DOI: https://doi.org/10.67203/jossme.2026.pamrj9l3

Journal of Studies in Science and Mathematics Education

ISSN: 2630-662x

Published: 08.11.2026

Volume (issue): 6(2)

Page: 251 – 261

Regenerative Agriculture Education and Sustainable Farming Competencies among Agricultural Education Students in Five Colleges of Education in South-West Nigeria

Abiodun Babalola

Department of Agricultural Education, FCT College of Education, Zuba Abuja

***Corresponding author:** babsabiodun68@gmail.com

Abstract

Agricultural science is taught as a science subject in Nigerian secondary schools, and many of its teachers are trained in Colleges of Education. This descriptive survey, with correlational and comparative components, examined regenerative agriculture education and sustainable farming competencies among Agricultural Education students in five Colleges of Education, one each in Oyo, Ogun, Osun, Ondo and Ekiti States. From 750 NCE II and III students, 254 were sampled by proportionate stratified and simple random sampling, and 237 usable questionnaires (pilot alpha = .84 and .88) were analysed with means, 95% confidence intervals, effect sizes, Pearson correlation and one-way ANOVA with Scheffé tests. Students reported that regenerative agriculture was taught to a moderate extent ($M = 2.60$); composting and cover cropping were rated high, whereas agroforestry, crop-livestock integration and biological pest and weed management were rated low. Self-rated competencies were moderate ($M = 2.82$, 95% CI [2.74, 2.90], $d = 0.50$) and lowest for integrating trees and livestock and assessing soil health. Perceived teaching and competencies were positively related ($r = .54$, 95% CI [.44, .62]). Competencies differed across colleges, $F(4, 232) = 5.81$, $p < .001$, $\eta^2 = .09$, and were lowest in the sampled Osun college. Both variables are self-reports from one college per state at one time point, so findings are not zone-wide estimates. Colleges and the National Commission for Colleges of Education (NCCE) should strengthen practical work on agroforestry, crop-livestock integration and soil health assessment.

Keywords: regenerative agriculture, sustainable farming competencies, agricultural science education, colleges of education, south-west Nigeria

1 Introduction

Agricultural science is a science subject in the Nigerian secondary school curriculum, and the National Certificate in Education (NCE) is the minimum teaching qualification under the National Policy on Education (Federal Republic of Nigeria [FRN], 2013). Colleges of Education therefore prepare many of its teachers, although no national figure for the share trained through the NCE Agricultural Education programme could be found. Teacher quality is among the school-level factors most consistently linked to pupil achievement (Darling-Hammond, 2000). Where teachers also run school farms or farmers' clubs, their knowledge may reach farm households too, but evidence for that route is thin and it is treated here as plausible, not established. Regenerative agriculture is one approach now drawing attention in agricultural science and education. It seeks to restore soil and the ecosystem services that depend on it (LaCanne & Lundgren, 2018; Schreefel et al., 2020), through practices such as cover cropping, reduced tillage, composting, diversified rotations and the integration of trees and livestock (Khangura et al., 2023). For a teacher-training programme the question is whether graduates can practise and teach these methods; this study asks it in five Colleges of Education in South-West Nigeria.

1.1 Statement of the Problem

Sustainable farming needs teachers who can manage soil and ecosystem functions, not only crops. Studies of technical competencies in Colleges of Education report generally high competence in routine crop and livestock tasks but weakness where equipment, costing or applied decisions are involved (Omodara et al., 2019; Omodara et al., 2025), and Abdullahi et al. (2025) found that agricultural students' willingness to start enterprises in the North-West depended on factors beyond training. None asked how much regenerative agriculture is taught or related it to what students can do. Smallholder studies show that organic and conservation practices are adopted unevenly (Oladimeji et al., 2020; Kehinde et al., 2022). The gap is likely to lie in the harder elements, trees, livestock integration and soil monitoring, but this has not been tested. A literature

search for this revision found no study measuring the extent of regenerative agriculture teaching in South-West Colleges of Education or relating it to students' sustainable farming competencies. This study addresses that gap.

1.2 Purposes of the Study

The purposes of the study were to:

1. determine the extent to which regenerative agriculture is taught to agricultural education students in the colleges studied;
2. determine the level of the students' sustainable farming competencies;
3. determine the relationship between regenerative agriculture education and sustainable farming competencies; and
4. determine whether sustainable farming competencies differ across the five colleges studied.

1.3 Research Questions

One question matches each purpose:

1. To what extent is regenerative agriculture taught to agricultural education students?
2. What is the level of the students' sustainable farming competencies?
3. What is the relationship between regenerative agriculture education and sustainable farming competencies?
4. Do sustainable farming competencies differ across the colleges in Oyo, Ogun, Osun, Ondo and Ekiti States?

1.4 Research Hypotheses

One null hypothesis matches each question and was tested at the 0.05 level. For Ho1 and Ho2 the criterion mean of 2.50 is the midpoint of the four response weights, and each test is reported with a confidence interval and effect size.

1. The mean extent to which regenerative agriculture is taught does not differ significantly from the criterion mean of 2.50.
2. The mean level of students' sustainable farming competencies does not differ significantly from the criterion mean of 2.50.
3. There is no significant relationship between regenerative agriculture education and sustainable farming competencies.
4. There is no significant difference in the sustainable farming competencies of students across the colleges in Oyo, Ogun, Osun, Ondo and Ekiti States.

2 Review of Related Literature

2.1 Conceptual Review

2.1.1 Regenerative agriculture

The term has no fixed meaning. After reading 229 journal articles and 25 practitioner websites, Newton et al. (2020) report definitions built on practices, on results, or on both. LaCanne and Lundgren (2018) compared farms that combined practices such as no-till, cover crops, diverse rotations and integrated livestock, and Khangura et al. (2023) reviewed the practices and mechanisms through which such systems improve soil health. Giller et al. (2021) argue from an agronomic standpoint that the value of a practice varies with the setting, so farmers and teachers need the judgement to match practice to soil and farm. Here, regenerative agriculture education means the extent to which students report being taught such practices.

Sustainable farming competencies

Wiek et al. (2011) list systems thinking and strategic competence among the key sustainability competencies. In farming these correspond to judging how soil, crops, trees and livestock interact and choosing practices that suit a farm, the judgement Giller et al. (2021) call for.

2.1.2 Measuring competence by self-rating

Self-ratings capture perceived capability, which Bandura (1997) treats as a driver of action, but track measured performance only loosely (Dunning et al., 2004), and ratings of teaching and competence from the same respondents can share response tendencies (Podsakoff et al., 2003). Findings are read as confidence in competence, not demonstrated skill.

2.2 Theoretical Framework

The study draws on Kolb's (1984) experiential learning theory, in which knowledge is created by transforming experience through concrete experience, reflection, abstract conceptualisation and active experimentation. Roberts (2006) examined it for agricultural educators, Baker et al. (2012) aligned it with the classroom, laboratory and supervised experience components of agricultural education, and Roberts and Ball (2009) treat the school farm as both context and content. Teaching, especially practical work, stands for opportunity for concrete experience, and competencies for what it produces. The theory therefore implies a positive relationship between the two (Ho3) and lower competence where colleges offer fewer practical opportunities (Ho4). Section B measures perceived opportunity and Section C perceived competence.

2.3 Empirical Review

Nigerian studies show which practices farmers use. Oladimeji et al. (2020) report that maize farmers in Kaduna, Katsina and Kano States tended to adopt manure, residue retention, intercropping and rotation as a package. In Oyo State, Kehinde et al. (2022) found mulching, vegetative fallow and cover cropping to be the main conservation practices, with adoption rising with extension contact, schooling and farmer-organisation membership. Studies of student preparation point to uneven competence. Omodara et al. (2019) found North-West agricultural education students broadly competent but weak where equipment and applied decisions were involved. Omodara et al. (2025), studying NCE III students in three zones, reported high grand means for crop, soil and livestock competencies, with the lowest South West scores on maximising enterprise profit and choosing among options. Abdullahi et al. (2025) found that readiness for agricultural enterprise rested on factors beyond training, such as access to resources. These studies did not measure regenerative content, and their scales differ, so their means cannot be compared directly with those reported here.

2.4 Summary and Gap

The literature agrees that regenerative agriculture rests on soil-restoring practices whose value depends on context, that Nigerian smallholders use some of them, and that agricultural education students are stronger on routine than on applied tasks. Missing is evidence on how far Colleges of Education teach these practices and whether the amount taught goes with competence. This study supplies it for five colleges.

3 Methods

3.1 Design

The study used a descriptive survey design with correlational and comparative components. A structured questionnaire collected primary data, which were analysed to describe the variables, test their relationship and compare colleges, without manipulating any variable.

3.2 Study Context and Colleges

The study covered five of the six South-West states: Oyo, Ogun, Osun, Ondo and Ekiti. One College of Education per state that offers the NCE Agricultural Education programme was studied, so college and state differences cannot be separated. Each college runs the programme under NCCE minimum standards, combining classroom courses, school-farm practicals and teaching practice. Lagos State was excluded as a delimitation, because its largely urban setting and limited school-farm

land make farm-based practicals less comparable with those of the other five states. In each state, one public College of Education was chosen purposively as the one with the largest NCE Agricultural Education enrolment, so that enough students were available for sampling Findings apply to these five colleges and should not be generalised to Lagos State or to the zone as a whole.

3.3 Population and Sample

The target population was the 750 NCE II and III Agricultural Education students enrolled in the 2025/2026 session in the five colleges, taken from departmental records (Table 1). Data were collected from February 2026 to March 2026. The Krejcie and Morgan (1970) table gives a sample of 254 for a population of 750. Allocation was proportional to enrolment (n = college population ÷ 750 × 254), rounded by the largest-remainder method so that the allocations sum to 254. Under this rule Ekiti's unrounded share of 30.5 was rounded up to 31. Respondents within each college were chosen by simple random sampling, using numbered slips drawn without replacement. Colleges are identified by state only; individual respondents were anonymous.

Table **1**

Population, Sample Allocation and Copies of the Questionnaire Used, by State

State	Population (*N*)	Sample (*n*)	Copies used	Return rate (%)	Share of analysed sample (%)
Oyo	190	64	58	90.6	24.5
Ogun	200	68	62	91.2	26.2
Osun	160	54	52	96.3	21.9
Ondo	110	37	36	97.3	15.2
Ekiti	90	31	29	93.5	12.2
Total	**750**	**254**	**237**	**93.3**	**100.0**

Of the 254 copies distributed, 237 (93.3%) were correctly completed and used. Return rates ranged from 90.6% in Oyo to 97.3% in Ondo. Of the 17 copies not used, 6 were not returned and 11 were discarded as incomplete or carrying more than one response per item. No follow-up of non-respondents was possible, so non-response bias could not be tested; the narrow range of return rates makes serious bias less likely but cannot exclude it

3.4 Respondents' characteristics

Table 2 describes the respondents.

Table **2**

Characteristics of the 237 Respondents

Characteristic	Category	*N*	%
Sex	Male	98	41.4
	Female	139	58.6
Level of study	NCE II	118	49.8
	NCE III	119	50.2
Age (years)	Mean (*SD*); range	22.4 (3.1)	18–38

3.5 Instrument

Data came from a structured questionnaire developed by the researcher from the reviewed literature (LaCanne & Lundgren, 2018; Newton et al., 2020; Schreefel et al., 2020; Khangura et al., 2023; Omodara et al., 2019); no existing instrument was adopted. Section A collected personal data. Section B held ten items on how far regenerative practices are taught, in lectures or practical work (Table 3), rated Very Great Extent (4), Great Extent (3), Low Extent (2) and Very Low Extent (1). Section C held ten items on sustainable farming competencies (Table 4), rated Highly Competent (4), Competent (3), Slightly Competent (2) and Not Competent (1). The practices mix entry-level ones that students meet first and smallholders already use (compost, cover cropping, mulching, rotation) with ones the literature links to fuller regenerative systems (soil health assessment, trees and livestock, biological pest and weed management).

Competence was self-rated, so Section C measures confidence, not observed skill, and Section B measures teaching as students perceive it, not the curriculum. All ten items of each section are treated as one scale. Three experts in Agricultural Education, one in Soil Science and one in Measurement and Evaluation validated the instrument. Content validity indices from the five experts were satisfactory: item-level indices ranged from .80 to 1.00, and scale-level averages were .93 for Section B and .92 for Section C. After their comments, three items were reworded for clarity, the agroforestry item was widened to include tree integration, and one duplicate item was removed A pilot test with 30 Agricultural Education students outside the sampled states gave Cronbach alpha coefficients of .84 (Section B) and .88 (Section C). Alpha from 30 respondents is imprecise (Taber, 2018), so In the 237-respondent sample alpha was .86 for Section B and .89 for Section C, and no factor analysis was run.

3.6 Procedure and Ethics

Trained research assistants administered the questionnaire in class and retrieved it immediately. Permission was obtained in writing from the heads of department, and the study followed the ethical guidelines of the researcher's institution. Ethics approval is stated in the Declarations Participation was voluntary, respondents gave informed consent and no names were recorded on the forms. Assistants collected the forms in sealed envelopes, and no names or matriculation numbers were recorded

3.7 Data Analysis

Means below 2.50 were described as low, 2.50 to 2.99 as moderate and 3.00 and above as high; these researcher-set bands are descriptive only. For each scale the mean, the standard deviation of respondents' scale scores, a 95% confidence interval and the standardised difference from the scale midpoint of 2.50 ($d = (M - 2.50) \div SD$; Cohen, 1988; Lakens, 2013) are reported. One-sample *t*-tests tested Ho1 and Ho2. Pearson product moment correlation tested Ho3, with a confidence interval from the Fisher *z* transformation. One-way ANOVA tested Ho4, with Scheffé post hoc comparisons (Scheffé, 1953) and η^2 as the effect size. Homogeneity of variance was checked with Bartlett's test computed from the group variances. Skewness and kurtosis of both scales and of the college groups were within ±1, so the ANOVA assumptions were judged reasonable, and the test is robust to mild departures at these group sizes. All tests used the 0.05 level in SPSS.

4 Results and Discussion

4.1 Research Question 1 and H_{01}: Extent of Teaching

Table 3 shows that regenerative agriculture was taught to a moderate extent overall (grand mean = 2.60). Composting (3.10) and cover cropping (3.02) were rated high. Agroforestry (2.18), crop-livestock integration (2.22), biological pest and weed management (2.30), soil health assessment (2.40) and minimum tillage (2.48) fell below 2.50. The standard deviation of respondents' scale scores is 0.70, so the grand mean, 0.10 above the midpoint, has 95% CI [2.51, 2.69]; $t(236) = 2.20$, $p = .029$, $d = 0.14$. Ho1 was rejected, but the effect is small, so teaching is best described as moderate and only just above the midpoint.

Table **3**

Extent to which Regenerative Agriculture is Taught

S/N	Item	Mean	*SD*	Remark
1	Cover cropping and green manure practicals	3.02	0.78	High

S/N	Item	Mean	*SD*	Remark
2	Minimum or no-till farming practicals	2.48	0.86	Low
3	Composting and organic manure preparation	3.10	0.74	High
4	Crop rotation and diversification practicals	2.85	0.80	Moderate
5	Mulching and soil moisture conservation practicals	2.90	0.79	Moderate
6	Integrated crop-livestock systems	2.22	0.92	Low
7	Agroforestry and tree integration	2.18	0.94	Low
8	Soil health assessment and testing	2.40	0.90	Low
9	Biological pest and weed management	2.30	0.91	Low
10	Rainwater harvesting and efficient water use	2.55	0.85	Moderate
	Grand mean	**2.60**	**0.70**[a]	**Moderate**

[a] Standard deviation of respondents' scale scores. The mean of the ten item standard deviations is 0.85.

4.2 Research Question 2 and H_{02}: Sustainable Farming Competencies

Table 4 shows moderate competencies overall (grand mean = 2.82, 95% CI [2.74, 2.90]). The standard deviation of respondents' scale scores, derived from the total sum of squares in Table 7b, is 0.64, not the 0.78 obtained by averaging item standard deviations. The mean was 0.32 above the midpoint, $t(236) = 7.64$, $p < .001$, $d = 0.50$, a medium effect, so Ho2 was rejected. Students rated themselves highest in preparing compost (3.20), teaching sustainable practices (3.15), maintaining soil fertility with organic inputs (3.12) and planning rotations and intercropping (3.00), and lowest in integrating trees and livestock (2.35) and assessing soil health (2.45).

Table **4**

Level of Sustainable Farming Competencies

S/N	Item	Mean	*SD*	Remark
1	Maintain soil fertility and cover using organic inputs	3.12	0.70	High
2	Apply minimum or conservation tillage	2.60	0.80	Moderate
3	Plan crop rotations and intercropping	3.00	0.74	High
4	Prepare and use compost	3.20	0.69	High
5	Assess soil health using simple field indicators	2.45	0.86	Low
6	Manage pests and weeds with minimal synthetic chemicals	2.75	0.79	Moderate
7	Conserve water on the farm	2.70	0.81	Moderate
8	Integrate trees and livestock into cropping systems	2.35	0.88	Low
9	Keep farm records and compare costs and returns	2.88	0.77	Moderate
10	Teach sustainable farming practices to learners and farmers	3.15	0.72	High
	Grand mean	**2.82**	**0.64**[a]	**Moderate**

[a] Standard deviation of respondents' scale scores, $\sqrt{(98.00 \div 236)}$. The mean of the item standard deviations is 0.78.

Item-Level Correspondence between Teaching and Competence

Eight teaching items have a clear counterpart among the competence items (Table 5; the pairing is the author's judgement, and mulching, farm records and teaching others have none). Across these pairs the means correlate strongly ($r = .93$, Spearman $\rho = .86$), though with eight pairs this is a descriptive check, not a test. The two lowest-taught topics are also the

two lowest-rated competencies. The exception is pest and weed management, taught at a low level (2.30) but rated moderately competent (2.75).

Table **5**

Matched Teaching and Competence Means

Teaching item	Mean	Competence item	Mean	Competence minus teaching
Cover cropping and green manure	3.02	Maintain soil fertility using organic inputs	3.12	+0.10
Minimum or no-till farming	2.48	Apply minimum or conservation tillage	2.60	+0.12
Composting	3.10	Prepare and use compost	3.20	+0.10
Crop rotation	2.85	Plan rotations and intercropping	3.00	+0.15
Soil health assessment	2.40	Assess soil health	2.45	+0.05
Biological pest and weed management	2.30	Manage pests and weeds, minimal chemicals	2.75	+0.45
Rainwater harvesting	2.55	Conserve water on the farm	2.70	+0.15
Crop-livestock and agroforestry (mean of two items)	2.20	Integrate trees and livestock	2.35	+0.15

4.3 Research Question 3 and H_{03}: Relationship

Table 6 shows a moderate, significant positive relationship between regenerative agriculture education and sustainable farming competencies (r = .54, 95% CI [.44, .62], p < .001). The two scales share 29.2% of their variance, so Ho3 was rejected. The correlation was almost unchanged after controlling for level of study (partial r = .51, 95% CI [.41, .60]), so level of study does not explain it.

Table **6**

Relationship between Regenerative Agriculture Education and Sustainable Farming Competencies (Significant at p < 0.05)

Variables	*N*	*r*	95% CI	Shared variance (%)	*p*	Decision
Regenerative agriculture education and sustainable farming competencies	237	.54	[.44, .62]	29.2	< .001	Ho3 rejected

4.4 Research Question 4 and H_{04}: College Differences

Tables 7a to 7c show that competencies differed significantly across the five colleges, $F(4, 232) = 5.81$, $p < .001$, $\eta^2 = .09$, a medium effect, so Ho4 was rejected. Group standard deviations were similar (0.60 to 0.64), and Bartlett's test did not indicate unequal variances, $\chi^2(4) = 0.26$, $p = .99$. Means were highest in Ogun (3.00) and Oyo (2.98) and lowest in Osun (2.52). Scheffé comparisons (Table 7c) put the Osun college significantly below Ogun (difference = 0.48, $p = .003$) and Oyo (0.46, $p = .005$); the critical differences were 0.36 and 0.37. No other pair differed significantly.

Table **7a**:

Sustainable Farming Competencies by State

State	*N*	*M*	*SD*	95% CI
Oyo	58	2.98	0.62	[2.82, 3.14]

State	*N*	*M*	*SD*	95% CI
Ogun	62	3.00	0.60	[2.85, 3.15]
Osun	52	2.52	0.64	[2.34, 2.70]
Ondo	36	2.80	0.63	[2.59, 3.01]
Ekiti	29	2.66	0.61	[2.43, 2.89]

Table **7b**

One-Way ANOVA of Sustainable Farming Competencies by State (Significant at p < 0.05)

Source	Sum of squares	df	Mean square	*F*	*p*	Decision
Between groups	8.93	4	2.23	5.81	< .001	Ho4 rejected
Within groups	89.07	232	0.38			
Total	98.00	236				

$\eta^2 = 8.93 \div 98.00 = .09$.

Table **7c**

Scheffé Pairwise Comparisons of College Means

Pair (higher − lower)	Mean difference	Critical difference	*p*
Ogun − Osun*	0.48	0.36	.003
Oyo − Osun*	0.46	0.37	.005
Ogun − Ekiti	0.34	0.43	.207
Oyo − Ekiti	0.32	0.44	.275
Ondo − Osun	0.28	0.42	.364
Ogun − Ondo	0.20	0.40	.668
Oyo − Ondo	0.18	0.41	.759
Ondo − Ekiti	0.14	0.48	.936
Ekiti − Osun	0.14	0.45	.917
Ogun − Oyo	0.02	0.35	> .99

Note. A difference exceeding its critical difference is significant at the 0.05 level (marked with an asterisk).

5 Discussion

5.1 What is taught

Teaching is concentrated on cheap, farm-based practices such as composting and cover cropping, the kind that Oladimeji et al. (2020) and Kehinde et al. (2022) found smallholders already using. That suggests colleges teach what is easiest to demonstrate, though no farmer data were collected here, so this is an inference. Little time goes to trees, livestock and soil monitoring. Schreefel et al. (2020) place soil health at the base of regenerative agriculture, so the low score for soil health assessment matters most.

5.2 Competence and its limits

A moderate mean with a medium effect above the midpoint means students rate themselves as fairly, not strongly, able. Routine tasks were rated higher than integrative ones, as Omodara et al. (2025) found for South West students on applied

decisions. The high self-rating for teaching sustainable practices (3.15) needs caution: self-ratings reflect confidence (Bandura, 1997) and may overstate skill (Dunning et al., 2004), and a student who has never assessed soil on a real farm may still feel able to teach about it.

5.3 Teaching and competence

Students who reported more regenerative teaching rated themselves more competent, a result consistent with experiential learning theory (Kolb, 1984; Roberts, 2006), though correlation cannot confirm it. Prior farm experience, level of study, or a general tendency to answer positively could raise both scores (Podsakoff et al., 2003). The matched items in Table 5 support a link at topic level, but pest and weed management departs from it: competence (2.75) exceeds teaching (2.30) by 0.45. The competence item refers to using minimal synthetic chemicals, which students may do through farm experience, whereas the teaching item refers to biological methods that may be missing from the curriculum. Shared variance of 29.2% leaves most variation unexplained.

5.4 College differences

The Osun college scored about 0.75 pooled standard deviations below Ogun and Oyo, a large gap in practical terms. Because each state contributes one college, the result belongs to the sampled college and does not show a state effect. Farm access, supervision or local farming context may explain it, but none was measured. Kehinde et al. (2022) found that extension contact, schooling and farmer organisation membership shaped soil conservation in Oyo State, so a college's links with farmers may matter. The Osun college needs a local review of its practical programme, since a zone-wide remedy may not suit every college.

6 Limitations

Five limitations apply. Competence was self-rated, so it reflects confidence, not observed performance. Teaching was measured by perception, with no audit of the curriculum or NCCE minimum standards. Both scales came from the same respondents on one occasion, which allows common-method bias and prevents causal claims. One college per state was studied, college and state effects cannot be separated, and Lagos State was not covered, so the findings are not zone-wide estimates. Finally, the reliability pilot was small, and the item pairing in Table 5 rests on the author's judgement.

7 Conclusion and Recommendations

In the five colleges studied, regenerative agriculture was taught to a moderate extent, and students' self-rated sustainable farming competencies were moderate and above the scale midpoint (d = 0.50). Perceived teaching and competence were positively related. Both were weakest for agroforestry, crop-livestock integration and soil health. Competencies were lowest in the sampled Osun college. Given the limitations above, the following are recommended:

1. The NCCE, in its next review of NCE Agricultural Education minimum standards, should require practical units on agroforestry, crop-livestock integration and biological pest and weed management, which were taught least (Table 3).
2. Colleges should equip school farms and laboratories for simple soil health assessment and supervise students in it, because soil health was rated low for both teaching (2.40) and competence (2.45).
3. The sampled Osun college should review farm access and supervision of practical work, and the NCCE could include these in accreditation visits (Table 7c).
4. Before curriculum changes, the NCCE and colleges should audit what is actually taught on these topics, since teaching was measured here by perception.
5. Further studies should include Lagos State and more than one college per state, and should measure competence through observed performance rather than self-ratings.

8 Declarations

Ethics approval: Approved by [the research ethics committee of the researcher's institution; insert reference number].

Funding: The study received no external funding.

Conflict of interest: The author declares no conflict of interest.

Data availability: The anonymised data set is available from the corresponding author on reasonable request.

9 References

Abdullahi, A. G., Umar, S., Manuwa, A., Zakari, A., & Abubakar, A. A. (2025). Analysis of the factors influencing agricultural students' willingness to partake in agripreneurship in North-Western Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology, 5*(2A), 1–9.

Baker, M. A., Robinson, J. S., & Kolb, D. A. (2012). Aligning Kolb's experiential learning theory with a comprehensive agricultural education model. *Journal of Agricultural Education, 53*(4), 1–16. https://doi.org/10.5032/jae.2012.04001

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives, 8*, Article 1. https://doi.org/10.14507/epaa.v8n1.2000

Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment: Implications for health, education, and the workplace. *Psychological Science in the Public Interest, 5*(3), 69–106. https://doi.org/10.1111/j.1529-1006.2004.00018.x

Federal Republic of Nigeria. (2013). *National policy on education* (6th ed.). NERDC Press.

Giller, K. E., Hijbeek, R., Andersson, J. A., & Sumberg, J. (2021). Regenerative agriculture: An agronomic perspective. *Outlook on Agriculture, 50*(1), 13–25. https://doi.org/10.1177/0030727021998063

Kehinde, M. A., Akinola, A., Kehinde, A. D., & Ogundeji, A. A. (2022). Agricultural organizations and adoption of soil conservation practices among smallholder farmers in Oyo State, Nigeria. *Tropical and Subtropical Agroecosystems, 25*, Article 125.

Khangura, R., Ferris, D., Wagg, C., & Bowyer, J. (2023). Regenerative agriculture: A literature review on the practices and mechanisms used to improve soil health. *Sustainability, 15*(3), Article 2338. https://doi.org/10.3390/su15032338

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607–610. https://doi.org/10.1177/001316447003000308

LaCanne, C. E., & Lundgren, J. G. (2018). Regenerative agriculture: Merging farming and natural resource conservation profitably. *PeerJ, 6*, Article e4428. https://doi.org/10.7717/peerj.4428

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for *t*-tests and ANOVAs. *Frontiers in Psychology, 4*, Article 863. https://doi.org/10.3389/fpsyg.2013.00863

Newton, P., Civita, N., Frankel-Goldwater, L., Bartel, K., & Johns, C. (2020). What is regenerative agriculture? A review of scholar and practitioner definitions based on processes and outcomes. *Frontiers in Sustainable Food Systems, 4*, Article 577723. https://doi.org/10.3389/fsufs.2020.577723

Oladimeji, T. E., Oyinbo, O., Hassan, A. A., & Yusuf, O. (2020). Understanding the interdependence and temporal dynamics of smallholders' adoption of soil conservation practices: Evidence from Nigeria. *Sustainability, 12*(7), Article 2736. https://doi.org/10.3390/su12072736

Omodara, A. A., Balogun, B. I., Onwunali, M. R. O., & Hiikyaa, N. A. (2025). Comparative study of technical competencies acquired by agricultural education students in Colleges of Education in Nigeria. *International Journal of Scientific*

Research in Educational Studies & Social Development, 6(1), 22–34. https://doi.org/10.48028/iiprds/ijsressd.v6.i1.03

Omodara, A. A., Ndomi, B. M., & Mahmud, M. (2019). Comparative study of technical competencies acquired by agricultural education students of Federal and State Colleges of Education in Northwest Nigeria. *ATBU Journal of Science, Technology and Education, 7*(2), 60–68.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1), 17–29. https://doi.org/10.5032/jae.2006.01017

Roberts, T. G., & Ball, A. (2009). Secondary agricultural science as content and context for teaching. *Journal of Agricultural Education, 50*(1), 81–91. https://doi.org/10.5032/jae.2009.01081

Scheffé, H. (1953). A method for judging all contrasts in the analysis of variance. *Biometrika, 40*(1–2), 87–104. https://doi.org/10.1093/biomet/40.1-2.87

Schreefel, L., Schulte, R. P. O., de Boer, I. J. M., Schrijver, A. P., & van Zanten, H. H. E. (2020). Regenerative agriculture – the soil is the base. *Global Food Security, 26*, Article 100404. https://doi.org/10.1016/j.gfs.2020.100404

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education, 48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science, 6*(2), 203–218. https://doi.org/10.1007/s11625-011-0132-6

Publisher's Note

The views, interpretations, and conclusions expressed in this article are solely those of the author(s) and do not necessarily reflect the views or policies of the Journal of Studies in Science and Mathematics Education (JOSSME), its publisher, editorial board, editors, reviewers, or the authors' affiliated institutions. The publisher remains neutral with respect to jurisdictional claims in published maps, institutional affiliations, and other representations. Any products, materials, methods, or manufacturers mentioned or evaluated in this article are presented solely for scholarly purposes and do not constitute endorsement, recommendation, or guarantee by the publisher.