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The Effectiveness of the Smart Learning Accounting Module on Undergraduate Students' Learning Motivation in Accounting

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Abstract

This study examined the effectiveness of the Smart Learning Accounting Module on undergraduate students' learning motivation in accounting. The study involved 40 third-year accounting students from a selected university in Xinjiang, China, and employed a quantitative one-group pre-test and post-test quasi-experimental design. The module was implemented over an eight-week intervention on transaction analysis and journal entries. Students' learning motivation was measured using an ARCS-based questionnaire covering Attention, Relevance, Confidence, and Satisfaction. Data were analysed using descriptive statistics, reliability analysis, the Shapiro-Wilk normality test, and the Wilcoxon signed-rank test. The findings showed that overall learning motivation increased from a moderate level before the intervention ($M = 3.319$, $SD = 0.486$) to a high level after the intervention ($M = 4.040$, $SD = 0.724$). All four ARCS dimensions also improved. The Wilcoxon signed-rank test revealed a significant difference between pre-test and post-test motivation scores, $Z = -4.954$, $p < .001$, with a large effect size ($r = .783$). The findings suggest that the Smart Learning Accounting Module can enhance undergraduate students' learning motivation in accounting.

Keywords: Smart Learning, Accounting Education, Learning Motivation, Arcs Model, Higher Education

Introduction

In recent years, digital learning has emerged as a cornerstone of modern higher education, characterized by the systematic integration of online platforms, learning analytics, and intelligent instructional tools. Globally and within China, national and institutional initiatives have accelerated educational digitalization, leveraging smart education platforms to broaden learning access and instructional flexibility (Bond et al., 2024; Crompton & Burke, 2023). However, the mere implementation of digital infrastructure does not inherently guarantee enhanced educational outcomes. Scholars emphasize that the efficacy of these technologies is strictly contingent upon robust pedagogical design, student readiness, instructor guidance, and the learners' ultimate acceptance of the tool (Alyoussef, 2023; Barz et al., 2024; Haleem et al., 2022). Consequently, there is a critical need to examine how these digital interventions

operate within specific, highly structured academic disciplines. Nevertheless, existing research has paid limited attention to how smart learning tools function within discipline-specific contexts where conceptual understanding, procedural accuracy, and sustained motivation are equally important.

Accounting education provides a compelling domain for investigating this technological integration due to its deeply conceptual and procedural nature. Mastering accounting requires students to concurrently grasp abstract principles, analyze complex transactions, and execute precise, systematic problem-solving steps. Under conventional lecture-based paradigms, students frequently struggle with delayed feedback and a lack of self-efficacy when tackling independent exercises, leading to diminished engagement, confidence, and overall satisfaction. While prior literature suggests that technology-supported learning environments can mitigate these challenges by offering interactive, flexible resources (Haji Moradkhani et al., 2023; Ma & Ruannakarn, 2024), empirical insights into how structured smart learning tools dynamically influence students' psychological and instructional experiences remain limited. This gap is particularly important because the effectiveness of digital learning cannot be assumed to be consistent across disciplines, institutions, or learner populations.

To address this pedagogical challenge, this study utilizes an established Smart Learning Accounting Module designed to facilitate structured explanations, guided practice, and immediate automated feedback. Crucially, rather than focusing on product development, this investigation evaluates the pedagogical value and experiential impact of an existing module embedded within a standard curriculum—an approach aligned with contemporary calls to prioritize learner experience over mere technical availability (Bond et al., 2024; Crompton & Burke, 2023). This evaluation is particularly urgent in geographically and socioeconomically distinct regions such as Xinjiang. Despite participating in China's broader digital transformation, universities in the region face unique constraints regarding institutional resources, student digital literacy, and adaptive learning conditions (Guo & Wan, 2022; Fang & Nie, 2025). Because empirical findings from well-resourced regions cannot be seamlessly generalized to this setting, a localized classroom study is essential to understand how these unique student cohorts respond to digital interventions. Thus, this study responds to a contextual and empirical gap by examining students' motivational experiences with an established smart learning module in a relatively underexamined regional higher-education setting.

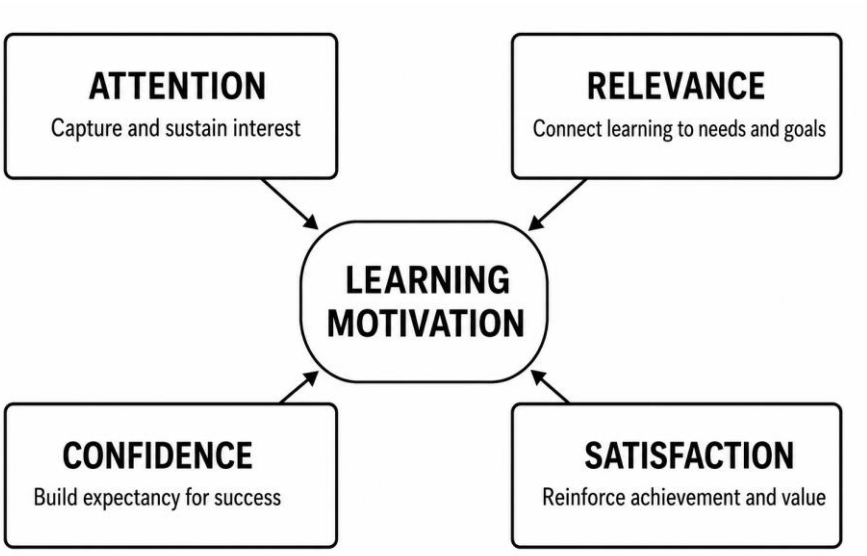

Figure 1 Keller's (2010) ARCS Motivation Model

Theoretically, this study conceptualizes student engagement through the lens of learning motivation, which serves as a sensitive, immediate indicator of instructional efficacy. The primary framework employed is Keller's (2010) ARCS Motivation Model, which delineates motivation into four distinct dimensions: Attention, Relevance, Confidence, and Satisfaction, as illustrated in Figure 1. To provide a more holistic understanding of the psychological mechanisms driving this motivation, the ARCS model is complemented by Self-Determination Theory, which highlights the roles of autonomy, competence, and relatedness (Ryan & Deci, 2000), alongside the Technology Acceptance Model, which posits that perceived usefulness and ease of use govern user engagement (Davis, 1989; Venkatesh & Davis, 2000). Together, these theories offer a robust foundation for analyzing how a smart learning module can fulfill basic psychological needs and foster positive technology acceptance, thereby driving academic motivation.

Building upon these theoretical and contextual foundations, the present study investigates the impact of the Smart Learning Accounting Module on undergraduate accounting students' learning motivation at a selected university in Xinjiang. By evaluating this digital intervention within a localized classroom setting, this research provides preliminary empirical evidence regarding its potential to support learning motivation in specialized business education, while recognizing that the findings are context-specific. Ultimately, this pedagogical evaluation directly addresses the core focus of this investigation, which is guided by the following numbered research questions:

1. What are the specific levels of undergraduate accounting students' learning motivation before and after engaging with the Smart Learning Accounting Module?
2. Does the deployment of this digital module yield a statistically significant difference between students' pre-test and post-test motivation scores?

Literature Review

Smart learning environments have transitioned from peripheral auxiliary resources to essential infrastructures within contemporary higher education. Rather than merely denoting the deployment of hardware or software, a smart learning environment encapsulates an

integrated ecosystem that delivers structured content, synchronous and asynchronous interaction, operational flexibility, and responsive, personalized support (Dai et al., 2021; Li & Wong, 2021). Recent scholarship underscores the pervasive integration of digital and artificial intelligence (AI)-supported technologies to optimize feedback mechanisms, learning access, and assessment protocols (Bond et al., 2024; Crompton & Burke, 2023). However, technological presence alone does not inherently enhance the student experience; its ultimate efficacy remains strictly contingent upon rigorous pedagogical design, student digital readiness, proactive instructor guidance, and intentional technology acceptance by the learners (Alyoussef, 2023; Barz et al., 2024; Haleem et al., 2022).

Within this evolving digital landscape, accounting education serves as a critical domain for technological integration due to its intensely dualistic conceptual and procedural nature. Mastering accounting requires undergraduate students to synthesize abstract theoretical principles while demonstrating meticulous procedural accuracy in transaction analysis, journal entry formulation, and systematic problem-solving steps. Traditional lecture-based pedagogies often inadvertently hinder student progress by introducing delayed feedback loops and inducing lower self-efficacy during independent practice, which can severely compromise learner attention and satisfaction. To address these vulnerabilities, educational technology, curriculum design, and tech-supported assessments have emerged as core priorities in accounting education research (Apostolou et al., 2023; Churyk et al., 2025). Prior empirical findings indicate that digital learning units provide the interactive environments and adaptive learning activities required to mitigate these constraints (Haji Moradkhani et al., 2023; Ma & Ruannakarn, 2024), suggesting that a specialized Smart Learning Accounting Module could foster greater confidence and independent mastery among students.

Consequently, learning motivation stands as a critical, immediate outcome metric for evaluating the instructional efficacy of such digital interventions. Motivation directly dictates student cognitive engagement, including attention deployment, academic effort, task persistence, and an overall willingness to invest in complex learning activities. In accounting education, motivation is frequently undermined when students encounter repetitive procedural errors, delayed institutional feedback, or isolated learning struggles. While motivation has been structurally linked to broader learning outcomes and perceived career relevance (Howard et al., 2021; Sampaio et al., 2024), assessing it as an immediate psychological response provides a nuanced understanding of a module's pedagogical value prior to evaluating distal academic achievements. To rigorously operationalize this variable, Keller's (2010) ARCS Motivation Model provides a robust four-dimensional framework comprising Attention, Relevance, Confidence, and Satisfaction. This model remains highly viable for assessing motivational shifts within digital and online ecosystems (Fang et al., 2024; Maiti et al., 2023), serving as the baseline pre- and post-intervention metric for undergraduate accounting cohorts in this inquiry.

To complement the descriptive capacity of the ARCS model, this study incorporates Self-Determination Theory (SDT) and the Technology Acceptance Model (TAM) to elucidate the underlying psychological mechanisms driving motivational change. Under the framework of SDT, intrinsic and self-determined extrinsic motivations are heavily sustained when an environment satisfies the fundamental psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2000). A smart learning module can fulfill these needs by permitting

self-paced navigation (autonomy), delivering immediate automated feedback during guided practice (competence), and grounding the digital experience within the broader instructor-led classroom fabric (relatedness). Simultaneously, TAM posits that a user's behavioral intention and engagement with a system are primarily determined by its perceived usefulness and perceived ease of use (Davis, 1989; Venkatesh & Davis, 2000). Thus, if accounting students perceive the digital module as highly instrumental for procedural mastery and sufficiently intuitive to navigate, their technological acceptance will reinforce their baseline academic motivation.

Despite the expanding body of literature on digital pedagogy, three salient research gaps persist. First, the majority of empirical investigations focus on generalized higher education frameworks rather than the highly specialized, procedural environment of accounting classrooms. Second, existing literature predominantly prioritizes static measures such as system adoption or terminal academic achievement, leaving an empirical deficit regarding dynamic, pre- and post-intervention motivational changes. Third, there is a critical geographic and socioeconomic omission of remote, developing educational regions such as Xinjiang, where student digital literacy, institutional resource allocations, and learning adaptability exhibit distinct contextual differences (Fang & Nie, 2025; Guo & Wan, 2022). To address these interconnected gaps, the present study examines the efficacy of a Smart Learning Accounting Module on undergraduate accounting students' learning motivation at a selected university in Xinjiang. By synthesizing the ARCS framework with SDT and TAM, this classroom-based inquiry provides vital localized data concerning the capacity of intelligent digital support systems to enhance student motivational profiles.

Methodology

This study adopted a quantitative, one-group pre-test and post-test quasi-experimental design to evaluate changes in undergraduate accounting students' learning motivation resulting from the implementation of a Smart Learning Accounting Module. Formally represented as O1 X O2, where O1 signifies the baseline pre-test questionnaire, X denotes the module intervention, and O2 represents the post-test questionnaire, this approach was uniquely suited for an intact, classroom-based setting where random assignment was impractical. While the absence of a control group inherently restricts definitive causal assertions, the design effectively captures preliminary motivational shifts within a single cohort, meaning findings are interpreted as tentative evidence of change rather than absolute causal proof. The study was conducted at an undisclosed university in Xinjiang, China, utilizing a purposive sampling strategy to select 40 third-year undergraduate accounting students from one intact class. Inclusion required active enrolment in the specific financial accounting course, full participation in the digital intervention, completion of both assessment instruments, and the provision of written informed consent, with incomplete records excluded from the final paired analysis.

The intervention centred on the integration of an existing Smart Learning Accounting Module into an eight-week instructional unit focusing on transaction analysis and journal entries—a foundational topic requiring precise conceptual understanding and procedural mastery of debit and credit rules. Crucially, the module was not developed by the researcher but functioned as an established digital instructional aid embedded within the regular curriculum. The module comprised structured learning units, practical accounting examples,

guided activities, immediate automated feedback, and revision resources designed to help students independently identify errors, review core definitions, and consolidate their procedural knowledge. At the onset of the intervention, the lecturer introduced the module's learning objectives and instructed students on navigating the digital interface. Throughout the eight-week period, the module was utilized concurrently during face-to-face sessions and independent study, concluding with the administration of the post-test instrument.

The primary instrument employed was a learning motivation questionnaire adapted from Keller's (2010) Attention, Relevance, Confidence, and Satisfaction (ARCS) Motivation Model, which was administered identically at baseline and post-intervention to facilitate direct empirical comparison. The instrument was divided into two core components: Section A collected demographic and background profiles—including alphanumeric tracking codes, gender, age, and prior experience with digital learning utilities—ensuring participant responses could be matched longitudinally without compromising personal anonymity. Section B operationally measured learning motivation across the four ARCS dimensions, with each subscale comprising six distinct items for a total of 24 indicators. Responses were recorded using a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), where elevated mean scores denoted higher self-reported levels of academic motivation.

To ensure psychometric robustness, the instrument underwent rigorous validation and reliability screening prior to main data collection. Content validity was established via an independent panel of three experts specializing in accounting instruction, educational technology, and research methodology, whose qualitative feedback refined item clarity and structural alignment with the ARCS dimensions. Face validity was subsequently verified through a pilot evaluation with a small cohort of non-sample peers, resulting in minor syntactic adjustments to optimize readability. Internal consistency was evaluated utilizing Cronbach's alpha coefficient, establishing a threshold of .70 or above as acceptable for educational research. Given the localized sample size ($N = 40$), reliability indices were interpreted conservatively to ensure the instrument accurately captured the intended motivational constructs.

Data collection transpired across three systematic phases aligned with strict ethical protocols authorized by the institutional review body. Initially, administrative clearance was secured from the university and course directors, followed by student briefings that emphasized voluntary participation, the right to withdraw without academic penalty, and guaranteed data confidentiality. Upon obtaining signed informed consent, the second phase involved administering the pre-test questionnaire, during which students utilized unique alphanumeric codes rather than names to safeguard identities during longitudinal matching. The final phase occurred immediately following the conclusion of the eight-week intervention, where the identical post-test instrument was administered. All submitted instruments were audited for completion, and only fully paired pre-and-post datasets were retained for statistical processing.

Statistical analyses were executed utilizing specialized data analysis software, transitioning from descriptive profiles to inferential testing. Descriptive metrics, including frequencies and percentages, summarized participant demographics, while means and

standard deviations characterized motivation levels across three defined thresholds: low (1.00–2.33), moderate (2.34–3.67), and high (3.68–5.00). Prior to inferential modeling, data distribution was evaluated using the Shapiro-Wilk normality test; because the distribution of difference scores deviated significantly from normality, the non-parametric Wilcoxon signed-rank test was selected to evaluate pre-to-post motivational changes. Statistical significance was established at $p < .05$, with the inferential outputs reported via *Z*-values, *p*-values, and an effect size r calculated using the standard formula $r = |Z| / \sqrt{N}$. to quantify the practical magnitude of the digital module's impact.

Results and Findings

The data analysis for this study was derived from 40 undergraduate accounting students who completed both the pre-test and post-test administrations of the modified ARCS instrument. The findings are organized into three primary sections: participant demographics alongside preliminary psychometric and distributional diagnostics, descriptive statistics explicitly addressing Research Question 1, and inferential statistical testing directly addressing Research Question 2.

Participant Profile and Preliminary Analyses

The final analysis included a total of N = 40 valid paired student responses. The sample demonstrated a relatively balanced gender distribution, consisting of 21 male students (52.50%) and 19 female students (47.50%). In terms of age stratification, the majority of respondents were aged 21 to 23 years old (n = 23, 57.50%), followed by those aged 18 to 20 years old (n = 11, 27.50%) and those aged 24 years old and above (n = 6, 15.00%). Although an overwhelming majority of the cohort reported having prior general digital learning experience (n = 37, 92.50%), their frequency of utilizing digital learning tools specifically for accounting instruction varied considerably. Six students (15.00%) had never used digital tools for accounting, 14 students (35.00%) rarely used them, 14 students (35.00%) used them sometimes, five students (12.50%) used them often, and only one student (2.50%) always used them. This baseline profile suggests that while the students possessed general digital literacy, their routine exposure to specialized digital accounting environments was initially constrained.

To ensure the psychometric integrity of the instrument, internal consistency was evaluated using Cronbach's alpha (α). The overall scale demonstrated excellent reliability across both administrations, yielding alpha values of .926 at pre-test and .969 at post-test. For the individual pre-test subscales, Relevance, Confidence, and Satisfaction exhibited acceptable to good internal consistency, whereas the Attention subscale recorded a lower value (α = .686), which was noted and interpreted with appropriate scholarly caution. Conversely, the post-test data revealed good to excellent reliability across all four distinct ARCS dimensions, confirming the instrument's structural stability. Finally, prior to inferential modeling, a Shapiro-Wilk test was executed to assess the normality of the pre-to-post difference scores. The test revealed that the difference scores for overall motivation, Attention, Relevance, and Satisfaction deviated significantly from a normal distribution ($p < .05$), whereas Confidence met the normality assumption. Consequently, to maintain statistical rigor, the non-parametric Wilcoxon signed-rank test was selected as the appropriate inferential framework.

Student Learning Motivation Levels Before and After the Intervention

Research Question 1 sought to identify the specific levels of undergraduate accounting students' learning motivation both before and after their engagement with the Smart Learning Accounting Module. To evaluate these levels, mean scores were categorized into three interpretative thresholds: low (1.00–2.33), moderate (2.34–3.67), and high (3.68–5.00). Descriptively, the baseline pre-test findings indicated that the students began the intervention with a moderate level of overall learning motivation (M = 3.319, SD = 0.486). This moderate trend was uniform across all four individual ARCS dimensions. Satisfaction recorded the highest initial baseline score (M = 3.588, SD = 0.680), followed by Confidence (M = 3.329, SD = 0.541) and Relevance (M = 3.271, SD = 0.525), while Attention registered the lowest baseline mean (M = 3.088, SD = 0.467). These pre-test indices reveal that while students maintained acceptable motivational baselines, their initial cognitive focus and concentrated interest in accounting tasks were comparatively weak.

Following the execution of the eight-week intervention, the descriptive metrics revealed an upward shift in student motivation, successfully answering the second component of RQ1. The overall post-test motivation score advanced into the high classification threshold (M = 4.040, SD = 0.724), yielding a descriptive mean improvement of 0.721. Parallel gains were observed across all sub-dimensions, with every ARCS component climbing from a moderate level to a high level. Post-intervention, Satisfaction retained the highest mean position (M = 4.129, SD = 0.817). Notably, Attention experienced the most pronounced descriptive growth, increasing by 0.962 to become the second-highest post-test dimension (M = 4.050, SD = 0.725). This substantial reordering indicates that the interactive, module-based framework was descriptive of an enhanced capacity to capture and maintain student engagement. Confidence (M = 3.996, SD = 0.718) and Relevance (M = 3.983, SD = 0.803) similarly achieved high levels post-intervention, showing clear positive descriptive trajectories across all targeted motivational dimensions.

Table 1
Descriptive Statistics of Pre-Test and Post-Test Learning Motivation Scores (N = 40)

Variable	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Mean Difference	Pre-test Level	Post-test Level
Overall Motivation	3.319	0.486	4.040	0.724	0.721	Moderate	High
Attention	3.088	0.467	4.050	0.725	0.962	Moderate	High
Relevance	3.271	0.525	3.983	0.803	0.712	Moderate	High
Confidence	3.329	0.541	3.996	0.718	0.667	Moderate	High
Satisfaction	3.588	0.680	4.129	0.817	0.541	Moderate	High

Inferential Analysis of Pre- and Post-Intervention Motivational Differences (Addressing RQ2)

Research Question 2 investigated whether the deployment of the Smart Learning Accounting Module yielded a statistically significant difference between students' pre-test and post-test motivation scores. To answer this question definitively, a Wilcoxon signed-rank test was conducted. The inferential analysis revealed a statistically significant difference in overall learning motivation before and after the intervention, $Z = -4.954$, $p < .001$. The negative test statistic reflects a uniform directional shift toward higher post-test motivation scores. Furthermore, the calculated effect size for overall motivation was remarkably robust (r =

.783), exceeding the standard threshold for a large effect and establishing that the observed motivational growth carries substantial practical and instructional significance.

A granular inspection of the individual ARCS dimensions further confirmed statistically significant, positive shifts across all subscales, reinforcing the answer to RQ2. The Attention dimension yielded the most substantial inferential shift, Z = -5.063, p < .001, accompanied by the largest independent effect size in the study ($r = .801). Statistically significant advancements were also documented for Relevance (Z = -4.424, p < .001, r = .699), Confidence (Z = -4.848, p < .001, r = .767), and Satisfaction (Z = -4.306, p < .001, r = .681). Collectively, these large effect sizes substantiate that the statistical gains were pervasive rather than localized to a single sub-component. Consequently, the null hypothesis was rejected in favor of the alternative hypothesis, providing empirical proof that the implementation of the Smart Learning Accounting Module was associated with a statistically significant and meaningful improvement in undergraduate accounting students' learning motivation within this regional classroom context.

Table 2
Wilcoxon Signed-Rank Test Results for Pre-Test and Post-Test Motivation Scores (N=40)

Variable	Pre-test Median (P25, P75)	Post-test Median (P25, P75)	Z	p	Effect Size (r)
Overall Motivation	3.396 (3.167, 3.573)	4.292 (4.052, 4.490)	-4.954	< .001	.783
Attention	3.167 (2.833, 3.333)	4.167 (3.875, 4.667)	-5.063	< .001	.801
Relevance	3.333 (3.042, 3.500)	4.250 (3.833, 4.500)	-4.424	< .001	.699
Confidence	3.417 (3.167, 3.667)	4.333 (3.833, 4.500)	-4.848	< .001	.767
Satisfaction	3.667 (3.500, 4.000)	4.333 (4.000, 4.667)	-4.306	< .001	.681

The empirical findings of this study demonstrate that the integration of the Smart Learning Accounting Module yielded a statistically significant and instructionally robust increase in undergraduate accounting students' overall learning motivation. This positive shift directly aligns with prior literature advocating for the pedagogical value of intelligent instructional tools over simple technical availability (Bond et al., 2024; Crompton & Burke, 2023). Specifically, the dramatic inflation of the Attention dimension—which experienced the largest descriptive and inferential growth (r = .801)—substantiates Keller's (2010) assertion that structured, interactive digital components are uniquely capable of capturing and sustaining student concentration. In conventional accounting classrooms, learners frequently lose focus when confronted with repetitive procedural tasks and delayed feedback loops. By providing immediate automated feedback and dynamic instructional scaffolding, the smart module effectively mitigated these conventional barriers, corroborating the arguments of Haji Moradkhani et al. (2023) and Ma and Ruannakarn (2024) that technology-supported environments can effectively re-engage students during complex problem-solving exercises.

Furthermore, the significant advancements observed across the Confidence, Relevance, and Satisfaction subscales provide strong empirical validation for the theoretical integration of Self-Determination Theory (SDT) and the Technology Acceptance Model (TAM). The substantial post-test increase in Confidence (Z = -4.848, p < .001) suggests that the module's guided practice and immediate error-correction mechanisms successfully fulfilled the students' psychological need for competence, a core tenet of SDT (Ryan & Deci, 2000).

Similarly, the positive trajectories in Relevance and Satisfaction mirror the findings of Sampaio et al. (2024) and Howard et al. (2021), who noted that accounting students' behavioral engagement is deeply intertwined with perceived task utility and career applicability. From the perspective of TAM (Davis, 1989; Venkatesh & Davis, 2000), because the undergraduate cohort perceived the smart module as highly useful for mastering complex financial transactions and intuitive to navigate, their technology acceptance directly reinforced their intrinsic and extrinsic motivational baseline, translating into heightened satisfaction.

Finally, these outcomes offer vital, localized insights that address the geographic and socioeconomic empirical gaps characteristic of developing educational regions like Xinjiang. Previous scholars have cautioned that digital readiness, institutional disparities, and localized learning habits in peripheral provinces could severely constrain the efficacy of online learning platforms (Fang & Nie, 2025; Guo & Wan, 2022). Interestingly, although the baseline respondent profile revealed that 35% of the participants rarely utilized digital utilities for specialized accounting tasks prior to the intervention, the large effect sizes recorded across all ARCS dimensions indicate that these initial limitations were successfully overridden. This suggests that when smart learning modules are not merely assigned as isolated homework but are intentionally embedded into the active classroom fabric with teacher guidance, they can optimize student psychological profiles regardless of prior digital constraints. While the lack of a control group limits absolute causal determinations, these pervasive classroom-based findings provide a compelling template for business educators seeking to implement resilient digital frameworks in regional higher education settings.

Overall, the results show a consistent pattern of improvement. Students' overall learning motivation increased from a moderate level before the intervention to a high level after the intervention. The four ARCS components also improved from moderate to high levels. The Wilcoxon signed-rank test confirmed that the increase in overall motivation was statistically significant, and significant improvements were also found in Attention, Relevance, Confidence and Satisfaction. Among the four components, Attention showed the strongest improvement. Within the scope of the one-group design, the Smart Learning Accounting Module was associated with a significant improvement in undergraduate accounting students' reported learning motivation.

Conclusion

In conclusion, the empirical findings of this investigation demonstrate that the eight-week implementation of the Smart Learning Accounting Module was directly associated with a substantial, statistically significant improvement in undergraduate accounting students' learning motivation. The descriptive transition of overall motivation from a moderate baseline to a high post-intervention level—statistically validated by the Wilcoxon signed-rank test—underscores the instructional efficacy of structured digital scaffolding in specialized business education. Pervasive positive shifts were documented across all four dimensions of Keller's ARCS model (Attention, Relevance, Confidence, and Satisfaction), with the Attention subscale demonstrating the most pronounced growth. This core outcome suggests that incorporating pedagogical features such as interactive guided practice, self-paced content navigation, and immediate automated feedback holds an immense capacity for neutralizing the repetitive, procedural fatigue frequently associated with traditional accounting

instruction, thereby rendering the subject matter more engaging, meaningful, manageable, and satisfying for learners.

These findings yield critical practical and institutional implications for higher education, particularly regarding the execution of digital transformation initiatives in regional contexts like Xinjiang. For educators, the results indicate that smart learning modules should not be deployed as isolated, standalone resources; instead, these digital utilities must be deliberately blended with active instructor guidance, transparent learning objectives, and scaffolded feedback loops to optimize technology acceptance and psychological need satisfaction. Institutionally, the study highlights a pressing need for universities to shift their evaluative metrics away from mere platform availability toward the empirical quality of the students' actual learning experiences. However, given the structural limitations of this inquiry—specifically its reliance on a localized, one-group pre-test and post-test quasi-experimental design involving a single intact class of 40 students—the current insights must be interpreted with appropriate scholarly caution. To build upon this baseline evidence, future research should implement rigorous experimental frameworks utilizing active control groups, expanded and multi-institutional sample sizes, concurrent measures of objective academic achievement, qualitative data to capture nuanced participant narratives, and delayed post-tests to evaluate whether these motivational gains are sustained longitudinally over time.

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