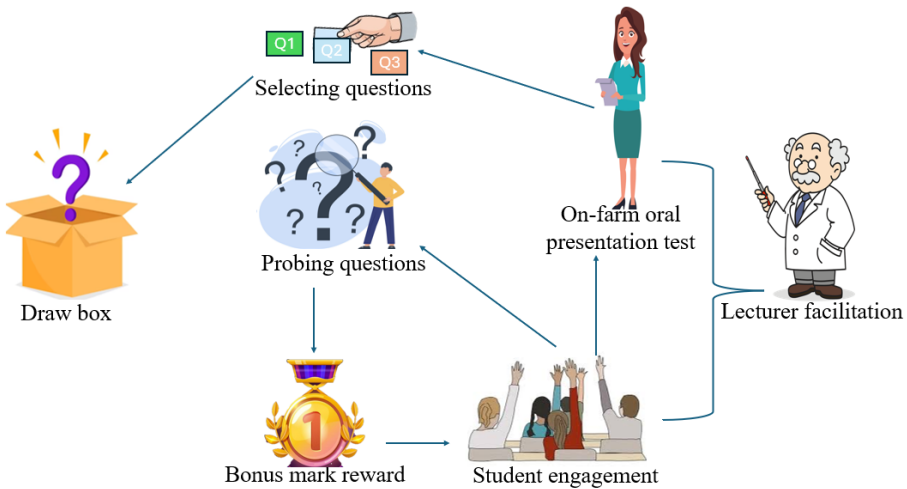


Figure 2: Mechanism adopted in oral test assessment and fostering student engagement.

delivery. Student assessments were divided into three components: two written tests (T1 and T2) and an oral test (OT). The written test examines theoretical knowledge of taught concepts in sit-in classroom assessment, while

the oral test assesses practical application and understanding of actual agricultural farm practices in the form of a presentation assessment. The oral test assessments were designed to evaluate students' knowledge of practical application, verbal communication, critical thinking, and problem-solving of theoretical concepts related to improving plant health and food security in real-world scenarios. The assessment involved the use of a draw box comprised of 200 distinct problem-solving questions as shown in Figure 2. Questions used in the assessment were developed to address a broad range of module-related subjects, and each student was allowed to select up to three questions from the box. After drawing the questions, each student was required to select the topic they felt most comfortable presenting, and the selected question formed part of the focused oral test. Following each presentation, there was an interactive session with students and the lecturer, followed by questions. The interactive session played an important part in encouraging students to engage with the presenter by asking requests and seeking clarifications to any questions. Bonus marks were awarded to students who asked relevant and insightful questions during the presentations to encourage participation. Students were assessed on the extent to which they understood the problem and concept, the suitability of suggested solutions, their capacity to answer posed questions, and their ability to confidently and clearly communicate their opinions. The student's grading criteria ranged from 0-39 (Fail), 40-49 (Pass), 50-64 (Average), 65-74 (Good), and 75-100 (Excellent) for each assessment.

2.3 Statistical analysis

Students' marks in Test 1, Test 2, and oral test (OT) from 2021 to 2024 were recorded and also categorized into 0-39, 40-49, 50-64, 65-74, 75-100 for students' performances. ANOVA of SPSS was used to analyze the means scores for each year as well as for each category and differences were considered at $P < 0.05$ while the nominal data of students distribution (students counts per grade) were analyzed using Chi-square, under Crosstabs of Descriptive statistics and differences were considered at $P < 0.05$.

3. Results

The present study was undertaken, to evaluate the effectiveness of on-farm oral tests in improving student performance versus written test assessments (Table 1). Student performance on the assessments was determined over a four-year period as part of the third-year crop protection module.

Table 1: Students mean performances in tests and oral test assessments from 2021-2024

Year	N	Student assessments			STD	P-value
		Test 1	Test 2	Oral Test		
2021	27	57.1	31.7	74.3	12.44	0.05
2022	32	49.8	50.1	85.3	14.16	
2023	36	40.8	41.2	82.0	13.64	
2024	27	74.3	29.6	61.7	22.18	
<i>STD</i>		14.19	9.44	10.48		
<i>P-value</i>		0.05	0.05	0.05		

STD= standard deviation

The results showed that the mean scores for the different tests varied ($P<0.05$) from 2021 to 2024. The highest ($P<0.05$) scores were observed in the oral test (OT), followed by test 1 and the lowest in T1 from 2021 to 2024. It was also noticed that the overall students performance decreased in 2024 compared to the previous years for OT.

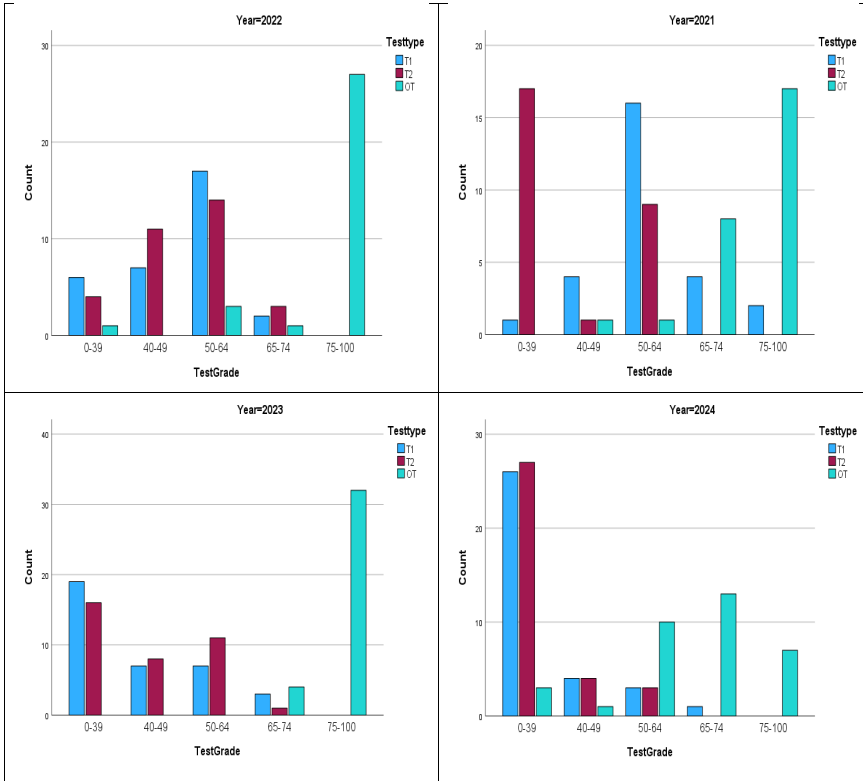


Figure 3: Students' written tests and oral test performance grading counts from 2021 to 2024. Where Test one = T1, test 2= T2 and oral test = OT. The distribution was analysed using crosstab of SPSS and Chi-square was used to establish difference between and within the years at $P<0.05$.

The distribution of students within and between the different performance gradings (0-39, 40-49, 50-64, 65-74, 75-100) varied ($P<0.05$) from 2021 to 2024. The results showed that students performed better in OT than in T1 and T2 with the highest number of students recorded at 75-100 from 2021 to 2024 (Figure 3). It was also noticed that student counts at 75-100, dropped in 2024. Test two showed the highest number of students who performed poorly (0-39) in all four years compared to T1 and OT.

Table 2 shows that the class average scores for the grading levels (0-39, 40-49, 50-64, 65-74, 75-100) varied ($P < 0.05$) within and between the different T1, T2, and T3 over the four years. The highest mean scores for 75-100 in OT was observed in 2022 followed by 2023 and 2024 and then 2021.

Table 2: Students performing grading mean scores for written test and oral tests in four years

Test Scores						
Year	Grading	Test 1	Test 2	Oral Test	Standard deviation	P-value
2021	0-39	26.0	19.4	0.0	10.17	0.05
	40-49	44.3	43.0	46.0	2.25	
	50-64	56.6	53.6	55.0	3.92	
	65-74	69.5	0.0	71.0	2.20	
	75-100	78.0	0.0	78.6	2.69	
2022	0-39	35.3	32.8	8.0	10.53	0.05
	40-49	43.6	44.3	0.0	2.33	
	50-64	55.5	55.8	56.7	3.87	
	65-74	66.0	68.3	71.0	2.10	
	75-100	0.0	0.0	91.9	5.74	
2023	0-39	29.4	27.0	0.0	8.44	0.05
	40-49	42.4	44.5	0.0	2.64	
	50-64	58.4	57.2	0.0	4.95	
	65-74	68.3	66.0	74.0	3.64	
	75-100	0.0	0.0	83.0	5.55	
2024	0-39	25.8	25.0	0.0	9.77	0.05
	40-49	41.8	44.0	45.0	2.47	
	50-64	53.3	52.0	58.6	3.20	
	65-74	70.0	0.0	68.3	1.91	
	75-100	0.0	0.0	82.7	5.53	

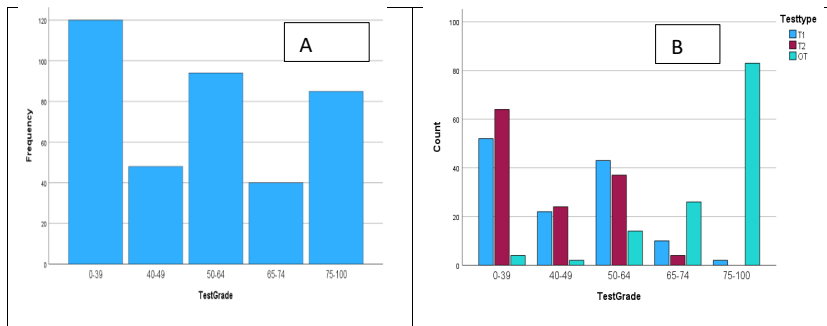


Figure 4: Overall distribution of students within the different grades (Figure 4A) and specific tests (Figure 4B).

Figure 4A shows the overall distribution of students within the different grades while Figure 4B maps the distribution within the specific tests for four years. Figure 4A shows that a lot of the students were still struggling due to the high counts in 0-39 and 40-49.

4. Discussion

One of the most trending topics in the higher education sector is the decline in quality of education (Le Nestour, Moscoviz, & Sandefur, 2022) especially in developing countries despite the birth of numerous technologies that can assist teaching and learning as well as assessments. Many scholars believe that traditional assessments of learning are the major setback of learning where students are trained often to pass their exams and move to the next vertical articulation instead of assessments for learning which has been reported to be key in the transformation of students' learning and teaching (Tolgfors, 2019). In this study, the traditional oral test (summative) as an interview presentation with students was transformed by giving an on-farm activity where theoretical knowledge and field practical training experience were evaluated individually using a draw box with different questions based on their observations and factors that were affecting their produce in the field. Such setup classified the OT assessment as formative and transformative because the evaluation process showed all the characteristics of formative assessments as well as the promoting mission and values by instilling skills that promote entrepreneurship as well as working with the immediate environment hence promoting the University slogan of “node of African thought”. It was very clear in the findings that students who were engaged with the formative oral test did not only enjoy the test but performed very well in terms of quality and numbers when compared to the different written tests. The high marks for oral test was associated with students high engagement and collaboration either with the lecturer or students to understand the problems they encountered on-farm. During the on-farm assessment, students benefited from practical examples because their discussion was centered on the actual practices and plant pests encountered or observed in the field, unlike theoretical tests where they memorize instead of seeing them in action on-farm. Positive responses were also observed in a similar study by Pate et al. (2019) where they transformed the assessment of an agricultural tractor and machinery safety curriculum for teacher training of students.

Both tests (T1 and T2, and OT) were able to test concepts thought in class especially at the basic levels of understanding such as behaviorism and cognitivism (were easily achieved) but application question were difficult in the traditional test while OT the examiners were able to probe deeper into students understanding and can gauge student dept of understanding especially from their onfarm project or practical experience. These are some of things that students sometimes cannot expressed in writing during theoretical test writing but would be able to say it loud and clear in OT. Additionally, the success of this formative and transformative assessment approach demonstrates the importance of on-farm practical experiences as an instrument of learning in the agricultural fields (Cooreman et al., 2018). Such an approach promotes a better understanding of concepts by engaging students directly in real-world challenges which encourages them to use their theoretical knowledge in a practical setting. It provides students with critical thinking and problem-solving skills needed in agricultural working environments (Worthington, 2024). The approach not only improves learning outcomes but also aligns well with the broader educational goals of promoting entrepreneurial skills (Osei & Zhuang, 2024). Incorporating more interactive and practical student assessments can play a vital role in bridging the gap between theory and practice in African resource-poor institutions.

5. Conclusion

Despite technological advancements in teaching and learning, the study addresses a decline in educational quality in developing countries. Learning in rural-based universities is limited by traditional assessments methods that

place more emphasis on passing tests than on developing students' deep understanding. The research transformed the traditional oral assessment into a formative on-farm engagement and the assessments focused on problem-solving of real-world scenarios. This practical approach, encourages critical thinking, practical skills, and entrepreneurship which aligns with formative assessment principles. The findings showed that students performed far better in the on-farm formative oral test compared to traditional written test assessments. This study demonstrated that oral, practical assessments are a useful substitute for summative assessments, which are often used due to standardization and limited resources. These assessments improved communication and critical thinking skills and provided immediate feedback, which is especially beneficial for students who live in rural areas with limited access to educational resources. Students continuously outperformed in oral assessment throughout the four-year period (2021–2024), with higher mean scores and more distinctions, demonstrating the effectiveness of this approach. Therefore, it is important to integrate on-farm practical assessments in agricultural courses. These assessments improve student performance and engagement, while offering transformative learning opportunities that equip students for challenges in the real-life setting of agriculture. Such an approach ought to be adopted to improve the standard of higher learning, especially in developing countries. However, further research is required to investigate the timing of the oral test especially before test 1 and 2 to see its importance in fostering theoretical test performances.

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