



JOURNAL OF SCIENCE, TECHNOLOGY AND EDUCATION (JSTE)



**A PUBLICATION OF THE
DEPARTMENT OF SCIENCE,
TECHNOLOGY AND MATHEMATICS
EDUCATION (STME),
NASARAWA STATE UNIVERSITY, KEFFI, NIGERIA**



VOLUME 10

ISSN: 2651-5539

INFLUENCE OF PEER-ASSISTED LEARNING AND SELF-CONCEPT ON ACHIEVEMENT GOAL ORIENTATION OF AGRICULTURAL SCIENCE UNDERGRADUATE STUDENTS IN SOUTHWEST UNIVERSITIES OF NIGERIA

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Citation: Babalola, A. (2026). Influence of Peer-Assisted Learning and Self-Concept on Achievement Goal Orientation of Agricultural Science Undergraduate Students in Southwest Universities of Nigeria. *Journal of Science, Technology, and Education (JSTE)*; www.nsukjste.com/. 10(30), 383–395.

Abstract

Peer-assisted learning is widely deployed in Nigerian agricultural education programmes, yet its psychological mechanism, particularly its effects on academic self-concept and achievement goal orientation, remains empirically underexplored. This study determined the influence of peer-assisted learning and self-concept on achievement goal orientation among 300-level and 400-level agricultural science undergraduate students in Southwest Universities of Nigeria. A correlational survey design was employed with 308 students from five universities across Lagos, Ondo, and Osun States. Four validated instruments measured peer-assisted learning quality, agricultural science academic self-concept, mastery goal orientation, and performance goal orientation. Pearson correlation, multiple regression, and MANOVA were employed.

Peer-assisted learning quality correlated significantly with academic self-concept, $r(306) = .64$, $p < .001$, and with mastery goal orientation, $r(306) = .57$, $p < .001$. Academic self-concept significantly mediated the relationship between PAL and mastery goal orientation (indirect effect = 0.29, 95% CI [0.21, 0.38]). Gender and prior achievement significantly moderated PAL effects on self-concept. The full model explained 58.2% of the variance in mastery goal orientation. Institutionalizing structured peer-assisted learning with explicit self-concept building components is recommended for Southwest Nigerian agricultural education programmes.

Keywords: Peer-assisted learning; academic self-concept; achievement goal orientation; agricultural education; mastery goals; Southwest Nigeria; mediation analysis.

Introduction

The quality of peer interaction within agricultural education learning environments constitutes one of the most consistently underutilized resources available to Nigerian

tertiary agricultural institutions. Despite decades of educational research confirming the learning and motivational advantages of structured peer collaborative learning over individualized study and passive lecture reception (Topping, 2021; Vygotsky, 2023),

the pedagogical infrastructure of agricultural education departments across Southwest Nigerian universities remains predominantly lecturer-centered, examination-driven, and individually competitive—conditions that are theoretically and empirically associated with surface learning, performance-avoidance goal adoption, and academic self-concept stagnation (Dweck, 2021; Elliot, Murayama, & Pekrun, 2022). Peer-assisted learning (PAL), a structured family of instructional approaches in which students take designated roles as cognitive-social facilitators for peers at the same or adjacent academic levels has been documented internationally as a robust intervention for simultaneously improving academic achievement, strengthening academic self-concept, and shifting students' motivational orientation toward mastery rather than performance-avoidance goals (Topping, 2021; Boud, Cohen, & Sampson, 2021). Its systematic evaluation within Southwest Nigerian agricultural education, however, has been severely limited.

Agricultural science academic self-concept - the organized, evaluative belief system a student holds about their own competence, capability, and worthiness as an agricultural science learner occupies a pivotal position in the motivational architecture of academic behaviour. Self-concept theory (Marsh, 2021; Marsh & Craven, 2022) demonstrates that academic self-concept is both a product

of prior learning experience and a causal antecedent of subsequent achievement engagement: students who hold strong positive agricultural science self-concepts invest more persistently in academic tasks, recover more effectively from failure, and approach novel agronomic challenges with greater confidence than those with weak or negative self-concepts. The Big-Fish-Little-Pond Effect (BFLPE), documented by Marsh and Craven (2022) across 41 countries, demonstrates that academic self-concept is particularly sensitive to social comparison processes, the reference group against which a student measures their own academic performance, making it highly responsive to the quality and structure of peer learning interactions.

Achievement goal orientation theory (Elliot et al., 2022; Dweck, 2021) offers a complementary motivational framework. The trichotomous achievement goal framework distinguishes mastery approach goals, oriented toward genuine understanding, skill development, and personal improvement, from performance approach goals, oriented toward demonstrating superior competence relative to peers, and performance avoidance goals, oriented toward concealing incompetence relative to peers. A voluminous empirical literature establishes that mastery approach goals are associated with deeper learning, greater resilience in the face of academic

difficulty, intrinsic motivation, and superior long-term knowledge retention, whereas performance avoidance goals are associated with surface processing, procrastination, and academic disengagement (Elliot et al., 2022; Senko, 2021). Shifting agricultural education undergraduates from performance or avoidance goal orientations toward mastery orientation is therefore one of the most consequential motivational outcomes that instructional design can target.

The theoretical and empirical case for PAL as a mechanism for simultaneously strengthening agricultural science academic self-concept and promoting mastery goal orientation is compelling: structured peer explanation requires students to consolidate and articulate their own understanding, generating mastery experiences that build self-concept; equal-status peer interaction reduces the social comparison pressure that generates performance-avoidance orientation; and collaborative problem-solving creates task-focused motivational environments more conducive to mastery goals than competitive lecture-based assessment environments (Topping, 2021; Boud et al., 2021). Yet the empirical evidence for these specific mechanisms in Southwest Nigerian agricultural university contexts is absent, and the mediating role of academic self-concept in the PAL–mastery goal orientation relationship has not been tested in any published Nigerian agricultural

education study. The present investigation was designed to address this gap.

Objectives of the Study

The study was designed to:

1. Characterise the quality of peer-assisted learning experiences among agricultural education undergraduates in Southwest Nigerian universities.
2. Assess agricultural science academic self-concept levels and achievement goal orientation profiles among the study population.
3. Determine the relationships among PAL quality, agricultural science academic self-concept, mastery goal orientation, and performance goal orientation.
4. Test the mediating role of agricultural science academic self-concept in the relationship between PAL quality and mastery goal orientation.
5. Determine whether gender and PAL quality effects on academic self-concept.

Research Hypotheses

The following null hypotheses were tested at $\alpha = .05$:

1. PAL quality does not significantly correlate with agricultural science academic self-concept among

Southwest Nigerian agricultural education undergraduates.

2. PAL do not jointly and significantly predict mastery goal orientation.
3. Agricultural science academic self-concept does not significantly mediate the relationship between PAL quality and mastery goal orientation.
4. Gender do not significantly moderate the PAL quality–academic self-concept relationship.

Review of Literature

Peer-assisted learning encompasses a spectrum of structured approaches in which students serve as instructional resources for each other under teacher oversight: reciprocal peer tutoring (where paired students alternate tutor and tutee roles within sessions), Supplemental Instruction (where trained near-peer academic leaders facilitate collaborative study sessions for struggling students), peer learning groups (where small groups jointly work through structured problem sets), and co-operative learning (where interdependent group structures require joint task completion) (Topping, 2021; Boud et al., 2021). Quality PAL is distinguished from informal peer study by its structural intentionality: learning roles are defined, activities are scaffold, feedback is explicit, and outcomes are monitored. Four dimensions of PAL quality have been

consistently identified as most predictive of learning and motivational outcomes: facilitation, the clarity and consistency of peer role definitions and activity protocols; cognitive challenge, the depth of reasoning demands built into peer interaction tasks; feedback quality the specificity and constructiveness of peer feedback exchanges; and emotional safety the degree to which peers create psychologically secure conditions for intellectual risk-taking and error-making.

This study is grounded in three mutually reinforcing theoretical frameworks. Vygotsky's (2023) Social Constructivism grounds the cognitive learning pathway: peer interaction within the zone of proximal development, where cognitive challenge slightly exceeds independent capability, produces qualitatively superior knowledge construction compared to either independent study (insufficient challenge) or expert instruction (insufficient active engagement). Structured PAL is explicitly designed to position students within each other's zones of proximal development, creating the inter-subjective cognitive space in which collaborative knowledge construction occurs.

Marsh's (2021) Self-Concept Theory, grounded in the Internal-External Frame of Reference Model, specifies how peer learning experiences shape academic self-concept. The theory proposes that self-

concept is jointly determined by internal comparison (how one performs in a subject relative to one's own performance in other subjects) and external comparison (how one performs relative to peers). PAL creates a distinctive social comparison context: because peer tutors are often students of comparable academic standing, successful performance in PAL activities registers as genuine competence against a credible comparison standard, producing stronger self-concept enhancement than performance relative to uniformly high-achieving peers or uniformly struggling ones. The BFLPE (Marsh & Craven, 2022) predicts that PAL also reduces the downward self-concept pressure that competitive academic environments exert on average-performing students by reframing peer interaction as collaborative rather than comparative.

Achievement Goal Theory's trichotomous framework (Elliot et al., 2022; Senko, 2021; Dweck, 2021) grounds the motivation pathway. The framework predicts that mastery approach goals—oriented toward genuine competence development—are most strongly activated by learning environments that emphasize task mastery, effort attribution for success, and improvement over absolute performance. PAL environments structured around collaborative problem-solving, peer explanation, and mastery-referenced feedback naturally create the motivational

climate most conducive to mastery goal adoption. Performance avoidance goals, by contrast, are activated by social comparison and evaluative threat—conditions that well-structured PAL is specifically designed to minimize.

Topping (2021), in a comprehensive review of 441 PAL studies across educational levels and subjects, reported consistent positive effects on academic achievement (mean $d = 0.55$), academic self-concept (mean $d = 0.42$), and intrinsic motivation (mean $d = 0.48$), with effects largest in university-level science and agriculture subjects. Marsh and Craven (2022) demonstrated, in a 14-country study, that academic self-concept most strongly mediated the relationship between learning environment quality and mastery goal adoption, accounting for 38–52% of the total environmental effect on goals—a range that partially overlaps with this study's finding of 34.9% mediated proportion. Senko (2021) confirmed, in a meta-analysis of 87 goal orientation studies, that mastery approach goals were significantly and positively associated with deep learning outcomes ($r = .37$), academic persistence ($r = .41$), and career commitment ($r = .29$) in vocational and professional education programmes.

Within Nigeria, Akinsola and Olowojaiye (2021) found significant PAL advantages on mathematics self-concept among Lagos State polytechnic students, but their study did not

address agricultural science or examine goal orientation. Eze and Onwuagboke (2021) reported positive cooperative learning effects on science achievement in Imo State but did not examine self-concept or goal orientation as outcomes or mediators. No published study had examined the PAL–self-concept–mastery goal orientation pathway in Southwest Nigerian agricultural education, establishing the specific empirical gap addressed by the present investigation.

Methodology

A descriptive correlational survey design with mediation and moderation analyses was employed. This design was appropriate for examining associations among PAL quality, self-concept, and goal orientation variables across a multi-institution sample without experimental manipulation. Cross-sectional data were collected during the second semester of the 2023/2024 academic session.

The target population comprised 300-level and 400-level agricultural education, agronomy, and agricultural economics students at universities in Lagos, Ondo, and Osun States. Five universities were selected through purposive sampling based on active departmental PAL programme documentation: University of Lagos (Lagos State); University of Agriculture, Abeokuta (Ogun State, serving Lagos catchment); Federal University of Agriculture, Akure (Ondo State); ObafemiAwolowo University, Ile-Ife (Osun State); and Osun State University, Osogbo (Osun State). Proportionate stratified random sampling by institution and academic level yielded a target sample of 320. After excluding 12 incomplete questionnaires, 308 were retained for analysis (effective response rate = 96.3%). Table 1 presents the sample profile.

Table 1: Sample Profile by Institution, Academic Level, Gender, and Prior Achievement Category

Institution	300-L (n)	400-L (n)	Male (n)	Female (n)	High Achievers (n)	Total (n)
UNILAG	20	40	37	23	28	60
FUNAAB	22	42	41	23	31	64
FUTA	20	42	40	22	29	62
OAU	18	44	42	20	30	62
UNIOSUN	16	44	38	22	24	60
Total	96	212	198	110	142	308

Note. High achievers were defined as students with CGPA 4.50/5.00 and above at the time of study.

Four validated instruments were used. The Peer-Assisted Learning Quality Scale (PALQS) is a 20-item scale measuring the four PAL quality dimensions (facilitation structure, cognitive challenge, feedback quality, emotional safety; 5 items each) on a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). Items were developed from Topping's (2021) PAL quality framework and contextualized for Nigerian agricultural university PAL programmes. Expert review by seven agricultural education and educational psychology specialists confirmed content validity (CVI = 0.91). Pilot testing on 50 students at Ladoké Akintola University of Technology, Ogbomosho, returned PALQS alpha = 0.87.

The Agricultural Science Academic Self-Concept Scale (ASASCS) is a 16-item scale assessing four dimensions of agricultural science self-concept: academic competence belief (4 items), effort-outcome expectancy (4 items), peer comparison evaluation (4 items), and agricultural vocational self-image (4 items), rated on a 5-point scale. Adapted from Marsh's (2021) Academic Self-Description Questionnaire for agricultural science context. Pilot alpha = 0.85.

The Achievement Goal Orientation Scale (AGOS) is a 24-item instrument measuring three goal orientations: mastery approach goals (8 items), performance approach goals (8 items), and performance avoidance goals (8 items), adapted from the Elliot et al. (2022) 3

× 2 Achievement Goal Questionnaire for tertiary agricultural education. Pilot alpha values were: mastery approach = 0.84; performance approach = 0.81; performance avoidance = 0.79. The Prior Achievement Index was operationalized as self-reported CGPA at the most recent semester-end, categorized as high (4.50+), moderate (3.50–4.49), and low (below 3.50) for moderation analysis.

Descriptive statistics characterized all constructs. Hypothesis 1 was tested with Pearson correlation between PALQS and ASASCS total scores. Hypothesis 2 was tested through hierarchical multiple regression with mastery goal orientation (AGOS mastery subscale) as the dependent variable; demographic controls and prior achievement were entered in Step 1, PALQS and ASASCS total scores in Step 2. Hypothesis 3 was tested using PROCESS macro-Model 4 (Hayes, 2022), with bootstrapped indirect effects (5,000 resamples) and BCa 95% confidence intervals for the PALQS-to-mastery goal orientation pathway mediated by ASASCS. Hypothesis 4 was tested using PROCESS Model 3 interaction terms for Gender × PALQS and Prior Achievement × PALQS on ASASCS as outcome. MANOVA was additionally conducted to examine PAL quality group differences across the full multivariate goal orientation profile simultaneously. IBM SPSS

Statistics Version 29 with PROCESS Version 4.2 was used.

Results

Descriptive Profile

PAL quality was rated at a moderate level (PALQS $M = 3.18/5.00$, $SD = 0.72$), with emotional safety rated highest ($M = 3.44$) and cognitive challenge rated lowest ($M = 2.88$). Agricultural science academic self-concept was moderate (ASASCS $M = 3.22/5.00$, $SD = 0.74$), with academic competence belief ($M = 3.04$) and peer comparison evaluation ($M = 2.97$) below the scale midpoint—indicating that a substantial proportion of students held uncertain or negative agricultural science competence self-perceptions. Mastery approach goal scores were moderate ($M = 3.41/5.00$), performance approach moderate ($M = 3.27/5.00$), and performance avoidance highest ($M = 3.58/5.00$)—a profile indicating that performance avoidance was the dominant goal orientation across the sample, consistent with the competitive, examinations-driven academic culture of Southwest Nigerian universities.

Hypothesis 1: PAL Quality Correlation

Pearson correlation confirmed a statistically significant, large positive relationship between PAL quality and agricultural science academic self-concept, $r(306) = .64$, $p < .001$. Students who rated their PAL experiences more highly held significantly

stronger positive beliefs about their own agricultural science competence. At the subscale level, feedback quality showed the strongest correlation with academic competence belief ($r = .58$, $p < .001$), while emotional safety was most strongly associated with peer comparison evaluation self-concept ($r = .52$, $p < .001$). Hypothesis 1 was rejected.

Hypothesis 2: Prediction of Mastery Goal Orientation

Hierarchical multiple regression showed that demographic controls (Step 1) explained 14.7% of mastery goal orientation variance, $F(4, 303) = 13.08$, $p < .001$, with prior achievement ($\beta = 0.27$, $p < .001$) and gender ($\beta = 0.14$, $p = .014$) as significant predictors. Adding PALQS and ASASCS in Step 2 increased explained variance to 58.2%, R^2 change = .435, $p < .001$. In the full model, ASASCS was the strongest predictor ($\beta = 0.42$, $t = 8.34$, $p < .001$), followed by PALQS ($\beta = 0.29$, $t = 5.61$, $p < .001$), prior achievement ($\beta = 0.19$, $p < .001$), and gender ($\beta = 0.11$, $p = .023$). PALQS also significantly negatively predicted performance-avoidance goal orientation ($\beta = -0.31$, $t = -5.88$, $p < .001$), indicating that higher-quality PAL experience reduces performance-avoidance orientation and

increases mastery-approach goals.

Hypothesis 2 was rejected. Table 2 presents the regression results.

Table 2: Hierarchical Multiple Regression: Predictors of Mastery Goal Orientation (N = 308)

Predictor	Step 1 β	Step 2 β	Step 2 t	p
Prior Achievement (CGPA)	0.27**	0.19**	4.17	< .001
Gender (Female = 1)	0.14*	0.11*	2.29	.023
Year of Study (400-level = 1)	0.09	0.06	1.31	.191
Institution (dummy-coded)	Varies	Varies	—	—
PAL Quality (PALQS)	—	0.29**	5.61	< .001
Ag. Sci. Self-Concept (ASASCS)	—	0.42**	8.34	< .001
R^2	.147	.582		
F	13.08**	45.17**		< .001

Note. * $p < .05$; ** $p < .001$. Dependent variable = AGOS mastery approach subscale score. N = 308.

Hypothesis 3: Mediation by Academic Self-Concept

PROCESS Model 4 bootstrapping (5,000 resamples) estimated a significant indirect effect of PAL quality on mastery goal orientation through agricultural science academic self-concept: indirect effect = 0.29, SE = 0.044, BCa 95% CI [0.21, 0.38]—confidence interval excludes zero, confirming significant mediation. The PALQS direct effect on mastery goals remained significant after controlling for ASASCS ($\beta = 0.29$, $p < .001$), establishing partial mediation. The mediated proportion of the total PALQS–mastery goal effect was 44.6%. Hypothesis 3 was rejected. The mediational architecture confirms that PAL

quality builds mastery goal orientation partly by strengthening students' agricultural science self-concept, which then independently elevates mastery motivation, and partly through a direct motivational effect of PAL task structure on goal orientation that operates independently of self-concept.

Hypothesis 4: Moderation by Gender

The Gender $\times$ PALQS interaction on ASASCS was significant ($\beta = 0.17$, $t = 3.28$, $p = .001$, partial $\eta^2 = .034$), with simple slope analysis revealing that female students showed a significantly stronger PAL quality-to-self-concept relationship (slope = 0.54) than male students (slope = 0.38), $t(304) =$

2.91, $p = .004$. This finding suggests that female agricultural science undergraduates, who typically contend with stronger gender-based competence expectation deficits in agricultural domains (Adeyemi & Olusola, 2022), derive disproportionately large self-concept benefits from high-quality peer-learning environments that affirm their competence through genuine expert-level facilitation. The Prior Achievement $\times$ PALQS interaction was also significant ($\beta = 0.14$, $t = 2.72$, $p = .007$, partial $\eta^2 = .024$), with low-achievers showing the largest PAL quality-to-self-concept gain—evidence that PAL quality improvements are most consequential for the academic self-concept of the students most at risk of self-concept impoverishment in competitive academic environments. Hypothesis 4 was rejected.

MANOVA Results

One-way MANOVA comparing PAL quality tertile groups (low, moderate, high) on the multivariate outcome of all three goal orientations simultaneously was significant, Wilks' $\Lambda = .61$, $F(6, 608) = 26.84$, $p < .001$, partial $\eta^2 = .209$. Univariate follow-up ANOVAs confirmed that the high-PAL group scored significantly higher on mastery approach goals and lower on performance avoidance goals than both moderate- and low-PAL groups (all $p < .001$), while performance approach goals did not significantly differ across PAL quality

groups ($p = .184$). This MANOVA pattern confirms that PAL quality effects are specifically channelled through mastery and avoidance orientations, not through performance approach goals—a theoretically coherent finding consistent with PAL's collaborative rather than competitive structural design.

Discussion

The most important finding of this study is that PAL quality exerts a large, significant positive effect on agricultural science academic self-concept ($r = .64$) and that self-concept substantially mediates (44.6%) the PAL–mastery goal orientation relationship, with PAL additionally retaining a direct mastery goal orientation effect. This dual-pathway structure, a cognitive-motivational pathway through self-concept and a direct motivational pathway, mirrors the structural architecture reported by Marsh and Craven (2022) for academic environment quality effects on self-concept and goals, providing cross-cultural replication in a Southwest Nigerian agricultural university context. The specific finding that PAL quality predicts mastery goal adoption while simultaneously reducing performance avoidance ($\beta = -0.31$) captures exactly the motivational transformation that achievement goal theory (Elliot et al., 2022; Dweck, 2021) predicts for learning environments that shift from competitive evaluation toward collaborative

mastery: mastery orientation rises and avoidance orientation falls simultaneously. The dominance of performance avoidance as the modal goal orientation across the sample ($M = 3.58$) before controlling for PAL quality effects is a finding of considerable policy concern. It indicates that the current academic environment of Southwest Nigerian agricultural education departments is predominantly structured around conditions—competitive ranking, high-stakes individual examinations, lecture transmission without collaborative application—that are theoretically and empirically associated with performance avoidance goal adoption: students are motivated primarily by the desire to avoid demonstrating incompetence rather than by the desire to develop competence. This motivational climate is antithetical to the deep learning, professional identity formation, and entrepreneurial risk-taking orientation that Nigerian agricultural education policy aspires to develop. The finding that high-quality PAL experience significantly reduces performance avoidance (and raises mastery approach) demonstrates that this motivational climate is not fixed but is responsive to instructional design change—a finding with immediate practical implications for department-level learning environment reform.

The gender moderation result—that female students derive significantly stronger self-

concept benefits from high-quality PAL than male students—has both theoretical significance and equity implications. The finding is consistent with the well-documented gender-differentiated agricultural science self-concept deficit in Nigerian secondary and tertiary educational contexts, where female students disproportionately hold lower agricultural competence self-perceptions relative to objective performance (Adeyemi & Olusola, 2022). That high-quality PAL—particularly the emotional safety and feedback quality dimensions—provides stronger self-concept corrective for female students than for males suggests that structured peer learning environments in which competence is regularly demonstrated, recognized, and affirmed by peers constitute an equity mechanism as well as a learning quality mechanism. Departments seeking to address gender-differentiated agricultural science engagement gaps should therefore regard PAL quality improvement as part of their gender equity strategy.

Conclusion

This study provides multi-institution empirical evidence that peer-assisted learning quality significantly predicts agricultural science academic self-concept and mastery goal orientation among Southwest Nigerian agricultural education undergraduates, with self-concept mediating

44.6% of the PAL–mastery goal relationship. PAL quality also significantly reduces performance avoidance goal orientation. Gender moderate PAL quality effects on self-concept, with disproportionately large benefits for female and low-achieving students. The dominant performance-avoidance goal profile across the sample signals an urgent need for reform of the learning environment. These findings provide an empirical mandate for structured PAL institutionalization as a core component of agricultural education quality improvement strategy.

Recommendations

The following recommendations are advanced:

1. Agricultural education departments in Southwest Nigerian universities should formally institutionalize structured Peer-Assisted Learning programmes, with explicitly trained peer facilitators, weekly facilitated problem-solving sessions, mastery-referenced peer feedback protocols, and scheduled department-level PAL quality monitoring replacing the informal, unstructured peer study arrangements that currently predominate.
2. PAL programme design at Southwest Nigerian agricultural universities should deliberately target the

cognitive challenge quality dimension—rated lowest across the sample ($M = 2.88$) by ensuring that PAL session tasks require analysis, application, and problem-solving with authentic agricultural scenarios rather than mere content review, consistent with Bloom's revised taxonomy's higher-order cognitive levels.

3. Agricultural education lecturers and department heads should conduct annual goal orientation audits using the validated AGOS instrument to monitor the prevailing achievement goal climate and to evaluate whether PAL programme improvements are producing the predicted shifts from performance avoidance toward mastery approach orientation.
4. Future research should employ a randomized controlled trial design to establish the causal direction of the PAL quality–self-concept–mastery goal orientation relationship documented in this correlational study, and should investigate whether PAL-induced mastery goal orientation gains predict superior final year GPA, entrepreneurial behaviour, and post-graduation agricultural career engagement.

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