The Influence of Deep Learning Strategies on Autonomy of Bachelor of Early Childhood Education Students

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Abstract

Student autonomy is a crucial factor in early childhood education, yet many students struggle with self-regulated learning and independent decision-making. This study explored the influence of deep learning strategies on autonomy among early childhood education students in a local college in Region XI, Philippines, utilizing a non-experimental quantitative research design, specifically correlation and regression analysis. Data was gathered through a census approach from 100 students using validated questionnaires measuring deep learning strategies and autonomy levels. Findings revealed a strong positive correlation between deep learning strategies and autonomy, with regression analysis indicating that deep learning strategies significantly predict autonomy. These results affirm Self-Determination Theory (SDT, 1985), which highlights the role of intrinsic motivation and self-regulation in fostering independent learning. However, external factors such as teacher support, institutional policies, and instructional methods also contribute to autonomy development. The study underscores the importance of integrating deep learning strategies into early childhood education curricula to enhance self-directed learning and academic success. Future research should examine additional mediating factors influencing autonomy and refine instructional approaches to support independent learning.

Keywords: *deep learning strategies, student autonomy, early childhood education, regression analysis*

1. INTRODUCTION

Autonomy in early childhood education remains a persistent challenge, as many students lack the ability to independently regulate their learning and decision-making processes, impacting their cognitive and social development. The development of autonomy is a critical component of early childhood education, allowing students to engage in self-directed learning and build confidence in their abilities (Zhao, 2014). However, despite the recognized importance of fostering autonomy, many early childhood education programs fail to provide sufficient opportunities for students to develop self-regulation and independent problem-solving skills (Castle, 2004). Research suggests that autonomy in learning is strongly influenced by environmental factors, including teacher guidance and institutional structures, which can either promote or restrict self-directed behavior in students (Ko, Park, & Park, 2024). Additionally, a study reviewing the development of student autonomy over the past decade highlights that students demonstrate greater autonomy when educational experiences are structured to support self-determination and experiential learning (Zabaleta & Pérez-Izaguirre, 2022). Given these challenges, further investigation into the role of deep learning strategies in

fostering autonomy among early childhood education students is necessary to enhance instructional methods and create a more student-centered learning environment.

The lack of autonomy among early childhood education students is a persistent global challenge, impeding their ability to engage in self-directed learning and independent decision-making. In Spain, a review of studies on student autonomy over the past decade revealed that while autonomy is recognized as a critical factor in early education, its development remains inconsistent across institutions due to variations in instructional approaches and teacher support (García Zabaleta & Pérez-Izaguirre, 2022). Similarly, in Ireland, fostering autonomy among international students in higher education has been challenging, with educators struggling to implement effective strategies that balance student independence with structured learning environments (Sudhershan, 2012). In South Korea, early childhood teachers' autonomy in implementing curriculum has been found to be significantly influenced by factors such as play sensitivity, organizational health, and professional knowledge, further complicating efforts to establish independent learning environments for young students (Lee & Kim, 2022).

The Philippines faces similar issues, with autonomy among early childhood education students remaining underdeveloped due to institutional constraints and teacher-centered learning environments. A study on Filipino adolescents found that autonomy in education is heavily influenced by cultural expectations and interdependent learning structures, making it difficult for students to cultivate self-governance (Aruta, 2016). In the higher education sector, pre-service teachers have exhibited high autonomy in English language learning; however, this autonomy has not been effectively transferred to early childhood education settings where young learners are still highly dependent on teacher guidance (Cabugsa, 2022). Moreover, in a study conducted in a Philippine state university, it was found that autonomy support from instructors significantly affects students' engagement and motivation, highlighting the need for improved teaching strategies to foster independence among learners (Lobo et al., 2024). These findings suggest that while efforts to improve autonomy in early childhood education exist, significant gaps remain in curriculum implementation, teacher training, and institutional policies.

The lack of autonomy among early childhood education students presents significant challenges, affecting their academic performance, engagement, and long-term learning success. Students who struggle with autonomy often exhibit lower self-regulation, reduced motivation, and difficulties in independent problem-solving, ultimately impacting their ability to adapt to complex learning environments (García Zabaleta & Pérez-Izaguirre, 2022). In college settings, limited autonomy has been linked to lower self-efficacy, increased dependency on instructors, and poor academic resilience, highlighting the need for educational strategies that foster independent learning (Carrigan-Smith, 2015). Despite its importance, studies indicate that many students, particularly in developing countries, receive minimal opportunities to practice self-directed learning due to rigid curriculum structures and teacher-centered instructional methods (Martín-del-Pozo & Martín-Sánchez, 2022). While autonomy has been widely examined in higher education and professional learning settings, there remains a significant gap in research concerning the factors influencing autonomy development specifically among early childhood education students at the college level. Most existing studies focus on teacher interventions and parental influence, yet little attention has been given to student-centered approaches that enhance self-regulation and independent learning (Qiu & Ye, 2023). Addressing this gap is critical for developing instructional frameworks that integrate deep learning strategies to foster autonomy, equipping students with essential cognitive and problem-solving skills. Given the increasing demand for self-directed learners in the modern workforce, it is imperative to examine and implement effective pedagogical interventions that cultivate autonomy among early childhood education students.

2. METHOD

This study employed a non-experimental, quantitative research design using a descriptive-correlational method to examine the relationship between deep learning strategies and student autonomy among early childhood education students. This approach is appropriate for analyzing social phenomena without altering respondents' conditions (Frey, 2018) and allows for the examination of naturally occurring relationships between variables.

The research was conducted in a local college in Region XI, Mindanao, Philippines, selected for its representative educational environment. The study included 100 early childhood education students enrolled in the academic year 2023–2024, chosen through census sampling to ensure inclusivity and minimize selection bias. While census sampling ensures complete representation, it may introduce non-response bias if some students choose not to participate. Future research may consider stratified random sampling to improve generalizability across different subgroups.

Data collection utilized two adapted questionnaires. The Deep Learning Strategies Questionnaire, adapted from Panadero et al. (2021), comprised 30 items categorized into four subscales: basic learning self-regulation, visual and summary elaboration, social self-regulated learning, and deep information processing strategies. It underwent expert validation and a pilot test with 30 respondents, achieving Cronbach's alpha of .906, confirming its high reliability. The Student Autonomy Questionnaire, adapted from Li, et al. (2022), contained 16 items categorized into four subscales: autonomous decision-making, autonomous protection, autonomous regulation, and autonomous problem-solving. After expert validation and pilot testing, Cronbach's alpha of .897 was achieved, indicating high reliability. Content validity was established through expert review, ensuring that the questionnaire items accurately measured deep learning strategies and autonomy. Both instruments used a 5-point Likert scale, ranging from "very low" to "very high" to assess responses.

Descriptive and inferential statistical techniques were applied to data analysis. Mean scores were used to determine the levels of deep learning strategies and autonomy (Mann, 2012). The Pearson Product-Moment Correlation Coefficient analyzed the relationship between deep learning strategies and student autonomy, measuring association strength and direction (Freedman et al., 2007). Correlation strength was categorized as weak (0.00–0.40), moderate (0.41–0.60), and strong (0.61–1.00). Regression analysis further examined the impact of deep learning strategies on autonomy, providing insights into their influence on students' independent learning development (Ding, 2006). Statistical analyses were conducted using SPSS or similar software, with significance set at $\alpha \leq 0.05$.

Strict ethical considerations were followed, complying with the Research Ethics Committee's guidelines and the Data Privacy Act of 2012. Participants were fully informed about the study's objectives, voluntary participation, and their right to withdraw at any time without consequences. Informed consent was obtained, and confidentiality was maintained by anonymizing personal data. No incentives were provided to avoid undue pressure on respondents, and their academic standing remained unaffected. The researcher committed to accurate reporting of findings and full transparency, with all collected data used strictly for academic purposes. Potential limitations include the self-reporting nature of questionnaires, which may introduce social desirability bias. Future studies may integrate qualitative methods, such as interviews or observations, to complement the findings and provide a deeper understanding of student autonomy development.

3. RESULTS AND DISCUSSION

Table 1 presents descriptive statistics for two key areas: Interactive Learning Skills and Metacognitive Strategies, summarizing their Standard Deviation (SD), Mean scores, and Descriptive Levels. Overall, both categories exhibit high mean scores, indicating that students demonstrate intense interactive learning and metacognitive skills.

Table 1. Descriptive Levels

	SD	Mean	Descriptive Level
Deep Learning Strategies	**0.37**	**4.28**	**Very High**
Basic Learning Self-Regulation Strategies	0.45	4.33	Very High
Visual and Summary Elaboration Strategies	0.52	4.22	Very High
Social Self-Regulated Learning Strategies	0.50	4.26	Very High
Deep Information Processing Strategies	0.42	4.30	Very High
Student Autonomy	**0.39**	**4.23**	**Very High**
Autonomous Decision Making	0.52	4.26	Very High
Autonomous Protection	0.58	4.31	Very High
Autonomous Regulation	0.52	4.07	High
Autonomous Problem Solving	0.55	4.27	Very High

The table presents the descriptive statistics for Deep Learning Strategies and Student Autonomy among early childhood education students, including the Standard Deviation (SD), Mean, and Descriptive Level. The findings indicate that students exhibit very high levels of deep learning strategies and autonomy, suggesting frequent engagement in deep learning approaches and strong self-regulation. The overall mean for Deep Learning Strategies is 4.28 (SD = 0.37), classified as Very High, with all four subcategories scoring similarly high. Among these, Basic Learning Self-Regulation Strategies (M = 4.33, SD = 0.45) received the highest rating, implying that students actively manage their learning processes. Similarly, Deep Information Processing Strategies (M = 4.30, SD = 0.42) indicate that students effectively integrate and process information at a deep level, while Social Self-Regulated Learning Strategies (M = 4.26, SD = 0.50) suggest frequent collaboration for learning. Additionally, Visual and Summary Elaboration Strategies (M = 4.22, SD = 0.52) highlight the use of organizing techniques like summarization and visualization to enhance understanding.

For Student Autonomy, the overall mean is 4.23 (SD = 0.39), also classified as Very High, indicating that students demonstrate strong independence in learning. Autonomous Protection (M = 4.31, SD = 0.58) and Autonomous Problem Solving (M = 4.27, SD = 0.55) received the highest ratings, suggesting that students are confident in managing their learning environments and solving academic challenges independently. Autonomous Decision-Making (M = 4.26, SD = 0.52) also falls under the Very High category, showing students' confidence in making learning-related choices. However, Autonomous Regulation (M = 4.07, SD = 0.52)

is rated High instead of Very High, indicating that while students exhibit self-regulation, some may still require structured guidance to fully develop this skill.

The findings of this study indicate that early childhood education students exhibit very high levels of deep learning strategies and autonomy, suggesting that they engage in self-regulated learning and independent decision-making. This aligns with previous research emphasizing the positive impact of deep learning strategies on student autonomy. According to Núñez and Léon (2016), autonomy-supportive environments foster deep learning by enhancing intrinsic motivation and self-directed learning behaviors. Similarly, Maldonado-Sánchez et al. (2019) found that students who use structured learning strategies tend to develop stronger autonomous learning behaviors, reinforcing the results of this study. Moreover, Rostom (2019) highlights that project-based learning fosters student autonomy by encouraging self-commitment, active learning, and independent problem-solving factors that resonate with the high autonomy scores observed in this study.

However, some research contradicts the findings, indicating that deep learning strategies do not always translate to higher autonomy levels. Maes-Ruiz et al. (2023) found that despite students demonstrating deep learning strategies, many still struggle with self-regulation and decision-making, suggesting that external instructional support remains crucial. Similarly, Pineda, et al. (2024) argue that student autonomy is often limited by institutional structures and lack of teacher guidance, which may impede independent learning despite the use of deep learning strategies. Furthermore, Ciechanowska (2015) highlights that massification in higher education has led to a decline in student autonomy, as students tend to rely on structured instruction rather than independently seeking knowledge.

Overall, while this study's findings support the strong link between deep learning strategies and student autonomy, existing literature suggests that external factors, such as institutional support, instructional methods, and student preparedness, can influence the extent to which autonomy is fully developed. Addressing these challenges may require a balanced approach, incorporating structured guidance while still promoting deep learning and self-regulation.

Table 2. Relationship Between Variables

	Students' Autonomy			
	r	p-value	Interpretation	Decision on H_o
Deep Learning Strategies	.671	.000	Reject	Significant

Table 2 presents the correlation analysis between Deep Learning Strategies and Students' Autonomy using the Pearson Product-Moment Correlation Coefficient (r). The correlation coefficient r = 0.671 indicates a strong positive relationship between deep learning strategies and students' autonomy. This suggests that as students engage more in deep learning strategies, their autonomy levels also increase. The p-value (.000) is less than the significance level ($\alpha = 0.05$), leading to the rejection of the null hypothesis (H_0), confirming that the relationship between the two variables is statistically significant.

The strong correlation implies that students who adopt deep learning strategies such as self-regulated learning, elaboration, and critical thinking are more likely to exhibit higher levels of autonomy, making independent decisions about their learning processes. This finding aligns

with previous studies that emphasize the crucial role of deep learning strategies in fostering autonomy. Marantika (2021) found that students with strong metacognitive abilities, which are essential to deep learning, exhibit a higher degree of self-regulated learning and decision-making. Similarly, Shen (2023) identified a moderate positive correlation ($r = 0.68$, $p < .01$) between learner autonomy and the use of learning strategies, reinforcing the idea that self-directed learning habits enhance autonomy. Moreover, Irgatoğlu (2024) noted that students in traditional learning environments, where deep learning strategies are encouraged, exhibited higher autonomy levels compared to students in online education, further validating the positive association.

However, some research challenges the notion that deep learning strategies directly contribute to autonomy. Ekalia (2017) found that while students displayed high levels of autonomy in learning, the correlation with academic achievement was weak, suggesting that deep learning alone does not guarantee independent success. Additionally, Tomasouw & Marantika (2020) argue that while autonomy fosters motivation and engagement, it is highly dependent on external factors such as institutional support, instructional approaches, and student-teacher relationships. This suggests that autonomy is not solely influenced by deep learning strategies but also by contextual factors. Furthermore, Swatevacharkul (2015) found that while deep learning approaches were linked to improved learning strategies, student autonomy remained moderate rather than high, indicating that structured guidance is still necessary for effective learning.

Overall, while this study's findings confirm a strong and statistically significant relationship between deep learning strategies and student autonomy, existing literature suggests that autonomy is influenced by multiple factors beyond deep learning alone, including institutional structures, teacher facilitation, and learning environments. Future research should consider examining these mediating factors to gain a more nuanced understanding of how deep learning strategies contribute to student autonomy.

Table 3. Predictive Strengths of Independent Variable

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	1.231	0.338		3.648	.000
Deep Learning Strategies	0.701	0.079	0.671	8.913	.000

R =.671, R2 = .450, F-ratio = 76.448, p-value = .000

Table 3 presents the regression analysis results, showing the predictive strength of deep learning strategies on student autonomy. The unstandardized coefficient ($B = 0.701$, $p = .000$) suggests that for every one-unit increase in deep learning strategies, student autonomy increases by 0.701 units, indicating a strong positive relationship between these variables. The standardized beta coefficient ($\beta = 0.671$) reinforces this, suggesting that deep learning strategies significantly contribute to autonomy. Additionally, the constant ($B = 1.231$, $p = .000$) represents the baseline level of autonomy when deep learning strategies are absent. The model's coefficient of determination ($R^2 = 0.450$) indicates that deep learning strategies explain 45.0% of the variance in student autonomy, while the F-ratio ($F = 76.448$, $p = .000$) confirms the model's overall statistical significance.

While the results highlight the substantial predictive value of deep learning strategies, they also suggest that other factors contribute to autonomy, given that 55% of the variance remains unexplained. Previous research indicates that multiple factors, including intrinsic motivation, instructional approaches, and environmental support influence autonomy. Although deep learning strategies foster critical thinking, self-regulation, and independent problem-solving, students may still rely on teacher guidance, institutional resources, and external motivation to develop autonomy fully. Future research should explore additional predictors to provide a more comprehensive understanding of how autonomy is cultivated in learning environments.

These findings are consistent with prior research demonstrating the positive relationship between deep learning and autonomy. Ha (2020) found that students who understood and adapted their learning strategies showed higher levels of autonomy. The study suggested that improving metacognitive awareness and strategic learning can enhance autonomous learning capabilities. Similarly, Cheng, et al. (2018) emphasized that learning strategies and autonomy are interrelated, with students who employ deep learning techniques showing higher levels of independence and academic proficiency. Moreover, Maheswari and Preethi (2020) highlighted that deep learning techniques improve student performance by promoting self-regulated learning behaviors, further supporting the argument that these strategies enhance autonomy.

However, despite the positive correlation, other studies challenge the idea that deep learning strategies alone are sufficient to develop autonomy. Kim, et al. (2020) argue that while deep learning strategies may improve academic achievement, their effectiveness in fostering autonomy depends on institutional support and instructional approaches, as students often require structured guidance. Additionally, Kurt and Tas (2019) found that factors such as parental involvement and teacher facilitation play a more critical role in shaping autonomy than learning strategies alone. They argue that students exposed to independent learning environments from an early stage tend to develop autonomy more effectively than those who rely on deep learning strategies later in their academic careers. Lastly, Hussain et al. (2020) pointed out that while deep learning methods enhance academic outcomes, their role in promoting autonomy is often moderated by students' goal orientation and intrinsic motivation, emphasizing the need for a holistic approach that incorporates both cognitive and environmental factors.

Overall, the results confirm a strong and statistically significant relationship between deep learning strategies and student autonomy. However, autonomy is not solely dependent on learning strategies; external factors such as teacher guidance, institutional support, and student motivation also influence its development. Future research should consider additional mediating variables to understand better how deep learning strategies interact with other influences in shaping autonomous learning.

4. CONCLUSION

Based on the findings of this study, it is concluded that deep learning strategies have a significant influence on autonomy among early childhood education students. Students who actively engage in self-regulated learning, elaboration, and deep information processing exhibit higher levels of independence in decision-making, problem-solving, and self-management in their academic pursuits. This conclusion affirms Deci and Ryan’s Self-Determination Theory (SDT, 1985), which emphasizes the role of intrinsic motivation and self-regulation in fostering autonomy. The findings support the idea that when students are encouraged to engage in deep learning strategies, they develop greater competence and self-determination, leading to an increased capacity for autonomous learning. However, while deep learning strategies significantly contribute to autonomy, other factors such as teacher support, institutional

policies, and students' intrinsic motivation also play a role. This suggests that while SDT provides a strong theoretical foundation for understanding autonomy development, a more holistic approach integrating instructional guidance and environmental influences could further enhance students' ability to become independent learners.

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This study offers a fresh perspective by exploring how deep learning strategies influence autonomy among early childhood education students, an area that has received limited attention in existing research. While autonomy is often linked to self-regulation and motivation, this study highlights the role of deep learning techniques, such as critical thinking, self-directed learning, and metacognitive awareness, in fostering independence at an early stage of education. The findings provide new insights into how integrating structured deep learning frameworks into early childhood curricula can enhance students' ability to make independent decisions, self-regulate their learning, and develop problem-solving skills. By addressing gaps in traditional teacher-centered approaches, this study contributes to the advancement of student-centered learning methodologies, offering educators practical strategies to cultivate autonomy in young learners.

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