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DEEP LEARNING AMONG ACCOUNTING EDUCATION STUDENTS: THE ROLE OF MEANINGFUL, MINDFUL, JOYFUL LEARNING AND DIGITAL PEDAGOGICAL SELF-EFFICACY

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ABSTRACT

Despite growing interest in Meaningful Learning, Mindful Learning, and Joyful Learning, previous studies have generally examined these approaches separately and paid limited attention to the role of Digital Pedagogical Self-Efficacy (DPSE) in strengthening Deep Learning. This study investigates the effects of Meaningful Learning, Mindful Learning, and Joyful Learning on Deep Learning and examines the moderating role of DPSE among 137 Accounting Education students at the Faculty of Teacher Training and Education. A quantitative survey approach was employed, and the data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicate that Meaningful Learning ($\beta = 0.280$, $p = 0.007$), Mindful Learning ($\beta = 0.231$, $p = 0.001$), and Joyful Learning ($\beta = 0.245$, $p = 0.001$) positively and significantly influence Deep Learning. Furthermore, DPSE significantly strengthens the relationships between Meaningful Learning, Mindful Learning, and Joyful Learning and Deep Learning. The results suggest that students with higher levels of digital pedagogical confidence are better able to transform meaningful, reflective, and enjoyable learning experiences into deeper conceptual understanding. This study contributes to the Deep Learning literature by integrating cognitive, reflective, and emotional learning dimensions within a single framework and by demonstrating the moderating role of DPSE through the lens of Social Cognitive Theory. Practically, the findings provide implications for teacher education institutions in designing learning environments that simultaneously promote humanistic learning experiences and digital pedagogical competence.

Keywords: *Meaningful learning, mindful learning, joyful learning, deep learning, digital pedagogical self-efficacy*

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INTRODUCTION

The transformation of higher education in the digital era demands a fundamental shift in the learning paradigm, particularly within faculties of education that hold a strategic mandate to prepare professional future teachers (Asmawan & Arianto, 2022). The transition from content-oriented teaching approaches to learning that emphasizes experiential engagement, reflective awareness, and the development of higher-order thinking capacities has become imperative (Feriyanto & Anjariyah, 2024; Levin, 2024; Narimo et al., 2022). In this context, the concept of deep learning has received increasing attention, as it is considered capable of fostering learning that goes beyond short-term cognitive achievement to promote profound conceptual understanding, interconnection between concepts, and the adaptive application of knowledge in real-world situations (Diputera, Zulpan, & Eza, 2024; Jangid & Kumar, 2025). For pre-service education students, deep learning serves as a crucial foundation in developing professional competencies, enabling future teachers to think critically, reflectively, and responsively to the dynamics of teaching and learning in the digital era.

Various empirical findings indicate that learning practices in higher education, including teacher education programs, are still largely dominated by surface learning approaches, which focus on rote memorization and task completion without providing students the opportunity to engage in reflective and meaningful learning processes (Bryce & Blown, 2024; Kostiainen et al., 2018). This situation underscores the need for learning strategies that can foster deep learning in a more meaningful, mindful, and joyful manner (Feriyanto & Anjariyah, 2024).

Meaningful Learning, Mindful Learning, and Joyful Learning have been widely studied as strategies to enhance the quality of students' learning experiences. Meaningful Learning emphasizes the importance of connecting new knowledge with students' existing cognitive structures (Cochran & Parker Peters, 2023; Efferin & Soeherman, 2024; Santi et al., 2024), making learning more relevant, contextual, and sustainable. Mindful Learning encourages students to be open to multiple perspectives, think flexibly, and engage in critical reflection on their learning experiences (Gu et al., 2024; Klusmann et al., 2023; Yeh et al., 2023). Meanwhile, Joyful Learning highlights the role of positive emotions in the learning process, which can broaden students' cognitive and affective capacities and build psychological resources that support creativity and learning perseverance (Bhakti et al., 2018; Sundaram & Ramesh, 2022).

Although these three approaches have the potential to promote deep learning, their effectiveness is highly influenced by students' confidence in utilizing digital technology in pedagogical contexts. In the digital era, students are required to possess both technological literacy and digital pedagogical competence to integrate technology creatively and reflectively (Gan et al., 2015; Shi et al., 2025; Weng et al., 2022). The concept of Digital Pedagogical Self-Efficacy (DPSE) becomes crucial, as students with high DPSE are better able to explore digital media to enrich learning experiences, including through interactive platforms, digital reflection, and online collaboration. Conversely, students with low DPSE tend to face challenges in leveraging technology for pedagogical purposes (Jabagat et al., 2025; Wijayanto et al., 2024).

Despite the growing body of literature on Meaningful Learning, Mindful Learning, and Joyful Learning, existing studies have largely examined these learning approaches independently and primarily focused on general learning outcomes such as engagement, motivation, academic achievement, or well-being. Limited attention has been given to investigating how these three complementary humanistic learning approaches collectively contribute to the development of Deep Learning among pre-service teachers. Furthermore, previous studies have rarely integrated Meaningful Learning, Mindful Learning, and Joyful Learning within a single conceptual framework, despite the theoretical assumption that deep learning emerges through the interaction of cognitive relevance, reflective awareness, and positive emotional engagement. Consequently, empirical evidence explaining the combined contribution of these approaches to Deep Learning in teacher education remains limited.

In addition, the role of DPSE in strengthening the effectiveness of humanistic learning approaches has received insufficient scholarly attention. Previous research has predominantly examined self-efficacy and digital competence as direct predictors of technology adoption, learning performance, or teaching effectiveness. However, little is known about whether students' confidence in utilizing digital technologies for pedagogical purposes can amplify the benefits of Meaningful Learning, Mindful Learning, and Joyful Learning in fostering Deep Learning. From a social cognitive perspective, individuals with higher self-efficacy are more likely to utilize available resources effectively, persist in challenging learning situations, and transform learning experiences into deeper conceptual understanding. Therefore, DPSE is theoretically positioned as a moderating variable that may strengthen the relationship between humanistic learning experiences and Deep Learning outcomes. Addressing these gaps, the present study investigates the direct effects of Meaningful Learning, Mindful Learning, and Joyful Learning on Deep Learning while examining the moderating role of DPSE among Accounting Education students.

Within the context of the Faculty of Teacher Training and Education, examining the relationship between learning approaches (Meaningful Learning, Mindful Learning, and Joyful Learning) and deep learning, as well as the moderating role of DPSE, is highly relevant. This study aims to analyze the influence of these three learning approaches on students' deep learning while simultaneously investigating the role of DPSE as a moderating variable. Theoretically, the study is expected to contribute to the literature on enhancing deep learning in higher education through digitally-oriented pedagogical practices. Practically, the findings can serve as a reference for lecturers in the Faculty of Teacher Training and Education in designing holistic, reflective, and contextually relevant learning strategies aligned with the demands of the digital education era.

Based on the theoretical and conceptual review outlined above, the research hypotheses are formulated as follows.

H_1 : Meaningful Learning has a positive effect on students' Deep Learning.
H_2 : Mindful Learning has a positive effect on students' Deep Learning.
H_3 : Joyful Learning has a positive effect on students' Deep Learning.
H_4 : Digital Pedagogical Self-Efficacy moderates the effect of Meaningful Learning on students' Deep Learning.
H_5 : Digital Pedagogical Self-Efficacy moderates the effect of Mindful Learning on students' Deep Learning, such that the influence is stronger at higher levels of DPSE.
H_6 : Digital Pedagogical Self-Efficacy moderates the effect of Joyful Learning on students' Deep Learning.

RESEARCH METHOD

This study employs a quantitative approach with an explanatory survey design. Data analysis was conducted using Partial Least Squares (PLS)-based Structural Equation Modeling (SEM) through SmartPLS 3.0, as the research model involves latent variables and complex moderating relationships (Hair et al., 2014). The study was carried out at the Faculty of Teacher Training and Education, Universitas Muhammadiyah Surakarta. This location was selected due to the relevance of the characteristics of education students, who are in the process of developing pedagogical competencies, critical reflection skills, and the ability to integrate technology into the learning process.

The object of this study is the influence of Meaningful Learning, Mindful Learning, and Joyful Learning on Deep Learning, with DPSE serving as a moderating variable. The subjects of this study were undergraduate students enrolled in the Accounting Education Study Program at the Faculty of Teacher Training and Education, Universitas Muhammadiyah Surakarta.

The population consisted of all active Accounting Education students. Based on institutional academic records, the total population comprised 137 students. Given the relatively small and accessible population size, this study employed a total sampling (census) technique, whereby all members of the population were included as research respondents. Consequently, the final sample consisted of 137 students, representing 100% of the target population.

To examine the moderating role of DPSE, moderation analysis was conducted using the Product Indicator Approach available in SmartPLS 3.0. Interaction constructs were created by multiplying the indicators of each independent variable (Meaningful Learning, Mindful Learning, and Joyful Learning) with the indicators of DPSE. Three interaction terms were subsequently generated, namely Meaningful

Learning × DPSE, Mindful Learning × DPSE, and Joyful Learning × DPSE. These interaction constructs were incorporated into the structural model to assess whether DPSE strengthened or weakened the relationships between the learning approaches and Deep Learning.

The research instrument consisted of a closed-ended questionnaire using a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Data were collected online, with respondents asked to rate each statement based on their experiences and perceptions of the learning process. Subsequently, the data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 3.0. The research variables and their operational definitions are presented as follows.

Table 1.
Variables and Operational Definitions

Variable	Operational Definition	Code
Meaningful Learning	The extent to which students connect new knowledge with prior experiences or cognitive structures to support professional learning.	ML1–ML6 (Likert Scale 1-5)
Mindful Learning	The degree of full awareness, reflection, and cognitive flexibility in students' learning process.	MFL1–MFL6 (Likert Scale 1-5)
Joyful Learning	The extent to which students experience enjoyment and positive emotions during learning that enhance engagement and motivation.	JL1–JL6 (Likert Scale 1-5)
Deep Learning	The level of students' deep understanding, conceptual connections, and ability to apply knowledge in real contexts.	DL1–DL6 (Likert Scale 1-5)
Digital Pedagogical Self-Efficacy	Students' confidence in using digital technology effectively within a pedagogical context to design, implement, and evaluate learning.	DPSE1–DPSE6 (Likert Scale 1-5)

Thus, the conceptual model illustrating the relationships among the variables in this study is presented as follows.

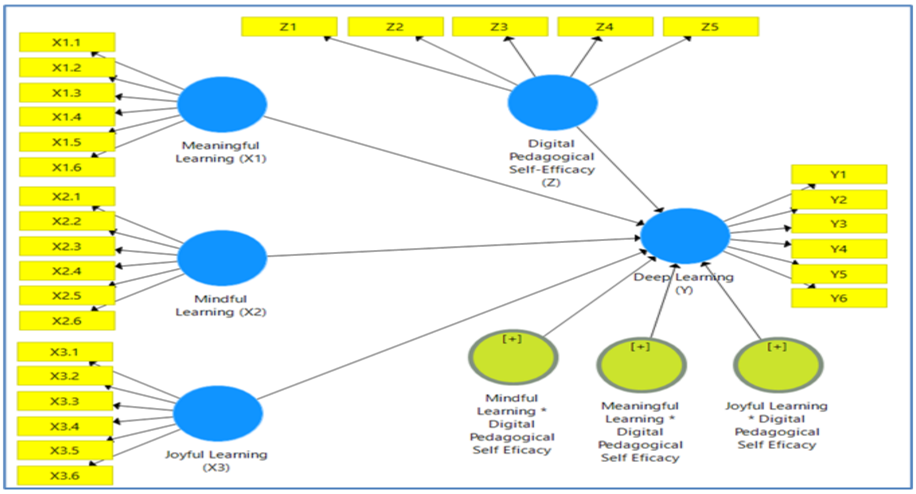

Figure 1.
Research Model

Figure 1 presents the proposed research model. Meaningful learning, mindful learning, and joyful learning are specified as exogenous variables that directly influence deep learning. DPSE is modeled as a moderating variable that may strengthen the effects of the three learning approaches on deep learning. Accordingly, three interaction constructs Meaningful Learning × DPSE, Mindful Learning × DPSE, and Joyful Learning × DPSE were included in the model to test the moderating hypotheses.

RESULTS AND DISCUSSION

The study involved 137 students from the Accounting Education program at Faculty of Teacher Training and Education. To better understand the characteristics of the participants, demographic data were analyzed using descriptive statistics, including frequency and percentage distributions. This analysis aimed to provide an overview of the respondents' gender, year of enrollment, and program of study. Understanding these demographic profiles is important to contextualize the findings and ensure that the sample accurately represents the population under study.

Table 2.
Respondent Demographic Profile

No.	Respondents	Frequency (n=137)	Percentage (%)
1.	Gender		
	Male	48	35
	Female	89	65
2.	Year of Enrollment		
	2022	42	30.7
	2023	28	20.4
	2024	24	17.5
	2025	43	31.4

The study involved 137 students from the Accounting Education program at the Faculty of Teacher Training and Education. Analysis of demographic data shows that the majority of participants are female (65%) compared to male students (35%). Regarding the year of enrollment, most students belong to the 2025 cohort (31.4%), followed by 2022 (30.7%), 2023 (20.4%), and 2024 (17.5%). All respondents are enrolled in the Accounting Education program, providing a focused perspective on the target population for this study.

The measurement model was assessed through outer loadings to determine the convergent validity of the indicators. Table 3 summarizes the outer loadings for each construct. All indicators exceed the threshold of 0.70, confirming that the items adequately represent their respective latent variables.

Table 3.
Outer Loadings of Research Variables

Variable	Indicator	*Outer Loading*
Meaningful Learning (ML)	ML1	0.914
	ML2	0.903
	ML3	0.862
	ML4	0.919
	ML5	0.902
Mindful Learning (MFL)	MFL1	0.892
	MFL2	0.900
	MFL3	0.802
	MFL4	0.885
	MFL5	0.780
Joyful Learning (JL)	JL1	0.904
	JL2	0.885
	JL3	0.908
	JL4	0.907
	JL5	0.847
Digital Pedagogical Self-Efficacy (DPSE)	DPSE1	0.916
	DPSE2	0.878
	DPSE3	0.900
	DPSE4	0.928
	DPSE5	0.922
Deep Learning (DL)	DL1	0.915
	DL2	0.942
	DL3	0.926
	DL4	0.915
	DL5	0.928

The high loadings indicate that each item strongly contributes to its respective construct. This confirms the conceptual alignment of the measurement items with theoretical foundations, such as the relevance of meaningful learning in connecting prior knowledge (Bryce & Blown, 2024), the role of mindfulness in enhancing cognitive flexibility (Bakosh et al., 2016), and the influence of positive emotions in joyful learning (Bureau et al., 2022; Fredrickson, 2001).

The internal consistency of each construct was evaluated using Cronbach's Alpha, rho_A, Composite Reliability (CR), and Average Variance Extracted (AVE). The results are presented in Table 4.

Table 4.
Reliability and Validity of Constructs

Variable	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Meaningful Learning	0.941	0.943	0.955	0.810
Mindful Learning	0.906	0.914	0.930	0.728
Joyful Learning	0.935	0.936	0.950	0.793
Digital Pedagogical Self-Efficacy	0.947	0.950	0.960	0.826
Deep Learning	0.958	0.958	0.968	0.856

Table 4 presents the reliability and validity results for the constructs used in this study. All variables demonstrate high internal consistency, with Cronbach's Alpha values ranging from 0.906 (Mindful Learning) to 0.958 (Deep Learning), exceeding the recommended threshold of 0.70. Composite Reliability (CR) values are also strong, ranging from 0.930 to 0.968, indicating that the indicators consistently represent their respective latent constructs. Furthermore, the Average Variance Extracted (AVE) for all variables exceeds 0.70, which confirms the convergent validity of the measurement model. These results suggest that the instruments used for Meaningful Learning, Mindful Learning, Joyful Learning, Digital Pedagogical Self-Efficacy, and Deep Learning are both reliable and valid for analyzing the structural relationships in this study.

Following the assessment of convergent validity and reliability, discriminant validity was evaluated to ensure that each construct was empirically distinct from the others. Discriminant validity is essential in PLS-SEM because it demonstrates that the indicators of a construct measure unique concepts that are not excessively correlated with other constructs in the model. In this study, discriminant validity was assessed using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT), as recommended by Hair et al. (2014).

Table 5.
Fornell-Larcker Criterion

Construct	ML	MFL	JL	DPSE	DL
Meaningful Learning (ML)	0.900				
Mindful Learning (MFL)	0.670	0.853			
Joyful Learning (JL)	0.718	0.491	0.890		
Digital Pedagogical Self-Efficacy (DPSE)	0.763	0.598	0.571	0.909	
Deep Learning (DL)	0.805	0.734	0.684	0.762	0.925

Table 5 presents the Fornell-Larcker criterion used to assess discriminant validity. The results show that the square root of the Average Variance Extracted (AVE) for each construct exceeds its correlations with other constructs. Therefore, all constructs satisfy the Fornell-Larcker criterion, indicating adequate discriminant validity and confirming that each construct represents a distinct concept within the research model.

Although the Fornell-Larcker criterion remains one of the most widely used approaches for assessing discriminant validity, recent methodological studies recommend complementing it with the Heterotrait-Monotrait Ratio (HTMT), which provides a more stringent evaluation of construct distinctiveness. Therefore, HTMT was also examined to provide additional evidence regarding the discriminant validity of the measurement model.

Table 6.
Heterotrait-Monotrait Ratio (HTMT)

Construct	ML	MFL	JL	DPSE	DL
Meaningful Learning (ML)	-				
Mindful Learning (MFL)	0.719	-			
Joyful Learning (JL)	0.764	0.529	-		
Digital Pedagogical Self-Efficacy (DPSE)	0.805	0.642	0.604	-	
Deep Learning (DL)	0.846	0.785	0.722	0.797	-

To further assess discriminant validity, the Heterotrait-Monotrait Ratio (HTMT) was examined. As presented in Table 6, all HTMT values were below the recommended threshold of 0.90, ranging from 0.529 to 0.846. These results indicate that the constructs are empirically distinct from one another and provide additional evidence supporting the discriminant validity of the measurement model.

In addition to assessing discriminant validity, collinearity diagnostics were performed to ensure that the predictor constructs did not exhibit excessive multicollinearity and to provide an indication of potential common method bias.

Table 7.
Collinearity Statistics (VIF)

Construct	VIF
Meaningful Learning (ML)	3.902
Mindful Learning (MFL)	2.352
Joyful Learning (JL)	2.198
Digital Pedagogical Self-Efficacy (DPSE)	2.553
Deep Learning (DL)	-

Collinearity among predictor constructs was assessed using the Variance Inflation Factor (VIF). As presented in Table 7, all VIF values ranged from 2.198 to 3.902, which are below the recommended threshold of 5.00. These findings indicate that multicollinearity is not a concern in the structural model.

Given that all constructs exhibited acceptable VIF values and no severe collinearity issues were detected, the results also suggest that common method bias is unlikely to substantially affect the relationships among the study variables.

Therefore, the measurement and structural models can be considered adequate for subsequent hypothesis testing.

The explanatory power of the structural model was evaluated using the coefficient of determination (R^2). The results indicate that Deep Learning achieved an R^2 value of 0.797 and an adjusted R^2 value of 0.786. This means that 79.7% of the variance in Deep Learning can be explained by Meaningful Learning, Mindful Learning, Joyful Learning, Digital Pedagogical Self-Efficacy, and the interaction effects included in the model, while the remaining 20.3% is explained by other factors outside the scope of this study. According to Hair et al. (2014), an R^2 value above 0.75 indicates substantial explanatory power. Therefore, the proposed model demonstrates strong explanatory capability in predicting students' Deep Learning.

In addition to explanatory power, the predictive relevance of the model was assessed using Stone-Geisser's Q^2 obtained through the blindfolding procedure. The results show that Deep Learning achieved a Q^2 value of 0.672. Since the Q^2 value is substantially greater than zero, the model possesses strong predictive relevance and demonstrates a satisfactory ability to predict the endogenous construct. These findings indicate that the proposed model is not only capable of explaining variations in Deep Learning but also possesses strong predictive accuracy.

Table 8 presents the results of the structural model assessment, including path coefficients, t-statistics, p-values, and effect sizes (f^2). The findings indicate that all proposed hypotheses are supported. Meaningful Learning, Mindful Learning, and Joyful Learning significantly influence Deep Learning. Furthermore, Digital Pedagogical Self-Efficacy significantly moderates the relationships between Meaningful Learning, Mindful Learning, and Joyful Learning and Deep Learning. The effect size analysis shows that the direct effects contribute more substantially to the explained variance in Deep Learning than the moderating effects, although all relationships remain statistically significant.

Table 8.
Hypothesis Testing Result

	β	T-Statistics	P-Values	f^2	Significance
Meaningful Learning -> Deep Learning	0.280	2.715	0.007	0.099	Significant
Mindful Learning -> Deep Learning	0.231	3.258	0.001	0.111	Significant
Joyful Learning -> Deep Learning	0.245	3.216	0.001	0.134	Significant
Meaningful Learning -> DPSE -> Deep Learning	0.092	2.134	0.032	0.018	Significant
Mindful Learning -> DPSE -> Deep Learning	0.190	4.106	0.000	0.122	Significant
Joyful Learning -> DPSE -> Deep Learning	0.120	2.110	0.045	0.016	Significant

As presented in Table 8, all hypothesized relationships are statistically significant, indicating support for H1 through H6. Among the direct effects, Meaningful Learning demonstrates the strongest influence on Deep Learning ($\beta = 0.280$), followed by Joyful Learning ($\beta = 0.245$) and Mindful Learning ($\beta = 0.231$). The effect size results indicate that all direct effects contribute meaningfully to the explained variance in Deep Learning, although their magnitude remains within the small-effect category. Regarding the moderating effects, DPSE significantly strengthens the relationships between Meaningful Learning, Mindful Learning, and Joyful Learning and Deep Learning. Among these moderating effects, the interaction between Mindful Learning and DPSE exhibits the largest effect size ($f^2 = 0.122$), suggesting that digital pedagogical confidence plays a particularly important role in enhancing the effectiveness of reflective and self-regulated learning processes. Conversely, the moderating effects associated with Meaningful Learning ($f^2 = 0.018$) and Joyful Learning ($f^2 = 0.016$) are statistically significant but demonstrate relatively limited practical contributions.

The results indicate that Meaningful Learning has a positive and significant effect on Deep Learning ($\beta = 0.280$, $t = 2.715$, $p = 0.007$). This finding can be explained through constructivist learning theory, which posits that knowledge is actively constructed when learners integrate new information with their existing cognitive structures. When students perceive learning materials as relevant to their prior experiences and future professional goals, they are more likely to engage in elaboration, reflection, and conceptual integration. Consequently, learning shifts from simple memorization toward deeper cognitive processing. In the context of accounting education, students are required not only to understand accounting concepts but also to apply them to authentic professional situations. Meaningful Learning therefore facilitates the development of conceptual understanding and professional reasoning that characterize Deep Learning. This finding is consistent with previous studies emphasizing the importance of connecting new knowledge with prior cognitive frameworks to promote deeper understanding and knowledge transfer (Bryce & Blown, 2024; Polman et al., 2021).

The findings reveal that Mindful Learning positively influences Deep Learning ($\beta = 0.231$, $t = 3.258$, $p = 0.001$). From a metacognitive perspective, mindful learning encourages learners to monitor, regulate, and reflect upon their cognitive processes. Students who learn mindfully tend to be more aware of how they acquire knowledge, evaluate their understanding, and adjust their learning strategies when encountering difficulties. Such reflective processes promote deeper cognitive engagement and reduce reliance on surface-level learning approaches. In accounting education, where analytical thinking and problem-solving skills are essential, mindful learning enables students to critically evaluate information and construct more meaningful interpretations of accounting concepts. This finding supports previous studies that highlight the role of mindfulness in fostering cognitive flexibility, reflection, and higher-order thinking skills (Cochran & Parker Peters, 2023; Santi et al., 2024).

Joyful Learning was found to have a positive and significant effect on Deep Learning ($\beta = 0.245$, $t = 3.216$, $p = 0.001$). This finding can be interpreted through the broaden-and-build theory, which suggests that positive emotions expand individuals' cognitive resources and encourage exploration, creativity, and sustained engagement. Students who experience enjoyment during learning are more likely to participate actively, invest effort in understanding concepts, and persist when facing academic challenges. In accounting education, positive learning experiences may reduce anxiety associated with quantitative and analytical tasks, thereby enabling students to focus more effectively on conceptual understanding. Consequently, joyful learning supports not only motivation but also deeper cognitive processing and knowledge retention. These findings are consistent with prior studies emphasizing the contribution of positive emotions to meaningful and sustainable learning outcomes (Bhakti et al., 2018; Sundaram & Ramesh, 2022).

The results indicate that DPSE significantly moderates the relationship between Meaningful Learning and Deep Learning ($\beta = 0.092$, $t = 2.134$, $p = 0.032$). This finding suggests that students who possess greater confidence in using digital technologies for pedagogical purposes are better able to transform meaningful learning experiences into deeper conceptual understanding. From the perspective of Social Cognitive Theory, self-efficacy influences how individuals utilize available resources, persist in challenging situations, and regulate their learning behaviors. Students with high DPSE are more likely to use digital tools to explore additional learning resources, connect concepts across multiple sources, and engage in reflective learning activities. Although the moderating effect is statistically significant, its effect size is relatively small ($f^2 = 0.018$), indicating that DPSE provides only a limited practical contribution in strengthening the relationship between Meaningful Learning and Deep Learning.

The results indicate that DPSE significantly strengthens the relationship between Mindful Learning and Deep Learning ($\beta = 0.190$, $t = 4.106$, $p < 0.001$). This finding suggests that students with higher levels of digital pedagogical confidence are better able to transform mindful learning experiences into deeper conceptual understanding. From the perspective of Social Cognitive Theory, self-efficacy influences individuals' motivation, self-regulation, and persistence in performing complex tasks. In digital learning environments, students who possess strong DPSE are more likely to utilize technological tools to support reflection, monitor their learning progress, and engage in self-directed learning activities. Consequently, mindful learning becomes more effective because students can combine reflective awareness with the strategic use of digital resources to deepen their understanding of concepts.

This finding is particularly relevant in accounting education, where students are required to engage in critical analysis, problem-solving, and reflective evaluation of financial information. Digital platforms, simulations, and online learning resources provide opportunities for students to practice these higher-order cognitive processes. Students with high DPSE are more capable of leveraging such technologies to support mindful learning practices, thereby enhancing Deep Learning outcomes. The relatively larger effect size of this moderating relationship (f^2 = 0.122) compared to the other moderation effects suggests that DPSE plays a particularly important role in strengthening reflective and self-regulated learning processes. This finding supports previous studies emphasizing that digital competence and self-efficacy enhance learners' ability to engage in reflective and cognitively demanding learning activities (Hakim et al., 2023; Weng et al., 2022).

The findings reveal that DPSE significantly moderates the relationship between Joyful Learning and Deep Learning (β = 0.120, t = 2.110, p = 0.045). This result indicates that students who possess greater confidence in using digital technologies for pedagogical purposes are more capable of transforming enjoyable learning experiences into deeper learning outcomes. Digital technologies can enrich joyful learning through interactive media, collaborative platforms, simulations, gamified learning environments, and multimedia resources that increase student engagement and participation. When students feel confident in utilizing these technologies, positive learning experiences are more likely to translate into meaningful cognitive engagement and conceptual understanding.

However, the effect size of this moderating relationship is relatively small (f^2 = 0.016), indicating that although the moderating effect is statistically significant, its practical contribution is limited. This suggests that positive emotions and enjoyment in learning may already exert a direct influence on Deep Learning regardless of students' level of digital pedagogical confidence. In other words, while DPSE can strengthen the effectiveness of Joyful Learning, its additional contribution beyond the direct effect of Joyful Learning appears relatively modest. This finding nevertheless supports previous studies indicating that technology-enhanced learning environments can increase student engagement and motivation, thereby creating conditions that facilitate deeper learning processes (Azzahra & Fauzan, 2023; Bhakti et al., 2018).

The findings of this study provide several theoretical and practical implications. Theoretically, this study extends the literature on Deep Learning by demonstrating that Meaningful Learning, Mindful Learning, and Joyful Learning collectively contribute to the development of deeper learning outcomes among pre-service teachers. More importantly, the findings highlight the role of DPSE as a contextual factor that strengthens the effectiveness of these learning approaches, thereby supporting the assumptions of Social Cognitive Theory regarding the importance of self-efficacy in shaping learning behaviors and outcomes. The results also contribute to the growing discourse on technology-enhanced learning by showing that digital pedagogical confidence not only influences technology use directly but can also amplify the impact of humanistic learning experiences on Deep Learning.

Practically, the findings suggest that higher education institutions, particularly teacher education programs, should not focus solely on creating meaningful, mindful, and joyful learning environments. Equal attention should be given to strengthening students' digital pedagogical self-efficacy through technology-integrated learning experiences, digital teaching simulations, and opportunities to engage with pedagogically relevant technologies. Such initiatives may help future teachers maximize the benefits of innovative learning approaches and better prepare them for the demands of digitally oriented educational environments.

CONCLUSION

This study examined the effects of Meaningful Learning, Mindful Learning, and Joyful Learning on Deep Learning, as well as the moderating role of DPSE, among Accounting Education students at the Faculty of Teacher Training and Education. The findings reveal that all three learning approaches significantly enhance Deep Learning, indicating that meaningful cognitive engagement, reflective awareness, and positive learning experiences are important drivers of deeper conceptual understanding. Furthermore, DPSE significantly strengthens these relationships, highlighting the importance of students' confidence in utilizing digital technologies for pedagogical purposes.

This study contributes to the growing literature on Deep Learning by demonstrating that cognitive, reflective, and emotional dimensions of learning should not be viewed independently but rather as complementary elements that collectively support deeper learning outcomes. In addition, the findings extend the application of Social Cognitive Theory by showing that DPSE functions as an important contextual factor that enhances the effectiveness of humanistic learning approaches in digital learning environments. These results provide empirical evidence that digital pedagogical confidence plays a meaningful role in transforming learning experiences into deeper and more sustainable learning outcomes.

From a practical perspective, the findings suggest that teacher education institutions should not only promote Meaningful, Mindful, and Joyful Learning strategies but also strengthen students' digital pedagogical self-efficacy through technology-integrated learning experiences, digital teaching simulations, and reflective technology-based activities. Such efforts may help future teachers develop the competencies required to facilitate deep learning in increasingly digitalized educational settings.

This study is limited to Accounting Education students from a single institution, which may restrict the generalizability of the findings. Future research may involve students from different academic disciplines and educational contexts, employ longitudinal designs, and investigate additional psychological or technological factors that may influence Deep Learning. Such studies may provide a more comprehensive understanding of how humanistic and technology-related factors interact to support meaningful and sustainable learning in higher education.

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