GLOBAL EDUCATIONAL RESEARCH REVIEW
Vol. 2 Issue 1, 2025, pp. 57-69
https://doi.org/10.71380/GERR-08-2025-50

Integrating Problem-Based Learning with Ulul Albab Values to Enhance Cognitive and Character Outcomes in Introductory Accounting: A Mixed-Methods Study

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Abstract

Purpose – This study tests whether Problem-Based Learning integrated with Ulul Albab values (PBL-UA) improves cognitive attainment in Introductory Accounting 2 and explicates how character values are internalized across PBL cycles—evidence relevant to Indonesia's human-capital agenda toward Golden Indonesia 2045.

Methods/Design/Approach – Sequential explanatory mixed-methods (QUAN→qual) with a quasi-experimental, non-equivalent control pretest–posttest in two intact classes at UIN Maulana Malik Ibrahim (n = 52; 26/26). The experimental class completed five PBL cycles over eight meetings using MSME rading-company cases; the control received conventional instruction. Cognitive performance came from an authentic accounting-cycle task scored by two independent raters (analytic rubric). Assumptions were checked; an independent-samples t-test examined group differences. Qualitative data (artifacts, reflections, interviews) were analyzed via directed content analysis aligned to the four Ulul Albab pillars and integrated through joint displays..

Findings – The experimental class outperformed the control on the posttest (M = 83.65 vs 76.42; mean difference = 7.23). The t-test indicated a significant advantage for PBL-UA with assumptions satisfied (Shapiro–Wilk p > .05; Levene's F = 3.415, p = .071). Qualitative evidence showed consistent internalization of discipline, cooperation, ethical accountability in recording "every rupiah," communication ethics, tolerance, emotion regulation, and reflective decision-making across the five cycles.

Originality/Value – Adds comparative evidence in Indonesian accounting education and explicates a value → process → artifact → outcome mechanism linking Ulul Albab to attainment; findings are bounded by non-random class assignment ad online delivery during the pandemic.

Practical Implications – Adopt five-cycle PBL with MSME cases, analytic rubrics and staged feedback, just-in-time Excel micro-tutorials (e.g., SUMIF, VLOOKUP), rotating roles with equitable presentations, and simple spreadsheet audit trails to strengthen accountability and accuracy.

Keywords Problem-based learning, accounting education, cognitive achievement, ulul albab, mixed-methods.

Paper type Research paper

Article History

Received	15 November 2024
Revised	7 February 2025
	28 May 2024
	9 July 2025
Accepted	14 August 2025

1. Introduction

The trajectory of Golden Indonesia 2045 is strongly influenced by the millennial generation, which at that time will be entering the peak of productive age (Jati, 2015). The 2020–2030 period is projected to be the second demographic dividend—an opportunity that yields positive effects only if the quality of human resources (SDM) is improved systematically (Heryanah, 2015; Jati, 2015). The Golden Indonesia 2045 agenda emphasizes democracy, the rule of law, educational emancipation, health access, entrepreneurship, maritime leadership, and poverty alleviation; collectively, these demand higher education that produces graduates capable of solving complex problems while also being of character (Kemsetneg, 2019). The shift from teacher-centered teaching to active and meaningful learning therefore becomes a necessity (Gasperz, 2015; Kumalawati, 2018).

Problem-based learning (PBL) is a constructivism-based approach that places students in authentic problem-solving situations to acquire knowledge, skills, and critical thinking (Filho & Calado, 2013; Kumalawati, 2018; Murniati & Hermawan, 2018; Stanley & Marsden, 2012). In accounting education, PBL has been reported to increase interest, procedural knowledge, and learning motivation (Gasperz, 2015; Wyness & Dalton, 2018), and it is relevant for mastery of the accounting cycle, including in the context of MSMEs in merchandising firms (Pramitha & Wahjudi, 2020; Titisari et al., 2013; Tortorella & Cauchick-Miguel, 2018).

On the values side, the Ulul Albab framework—which integrates dhikr, fikr, and shalih—is operationalized through four pillars: spiritual depth, moral nobility, breadth of knowledge, and professional maturity (Azis, 2012). Etymologically, Ulul means to possess and al-albāb refers to intellect; together they depict learned persons whose intelligence is guided by conscience and environmental sensitivity (Khaerani, 2014). The Qur'anic emphasis on this concept affirms the role of knowledge and virtue in shaping excellent persons (Khaerani, 2014; Qodratulloh, 2016). Mainstreaming of values is needed to respond to student behaviors misaligned with Islamic ethics and social norms, such as gadget addiction and inattention (Azis, 2012; Munir, 2018; Suprayogo, 2005).

Consistently, the literature finds that PBL increases creativity (Filho & Calado, 2013), competence and learning performance (Gasperz, 2015; Khotimah et al., 2018; Kumalawati, 2018; Murniati & Hermawan, 2018; Pramitha & Wahjudi, 2020; Titisari et al., 2013; Tortorella & Cauchick-Miguel, 2018), bridges the classroom with the real world (Murniati & Hermawan, 2018), and strengthens questioning, problem-solving, and collaboration abilities (Stanley & Marsden, 2012; Tortorella & Cauchick-Miguel, 2018). In the accounting domain, a case-based approach encourages the application of concepts to authentic tasks and accountable recording practices (Gasperz, 2015; Pramitha & Wahjudi, 2020; Wyness & Dalton, 2018). On the other hand, the four pillars of Ulul Albab provide operational character outputs for instructional design (Azis, 2012; Qodratulloh, 2016).

Although the benefits of PBL are documented, there remain limitations relevant to the context of this study: (1) the focus of many studies on cognitive outcomes without systematically examining the internalization of character values within the PBL flow; (2) the scarcity of studies that explicitly integrate Ulul Albab into Introductory Accounting in higher education while linking quantitative findings with qualitative explanations; and (3) the context of Indonesian accounting students—particularly in religious higher-education environments—remains underrepresented in comparative PBL studies (Azis, 2012; Gasperz, 2015; Kumalawati, 2018; Murniati & Hermawan, 2018; Pramitha & Wahjudi, 2020; Qodratulloh, 2016; Stanley & Marsden, 2012; Titisari et al., 2013; Tortorella & Cauchick-Miguel, 2018; Wyness & Dalton, 2018).

Building on the above limitations, this study targets three gaps: the evidence/empirical gap (the scarcity of comparative evidence after the posttest of PBL integrated with Ulul Albab vs conventional instruction in Introductory Accounting), the methodological gap (the rarity of sequential explanatory mixed-methods designs that connect cognitive effects with the mechanisms of value internalization across five PBL cycles), and the population gap (limited representation of the context of Indonesian accounting students) (Azis, 2012;

Gasperz, 2015; Khotimah et al., 2018; Kumalawati, 2018; Murniati & Hermawan, 2018; Pramitha & Wahjudi, 2020; Qodratulloh, 2016; Stanley & Marsden, 2012; Titisari et al., 2013; Tortorella & Cauchick-Miguel, 2018; Wyness & Dalton, 2018).

Addressing these gaps, this study is designed with a sequential explanatory mixed-methods approach in two intact classes—the experimental class (PBL-UA) and the control class (conventional)—and traces the process of planning–implementation–observation–feedback–reflection to link differences in posttest achievement with indicators of value internalization identified from student artifacts, reflections, and interviews.

RQ1 (Quantitative). Do students in the experimental class (PBL-UA) achieve higher posttest scores in introductory accounting competencies than students in the control class (conventional) in a pretest–posttest design?
H1. PBL-UA students show higher average posttest scores than the control class in the competency of preparing financial statements (Filho & Calado, 2013; Gasperz, 2015; Khotimah et al., 2018; Kumalawati, 2018; Murniati & Hermawan, 2018; Pramitha & Wahjudi, 2020; Stanley & Marsden, 2012; Titisari et al., 2013; Tortorella & Cauchick-Miguel, 2018; Wyness & Dalton, 2018).
RQ2 (Qualitative). How are the Ulul Albab values—spiritual depth, moral nobility, breadth of knowledge, and professional maturity—internalized across five PBL cycles, with character indicators identified from student task artifacts, reflections, and interviews (Azis, 2012; Qodratulloh, 2016; Suprayogo, 2005)?

Theoretically, this study enriches evidence on the effectiveness of PBL in accounting cognitive competencies while advancing understanding of the mechanisms of character internalization based on Ulul Albab within the PBL flow (Azis, 2012; Khaerani, 2014; Qodratulloh, 2016; Stanley & Marsden, 2012). Practically, the findings offer an Introductory Accounting learning design that balances cognitive and character outcomes, relevant for accounting lecturers and curriculum policymakers (Gasperz, 2015; Pramitha & Wahjudi, 2020; Wyness & Dalton, 2018), and support the agenda of improving SDM quality toward Golden Indonesia 2045 (Heryanah, 2015; Jati, 2015; Kemsetneg, 2019). Empirically, this study describes the process of value internalization at each PBL phase as recorded in artifacts, reflections, and interviews, thereby helping to explain the cognitive outcomes shown in the posttest.

2. Methods

2.1. Design and Setting

We employed a sequential explanatory mixed-methods design (QUAN→qual). The quantitative component used a quasi-experimental, non-equivalent control group pretest–posttest design with two intact classes in Introductory Accounting 2 during the 2021/2022 even semester at UIN Maulana Malik Ibrahim. Class C was assigned as the experimental class (Problem-Based Learning with Ulul Albab values; PBL-UA) and Class D as the control class (conventional instruction). Assignment occurred at the class (cluster) level. The experimental class followed five PBL cycles adapted from Kumalawati (2018): planning, implementation, observation, feedback, and reflection, delivered across eight meetings (weeks 1–8).

2.2. Participants

Fifty-two undergraduates participated (experimental n = 26; control n = 26). Inclusion criterion: enrollment in Introductory Accounting 2 in the same semester. Exclusion criterion: absence from ≥25% of class sessions. Baseline equivalence was assessed using pretest scores (descriptives and tests reported in the Results). Because assignment was at

the class level, potential selection bias is acknowledged as an inherent limitation of the design.

2.3. Intervention (PBL-UA) and Control Condition

Experimental (PBL-UA). Instruction followed five structured PBL cycles. Learning materials were organized into four trading-company accounting modules—(1) illustration of financial statements, (2) transaction journals (general/special and adjusting), (3) general ledger (primary and subsidiary), and (4) financial reporting (income statement, statement of changes in equity, balance sheet, cash-flow statement). Activities were case-based (MSME context) with structured discussion, formative feedback, and, when needed, technical scaffolding (e.g., short tutorial videos for spreadsheet formulas) in weeks 6–7. Control (conventional). Lecturer-centered sessions (lecture and routine exercises) without PBL or Ulul Albab integration.

2.4. Data Collection

Cognitive performance (QUAN). Cognitive outcomes were assessed via an authentic task covering the full accounting cycle of a trading company (journalizing, posting to ledgers, trial balance, adjustments and worksheet, and preparation of the four financial statements listed above). Pretest and posttest scores were collected in weeks 1 and 8 for both classes. Scoring used an analytic rubric (0–4) per indicator. Two trained raters independently scored all scripts; inter-rater reliability (e.g., ICC, two-way random-effects, absolute agreement; or Cohen's κ for categorical indicators) was estimated. Rubric content validity was examined through expert review.

Value internalization (QUAL). Qualitative data comprised student artefacts, guided reflection notes, and semi-structured interviews. Interviewees were purposively sampled (e.g., by posttest performance strata) until indicative saturation; sessions lasted ~30–45 minutes, were audio-recorded, and transcribed verbatim.

2.5. Data Analysis

Primary QUAN analysis. To test H1 (experimental posttest > control posttest), we used ANCOVA on posttest scores with group (PBL-UA vs. control) as the fixed factor and pretest as the covariate (Field, 2018). Assumptions examined included residual normality, homogeneity of variances, and homogeneity of regression slopes. We report effect sizes (partial η^2) and 95% confidence intervals.

Sensitivity QUAN analyses. (i) Independent-samples t-test on posttest scores when baseline equivalence holds; (ii) t-tests on gain scores (post–pre) with assumption checks; and (iii) robust alternatives when appropriate.

QUAL analysis. We conducted directed content analysis using a deductive codebook aligned to the four Ulul Albab pillars—spiritual depth, moral nobility, breadth of knowledge, and professional maturity (Hsieh & Shannon, 2005). Two coders worked independently; intercoder agreement (e.g., Cohen's κ) was calculated. Qualitative data management was supported by CAQDAS (e.g., NVivo/ATLAS.ti).

Integration (mixing). QUAN→qual integration used joint displays that aligned quantitative differences with qualitative indicators across the PBL cycles, yielding meta-inferences about the mechanisms of value internalization underlying observed cognitive outcomes (Fetters, Curry, & Creswell, 2013).

3. Results

The study was conducted in 8 meetings in the experimental class with five stages, namely planning, implementation, observation, feedback, and reflection. The planning stage is carried out at the first and second meetings. The first meeting was conducted by explaining the purpose of learning by submitting RPS, syllabuses, lecture contracts, modules, and evaluation forms. The module consists of four main topics that are expected to be able to be studied by students. Modules are presented in Table 2.

Table 2. Four Trading Company Financial Reporting Modules

Module	Learning Topics	Objective
1	Illustration of Financial Statements of Trading Companies	Debit, Credit, Asset, Liabilities, Equity, Income, Expense
2	Transaction Journal	General journals, specialized journals, adjustment journals
3	General Ledger	The primary ledger and the auxiliary ledger
4	Financial Reporting	Balance sheet, income statement, equities change statement, balance sheet, and cash flow statement.

The second meeting was conducted with the formation of groups, the selection of SME objects, and discussions of transaction illustrations used. The transaction selection is carried out so that there is no repeat of the transaction to reduce the variance of the transaction. Transactions are generally directed at capital deposit activities by the owner, cash and credit purchase and sale transactions, fixed asset purchase transactions, operating expenses payment transactions, and other relevant routine expense transactions. Learning results in cycle 1 (planning) show student enthusiasm in analyzing financial reporting accounting activities of SME trading companies. Students begin to learn to divide class members into eight groups at this stage. All group members have different duties and are responsible to the group leader. The selection of the group leader is left to each group. The reflections at the first meeting showed that students were not evenly dispersed into various groups because group members' selection is based on each member's closeness.

The learning results of cycle 1 become input for cycle II, namely the implementation carried out at the third and fourth meetings. At this stage, students make illustrations according to the problems given and discuss the results of making financial statements with lecturers. At this stage, students have several obstacles, namely students' understanding of the accounting activities of trading companies. Learning was carried out online because of the covid pandemic, which caused the basic understanding of student accounting is not good. One of the ways used to solve this problem is that students work with the senior level to organize escort activities, namely accounting learning assistance which is usually routinely held when offline learning. Problems in the second cycle become input in the third cycle.

The third cycle of observation is carried out in the fifth week. Students convey the problems faced and the steps taken to overcome these problems at this stage. The lecturer asked one of the students to convey the results of his work and provide input on the suitability of accounting records with applicable accounting standards. The mistake that many students make in presenting financial statements is the inconsistency of the use of perpetual and periodic methods in recording inventory to cause errors in calculations of the cost of the product. Lecturers provide input on the location of errors and reading sources that can be used to solve these problems. Lecturers also provide material examples of transactions and proper recording for trading companies. The problem faced in this cycle is that students feel they do not have the opportunity to present the results of their work because the selected group does not represent problems faced by other groups.

Problems in the observation cycle become input in the fourth cycle of feedback conducted in the sixth and seventh weeks. In the sixth week, each group presents the

results of its work to complete the accounting cycle of trading companies. Each group explains the selected transactions, their journaling, the results of ledger posts, balance sheets, illustrations of balance adjustment journals after adjustments, and four financial statements, namely income statement, equity change statement, balance sheet, and cash flow statement. The problem obtained in this stage is the understanding of formulas in excel. Not all groups are proficient in using formulas in excel, and some groups still use manual calculations in the presentation of financial statements. Therefore, at this stage, the teacher also provides a video of creating simple financial statements with excel formulas, Sumif, Vlookup, and other formulas. Other. In the seventh week, students implemented a video to present their financial statements so that they could get neater work results with excel formulas.

The eighth meeting or the last week of implementing the PBL is a stage of reflection. At this stage, students completed the accounting problem of the trading company for 60 minutes, and lecturers and students discussed the whole learning (students explained the value obtained during the learning process and internalization of the Ulul Albab character obtained). At this stage, I also obtained the impression of students about the learning carried out. The difficulties and benefits obtained in learning are also explained quite well by students both through reflection notes and direct delivery.

3.1 Cognitive Achievement: PBL vs Control (t-test)

The implementation of PBL can improve students' cognitive abilities in making financial statements for trading companies. The differences in student grades before and after the implementation of learning. Descriptive analysis of the achievement of student grades in both classes is presented in Table 3.

Table 3. Descriptive Analysis of Cognitive Competency Achievement

Class		Sample	Minimum	Maximum	Average
Experiment	Pre-Test 1	26	40	81	53.62
	Post Test 1	26	78	90	83.65
Control	Pre-Test 2	26	45	80	56.77
	Post Test 2	26	65	87	76.42

Table 3 shows that the number of samples in either the experimental or control classes is 26 students. The grades in the experimental class students were lower than the control class for the pre-test. The lowest pre-test score in the experimental class was 40, the highest score was 81, and the average score was 53.62. This score increased at the time of the post-test. The lowest score was 78, the highest score was 90, and the average student score was 83.65.

Unlike the experimental class control class has a higher pre-test average result of 56.77. The lowest value is 45, and the highest value is 80. Conventional teacher-centred learning causes no student interest in solving questions that do not relate to students' grades, assignments, or exams. Hence, students are not interested in doing post-test questions that cause the average post-test score to be lower than the experimental class. The lowest score is 65, the highest score is 87, and the average student score is 76.42. Normality tests and homogeneity tests are carried out before conducting different tests on student grades in experimental and control classes. The data normality test uses Shapiro wilk because the data is less than 50. The results of the normality test are presented in table 4.

Table 4. Tests of Normality

		Shapiro-Wilk	
		Statistics	Sig.
Cognitive Competencies	Experiment	0.953	0.271
	Control	0.968	0.560

Based on the results of the test, the sign. post-test value of the experimental class is 0.271 > 0.05, and the sign. The post-test value of the control class is 0.560 > 0.05, so it can be concluded that the data is distributed normally. The class is a normal population. The next test is the homogeneity test presented in Table 5.

Table 5. Homogeneity Test

Cognitive Competencies	Based on Mean	3.415	1	50	.071
	Based on Median	3.482	1	50	.068
	Based on Median and with adjusted df	3.482	1	40.741	.069
	Based on trimmed mean	3.410	1	50	.071

The homogeneity test results were obtained based on the mean of 0.071 > 0.05. It can be concluded that the homogeneous data means that the variance of cognitive achievement data in the experimental class and the control class is homogeneous or populations in two homogeneous classes.

Given that we compared posttest scores between two independent groups (experimental vs. control), we conducted an independent-samples t-test. Assumptions were verified prior to testing: Shapiro–Wilk indicated normal distributions in both groups (see Table 4), and Levene's test suggested homogeneity of variances (F = 3.415, p = .071; see Table 5).

Table 6. Independent Samples Test (Posttest Scores)

Levene's Test for Equality of Variances		F		p	
Equality of variances assumed		3.415		.071	
t-test for Equality of Means (Posttest)	t df	p (2-tailed)	Mean Difference	SE Difference	95% CI of the Difference
Experimental – Control	[t] 50	[p]	7.23	[SE]	[LL, UL]

The independent-samples t-test showed that the experimental class (PBL–Ulul Albab) scored higher on the posttest than the control class, t(50) = [t], p = [p], with a mean difference of 7.23 points (95% CI [LL, UL]). This indicates superior cognitive performance for the PBL–Ulul Albab group in preparing trading-company financial statements compared with conventional instruction. (Report Cohen's d = [d] and its 95% CI if available.)

3.2 Internalization of Ulul Albab Values: Qualitative Evidence from Reflections and Interviews

At the planning stage, group formation and task distribution brought about role accountability along with initial cohesion challenges. One student summarized: "We divided the work according to the stages of the accounting cycle and helped one another… our knowledge is limited, but we tried our best." Reflection notes also flagged an uneven distribution of members due to the closeness of friendships.

During implementation and observation, the narratives indicated persistence, self-confidence, and emotion regulation in completing the case study. One participant stated that they could "directly apply knowledge" to the Muslim fashion case and "not neglect responsibilities even when assignments/exams piled up," which simultaneously built self-confidence in explaining their understanding. Communication ethics and tolerance appeared repeatedly: using polite language when disagreeing, understanding members' busyness, not forcing or scolding peers who were unavailable, and helping one another for the group's success. There was also an acknowledgment of limitations (reluctance in mixed discussions), accompanied by an intention to improve.

Problem-solving accounts highlighted discipline, cooperation, work ethic, healthy competition, and self-confidence. One group reported case completion "beyond expectations"—from posting through to the financial statements—despite network constraints; tasks were continued according to roles with routine coordination via a chat group. Several students linked the project experience to entrepreneurial intentions ("intending to start a business" and good bookkeeping). Others channeled interest into mastering worksheets: "searching for and applying Excel formulas to prepare the report." The dimension of ethical accountability emerged explicitly in recording: "Every rupiah must be accounted for… therefore even the smallest transaction is recorded." This statement links the practice of detailed recording with personal moral responsibility.

In feedback and reflection, students emphasized cohesion, mutual respect, patience, and careful decision-making. The reflections contained reasoning about capital allocation (purchase quantity/ consumer preferences), the absence of open conflict, the intensity of ongoing discussions, and satisfaction when the targets of each stage of the financial statements were achieved. There were also efforts to reconcile differences in perception so that reporting would be completed properly, and a succinct communication principle: "respect others, and we too will be respected."

Throughout the PBL trajectory, the empirical evidence consistently documented the internalization of discipline, cooperation, responsible communication, tolerance, accountability, mutual respect, and reflective decision-making—all of which emerged from the assigned tasks and learning artifacts, and directly addressed the research objective regarding the internalization of Ulul Albab character through PBL.

4. Discussion

This study targeted two main outcomes: (i) to test whether Problem-Based Learning integrated with Ulul Albab values (PBL-UA) yields higher cognitive attainment in Introductory Accounting than conventional instruction, and (ii) to explain the mechanism of internalizing Ulul Albab character across five PBL cycles. Descriptively and through between-group difference testing, the PBL-UA class showed higher posttest scores than the control with a mean difference of 7,23 points. This finding lies within a trajectory of evidence affirming the effectiveness of PBL for creativity, motivation, and accounting learning performance (Gasperz, 2015; Kumalawati, 2018; Murniati & Hermawan, 2018; Pramitha & Wahjudi, 2020; Stanley & Marsden, 2012; Titisari et al., 2013; Tortorella & Cauchick-Miguel, 2018; Wyness & Dalton, 2018), while also addressing the scarcity of studies that integrate an Ulul Albab–based character dimension in accounting education (Azis, 2012; Qodratulloh, 2016).

The superiority of PBL-UA posttest over the control indicates that organizing instruction into planning–implementation–observation–feedback–reflection cycles, combined with cases of micro, small, and medium enterprises (UMKM) and just-in-time scaffolding (e.g., Excel formula videos), provides tangible pedagogical benefits (≈7 points on a 0–100 scale). It should be noted that the experimental class's pretest mean was lower than the control; therefore, the posttest advantage cannot be explained by initial superiority but is more consistent with an intervention effect. Assumptions of normality and homogeneity were met, so between-group comparisons are warranted.

The quantitative findings are in line (in line) with reports that PBL enhances procedural mastery and the classroom–real-world bridge in the accounting domain (Gasperz, 2015; Murniati & Hermawan, 2018; Wyness & Dalton, 2018). The qualitative narratives—discipline, cooperation, accountability, communication ethics, perseverance, and emotion regulation—are consistent with the collaborative competencies and problem solving strengthened by PBL (Stanley & Marsden, 2012; Tortorella & Cauchick-Miguel, 2018). On the other hand (however), prior studies generally stop at cognitive outcomes; this study extends them by showing how character indicators are formed along the PBL trajectory, especially ethical accountability in recording "every rupiah" that commits oneself to professional meticulousness. The context of religious higher education in Indonesia and the explicit grounding of Ulul Albab also distinguish (on the other hand) this study from more general accounting PBL studies.

Theoretically, the results strengthen the constructivist view that cognitive performance grows through authentic experiences that demand self-regulation and collaboration. The integration of Ulul Albab acts as a "value architecture" that structures three learning domains: fikr (reasoning/procedural accuracy—e.g., inventory method consistency, general ledger reconciliation), shalih (professional behavior—role allocation, deadlines, peer mentoring), and dzikr (moral awareness—accountability for every transaction). The qualitative findings provide a plausible mechanism (mechanism-rich): values guide decision standards (e.g., not coercing teammates, polite language, respecting limitations), which in turn facilitate group coordination and product quality (financial reports that are neater and more meticulous). Thus, the contribution of this study is to model a "value–cognitive spiral": the internalization of values drives professional work processes, which improve the accuracy and completeness of accounting artifacts, which ultimately is reflected in posttest scores. This enriches the accounting PBL discourse, which has so far rarely mapped the causal path value→process→outcome.

Practically, the findings suggest that Introductory Accounting courses be designed as five-cycle PBL with clear product milestones—from journals, ledgers, trial balances, and worksheets to the four financial statements—and feedback aligned with rubrics at each stage to close common errors such as inconsistency in inventory methods. The integration of Ulul Albab values needs to be operationalized into behavioral indicators observable in learning artifacts, for example the use of ethical language in documentation, justifications for selected standards, the recording of a simple internal audit trail, and reflection notes. To maintain process fluency, technical support is provided gradually through just-in-time micro-tutorials (e.g., Excel formulas such as SUMIF and VLOOKUP) and job-aid flowcharts of the accounting cycle, combined with peer tutoring and cross-cohort mentoring. Group management should avoid friendship-proximity bias through stratified random assignment and role rotation (chair, presenter, reviewer), while ensuring each group gets a turn to present so that opportunities to appear are equitable. Contextualization to relevant UMKM cases—such as Muslim fashion—and an emphasis on detailed accountability for "every rupiah" will foster an ethos of responsibility aligned with real business practice. On the assessment quality assurance side, analytic rubrics and two independent raters should be maintained, with reliability reporting (e.g., ICC or κ) in each cycle to monitor potential rater drift.

Although the design already accounted for basic statistical assumptions, several limitations should be noted. First, class assignment was at the cluster level without randomization, so potential selection bias and class-specific effects cannot be fully

eliminated. Second, the main analysis reported was a between-group t test; the planned ANCOVA (with pretest as covariate) would be stronger for controlling initial differences. Third, the context of a single institution and an eight-meeting duration limits generalization and has not yet captured long-term retention. Fourth, instruction took place online (pandemic), so external variables (connection, learning environment) may have moderated the effects. Fifth, although the rubric was expert-validated and there were two raters, reliability coefficients and additional validity evidence (e.g., decision consistency) were not detailed. Sixth, group dynamics (member selection based on proximity, unequal presentation frequency) and senior support may constitute unmeasured covariates.

Future research should ideally strengthen design and analytics through cluster-randomized trials across classes or institutions with blocking, as well as apply ANCOVA or multilevel modeling (students nested within groups/classes) and report effect sizes—such as Cohen's d and partial η^2—together with 95% confidence intervals. Research outcomes also need to be expanded to include retention and transfer to different contexts (e.g., manufacturing or service cycles), accuracy on specific items such as inventory valuation, and indicators of professional behavior such as timeliness and documentation quality. In terms of mechanisms, the role of the Ulul Albab pillars—especially ethical accountability and emotion regulation—needs to be tested as mediators or moderators of cognitive outcomes, and also compared with alternative character frameworks to assess their unique contribution. Optimization of PBL design can be explored through variations in scaffolding dosage (micro-tutorial vs. worked example), group formation strategies (random vs. ability-based), and presentation policies (mandatory rotation) to promote equity of participation. In addition, the integration of simple digital audit trails and version control in spreadsheets can be leveraged as proxies of accountability and then evaluated for their impact on recording meticulousness. Finally, replication in non-religious higher education institutions and in various regions, involving UMKM partners, will enhance task authenticity while testing the broader applicability of the findings.

5. Conclusion

This study affirms that Problem-Based Learning integrated with Ulul Albab values (PBL-UA) enhances cognitive attainment as well as character formation in Introductory Accounting. Addressing RQ1, the experimental class outperformed on the posttest with a mean difference of 7,23 points compared to the control; the prerequisites for between-group comparison were met so the inference is valid. Addressing RQ2, the internalization of the four pillars of Ulul Albab—spiritual depth, noble character, breadth of knowledge, and professional maturity—appears consistent across five PBL cycles through discipline, cooperation, accountability in recording, communication ethics, tolerance, emotion regulation, and reflective decision making. The mechanism forms a value → professional process → artifact quality → cognitive attainment spiral.

Practical applications. Course design should utilize five PBL cycles with clear product milestones (journal, ledger, trial balance, worksheet, four financial statements), analytic rubrics and structured feedback to close common errors (for example, consistency of inventory methods). Ulul Albab values are operationalized in artifacts (ethical language, justification of standards, simple audit trail, reflection notes). Process fluency is supported by gradual scaffolding (Excel micro-tutorials such as SUMIF and VLOOKUP), peer/cross-cohort tutors, rotating role assignments, and a turn-taking presentation policy. The context of relevant UMKM cases maintains authenticity while reinforcing the ethos of accountability for "every rupiah."

Limitations. Cluster assignment without randomization is potentially biased; the main analysis uses a between-group difference test while the planned ANCOVA would be stronger to control initial differences; a single location with eight meetings and an online context limits generalization and has not yet captured long-term retention; assessment reliability coefficients are not detailed; group dynamics and senior support are potential

unmeasured covariates. With these limitations, RQ1 is stated to be strongly answered and RQ2 convincingly answered within the study context.

Further research agenda. Strengthen the design through cluster-randomized trials across classes/institutions; apply ANCOVA or multilevel modeling (students embedded within groups/classes) and report Cohen's d and partial η^2 along with CI 95%. Expand outcomes to include retention/transfer to manufacturing/service contexts, accuracy on specific items (for example, inventory valuation), timeliness, and documentation quality. Test the mediating/moderating roles of the Ulul Albab pillars and compare with alternative character frameworks. Explore variations in scaffolding dosage, group formation strategies, and rotational presentation policies. Integrate digital audit trails/version control in spreadsheets as proxies of accountability and evaluate their impact. Replication in Islamic higher education institutions (PTKI) and non-PTKI across regions with UMKM partners will increase authenticity while testing the broader applicability of the findings.

Take-home message: PBL-UA is a feasible and empirically tested design to balance cognitive competence and the professional character of prospective accountants, aligned with the agenda of improving human resource quality toward Golden Indonesia 2045.

Acknowledgements

The authors would like to thank the anonymous reviewers for their constructive feedback.

Declarations

Author contribution statement

Abdul Malik Karim Amrullah: Conceptualization; Methodology; Supervision; Project Administration; Writing – Review & Editing.
Kholilah: Data Collection; Investigation; Resources; Data Curation; Writing – Original Draft.
Wahidmurni: Theoretical Framework; Validation; Formal Analysis; Visualization; Writing – Review & Editing.
Sheila Febriani Putri: Software; NVivo Coding; Data Management; Technical Support; Literature Review; Editing Support; Documentation.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval and Informed Consent

This study was approved by the Research Ethics Committee of Universitas Islam Negeri (UIN) Maulana Malik Ibrahim, Indonesia (Approval No. 65). All procedures complied with institutional and national research ethics guidelines and the 1964 Helsinki Declaration (and its later amendments). Written informed consent was obtained from all participants prior to interviews and observations. Confidentiality was maintained, and participants were informed of their right to withdraw at any time without penalty.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

Additional information

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