Self-efficacy among Nursing Students in Online Learning: A Cross-sectional Study in Banten

Hohi Hoschinthya Lobo Djingi[1], Indah Pratiwi Pomali[2], Vamy Christine Pellondou[3], Riama Marlyn Sihombing[4*], Komilie Situmorang[5]

[1]Siloam Hospital Kupang, East Nusa Tenggara, Indonesia.
[2]Siloam Hospital Purwakarta, West Java, Indonesia
[3]Siloam Hospital T.B Simatupang, South Jakarta, Indonesia
[4]Faculty of Nursing, Universitas Pelita Harapan, Tangerang, Banten 15811, Indonesia
[5]Faculty of Nursing, Universitas Pelita Harapan, Tangerang, Banten, Indonesia
[*] Corresponding Author:
Email: riama.sihombing@uph.edu

Abstract.

An increasingly important part of nursing education is online learning. Students' self-efficacy, or their confidence in their capacity to complete academic assignments, is a key factor in determining their level of engagement, performance, and flexibility in digital settings. Recent research suggests that among nursing students, self-efficacy is positively correlated with academic achievement, learning engagement, and preparedness for e-learning. The study aimed to characterize the degree of self-efficacy among online learning nursing students. This study applied a cross-sectional, descriptive design with 295 undergraduate nursing students at one private university in West Indonesia. The method employed was total sampling. A 14-item Likert-type questionnaire based on Bandura's dimensions (level, strength, and generality) was used to gauge self-efficacy. The instrument demonstrated good internal consistency (Cronbach's α = 0.944) following verification in a pilot test. Google Forms was used to gather data online between February and March of 2021. The findings revealed 23.7% of students demonstrated high self-efficacy, whereas 53.2% of students have moderate self-efficacy and 23.1% of respondents found low self-efficacy. Nursing students who have high self-efficacy expressed more confidence in their ability to manage online tasks, finish projects, and handle technical challenges. These results are consistent with new research showing that technology readiness, online learning satisfaction, device accessibility, and structured pedagogical approaches all boost online learning self-efficacy. In general, nursing students showed moderate levels of self-efficacy when learning online. Learning outcomes can be maximized by enhancing self-efficacy through improved learning design, increased technical assistance, and readiness-building initiatives.

Keywords: *Academic success; computer-assisted instruction; cross-sectional studies; nursing students; self-efficacy and technology.*

I. INTRODUCTION

Swift progress in digital technology, simulation, and virtual instructional design has rendered online learning a crucial element of current nursing education. Online learning refers to education conducted via the internet, where instructors and learners do not engage in face-to-face interactions[1]. Previous studies indicated that nursing students encounter hurdles in online learning, including internet connectivity issues, insufficient learning resources, difficulties in completing assignments post-lectures, and anxiety stemming from a lack of comprehension of the material presented[2]. Iskandar et al. (2020)[3] reported that 56.6% of nursing students express dissatisfaction with online lectures, with many encountering challenges related to internet connectivity and data limitations. Despite this, students engage with instructors through platforms such as Classroom, Edmodo, Google Meet, Zoom, and WhatsApp Groups, all of which rely on internet access. Certain literature indicated that not all learners would achieve success in online learning, owing to variations in ambient conditions and learner characteristics. A notable achievement of online learning is the motivation exhibited by students. Schunk[4] asserts that an individual's motivation to study significantly enhances their passion for learning.Elliot[5] identifies several aspects influencing student learning motivation, including anxiety, attitude, curiosity, locus of control, learned helplessness, self-efficacy, and cooperative learning; thus, self-efficacy is a significant determinant of learning motivation.

Academic self-efficacy, or students' confidence in their capacity to organize and carry out learning tasks, is a reliable indicator of engagement, perseverance, and success, even in blended or online learning environments. Self-efficacy is favorably correlated with results in synchronous, blended, and technology-rich forms, according to recent syntheses; impacts might be less pronounced in strictly asynchronous contexts[6]. Higher online learning self-efficacy in nursing education, in particular, is associated with increased preparedness and academic success and can be improved through instructional practices that increase presence, interaction, and technology confidence.[7] Studies from several countries demonstrate that academic self-efficacy is positively connected with student achievement in synchronous, asynchronous, and hybrid learning contexts. A recent literature review suggests that academic self-efficacy is a strong predictor of performance in mixed or blended learning environments, but its impact may be somewhat reduced in entirely asynchronous online contexts. Studies in the Middle East and Europe indicate that factors like institutional readiness, structured instructional design, and technological assistance significantly improve self-efficacy and academic achievement in health sciences and nursing students[7]. A 2024 cross-institutional study indicated that nursing students prepared for online learning exhibited greater confidence in their academic capabilities, hence reinforcing the notion that online education may enhance student performance[6].

Data from Asia, specifically Indonesia and India, demonstrates that while online learning increased stress and burnout in some nursing groups, moderate to high self-efficacy alleviated negative consequences. Indonesian nursing students with moderate self-efficacy experienced less burnout during remote learning and demonstrated enhanced academic perseverance, despite increased workload and technological challenges[8]. Comparable findings from India indicated that nursing students' self-efficacy in online learning significantly fluctuated based on their preparedness for digital education and prior experience with online learning[9]. In Turkey, comprehensive surveys indicated that online learning self-efficacy is significantly influenced by device accessibility, technological proficiency, and satisfaction with online education—factors that collectively explained over fifty percent of the variance in students' self-efficacy levels[10]. Comparable trends were observed in Egypt and Saudi Arabia, where self-directed learning readiness and online learning self-efficacy were mutually reinforcing, especially among undergraduate nursing students adapting to rapidly evolving digital curricula[11]. An increasing amount of global data indicates that enhancing nursing students' online learning self-efficacy is crucial for preparing them for the ever-evolving digital requirements in education and clinical training.While global research consistently identifies self-efficacy as a key factor in nursing students' online learning effectiveness, gaps remain in the literature. Recent research from Indonesia, India, Turkey, China, the Middle East, and Europe shows that digital preparedness, instructional design, technological accessibility, and psychological stresses like burnout affect self-efficacy levels.

However, much of this international research focuses on correlations, mediators, or cross-cultural comparisons rather than prevalence-based self-efficacy profiles across student populations. Numerous studies use sampling methods that exclude whole academic communities, limiting their applicability for institutional decision-making. Further, context-specific data from Southeast Asia, where online learning has been rapidly adopted but inconsistently supported across institutions, is scarce. Indonesian research links self-efficacy to burnout, yet extensive nursing programs rarely assess students' self-efficacy. Research from China and Europe emphasizes motivation, flow, and modality transitions, but it neglects the need for foundational institutional mapping of self-efficacy for administrators, curriculum developers, and educators[8,12].Given these gaps, institution-level evidence on nursing students' online learning self-efficacy must be prioritized. This data is essential for designing support programs, tailoring interventions, and measuring the mental and academic health of digital learners. A validated and contextually relevant self-efficacy assessment of undergraduate nursing students is the focus of this study. The study, conducted amid extensive online learning exposure, sheds light on students' digital adaptation ability.The study's objectives are dual in nature; match these priorities.

Our goal is to evaluate the prevalence of strong and low online learning self-efficacy among nursing students. Second, it measures the percentage of students with high self-efficacy to help institutions assess their online learners' readiness and resilience. A population-wide design, a validated 15-item self-efficacy

questionnaire with good psychometric properties, and an emphasis on statistically mapping self-efficacy rather than connecting it with other factors make this study unique. This study provides practical institutional data for curricular improvements, digital learning strategies, mental health support, and targeted interventions for at-risk students, unlike previous research from other countries that focused on mediating mechanisms, technological factors, or cultural comparisons. This study contextualizes the findings within a global framework to show that self-efficacy affects engagement, motivation, resilience, and performance across varied geographies, adding to the international conversation on online nursing education.

II. METHODS

Study Design

The study used a non-experimental design with a descriptive quantitative design. Meanwhile, a cross-sectional approach was applied to observe the subject just once and measure the variables through periodic observations beyond a specific time [13]. This current research investigated the self-efficacy of nursing students in the class of 2018 when using online learning.

Study Setting and Participant Characteristics (Eligibility and Exclusion criteria)

The research was carried out at one private university in West Indonesia during the period of online learning associated with the pandemic. The target population consisted of all undergraduate nursing students from the 2018 cohort who were actively participating in virtual learning modalities during the data collection period. A total of 325 students were deemed eligible; after excluding 30 students who had previously engaged in the instrument validation process, the final study population comprised 295 students.A total sampling technique was employed, indicating that everyone within the target population was solicited for participation. This methodology guaranteed thorough representation and mitigated sampling bias—an essential advantage, considering the study's objective of delineating self-efficacy distribution throughout the entire academic cohort.

Instrument

The survey's two parts have been offered to the respondents to complete. Demographic characteristics such as age and gender must be requested in the first part. The second part included 15 Likert-type three-point scoring items that indicated the degree (magnitude), strength, and general dimensions of self-efficacy, which were adapted from previous research. Each question has a 5-point Likert scale with the following answer choices: 1 = always, 2 = frequently, 3 = occasionally, 4 = once time, and 5 = never. Scores were categorized as high, moderate, or low self-efficacy based on the total score. If the overall score was greater than 62, the self-efficacy was high; meanwhile, if the score was between 52 and 62, the self-efficacy was moderate, and if less than 52, the self-efficacy was low.In preparation for data collection, the researcher executed a pilot study involving 30 nursing students at a private university in West Indonesia on January 29, 2021, adhering to the established inclusion criteria, followed by assessments of validity and reliability. Out of the 20 items, five questions exhibited a minimum correlation coefficient below 0.361. The procedure was reiterated by excluding the sixth item, revealing that all assertions were accurate, with the adjusted item-total correlation ranging from 0.409 to 0.853, and Cronbach's Alpha calculated at 0.944.

Data Collection

Permission to conduct this study was obtained from one private university in West Indonesia. Data collection occurred from February to March 2021 through an online questionnaire distributed via Google Forms. Links were disseminated via student communication platforms, including WhatsApp class groups managed by appointed student representatives. Participants voluntarily completed the survey at their convenience, and reminders were distributed to enhance response rates. All respondents received an explanation of the procedure; it required 15 to 30 minutes for participants to fill out the questionnaire. The questionnaire included components that were not difficult to interpret. Upon submission, each response was systematically documented and securely archived for analysis.

Ethical Clearance (Ethical Considerations)

The Research Ethics Committee of one private university in West Indonesia approved the current study before it was conducted with reference number 044/KEPFON/I/2021, on January 21st, 2021. Before

accessing the questions section of the informed consent form, the respondents indicated their permission to participate in the research by ticking the agree box. Respondents who chose the disagree option and decided not to participate in the survey failed to access the questions. Respondents were required to write their first names, which might be shortened or used as a pseudonym on the questionnaire, to preserve their confidentiality. By assuring that only the researchers could access the questionnaire link, this study maintained the confidentiality of the respondents' information. As researchers analyzed the data, they proved that it had to be stored in a locked folder and a computer database that only authorized users could access. After five years, the data must be erased.

Data Analysis

The analysis concentrated on descriptive statistics, consistent with the study's aim of delineating self-efficacy levels within the cohort. Univariate analysis was employed to ascertain frequency distributions, percentages, and summary statistics (mean, median) for self-efficacy scores. Considering the categorical classification of scores (high versus low), results were presented in proportional form to depict the overall distribution within the cohort. The study did not conduct inferential statistical tests as it did not aim to compare groups or evaluate predictors.

III. RESULT AND DISCUSSION

Data was gathered from 295 nursing students in the class of 2018 at one private university in West Indonesia between February and March of 2021. The target for this study was the number of respondents who completed the research link. More than half (55.9%) of respondents are 20 years old, with the average age of students being 20.31 years (SD=0.731) with a minimum of 18 years and a maximum of 23 years. Most of the students were female (n=247; 83.7%). Detailed information about the characteristics of the study respondents is provided in Table 1.

Table 1. Distribution characteristic of respondents (n=295)

Category		n	%
Age (years)	18	1	0.3
	19	26	8.8
	20	165	55.9
	21	89	30.2
	22	12	4.1
	23	2	0.7
Sex	Female	247	83.7
	Male	48	16.3
Total		295	100

Study demographics provide background for assessing students' self-efficacy. In this study, 55.9% of participants were 20 years old, with a mean age of 20.31 years (SD = 0.731), ranging from 18 to 23 years. This age range is typical of undergraduate nursing students worldwide, who balance early adult tasks with higher study. An Iranian multi-center study found a comparable mean age (M = 20.86, SD = 1.75), indicating that self-efficacy, stress, and academic involvement significantly impact learning outcomes in early adulthood[14]. Most students (83.7%) were female, reflecting global nursing program gender distributions. Many Southeast Asian and Middle Eastern nursing studies have shown a female predominance, such as an Indonesian study on burnout and self-efficacy with 78.3% women, reinforcing the concept that nursing is predominantly a female profession[8]. Saudi Arabia and Turkey have a female-dominated nursing program, reflecting global nursing employment patterns[10]. The Saudi survey on online learning self-efficacy largely comprised female nursing students, whose demographics were essential to understanding digital learning motivation and confidence[15]. The age and gender patterns in this study may explain some self-efficacy distribution aspects. Young adult learners (18–23) are still developing self-regulation and digital skills for online education[16,17]. Emotional management, academic stress, and digital readiness affect academic self-efficacy in this population, according to research.

The Iranian study found a strong association between academic self-efficacy, stress, and self-compassion, suggesting that younger learners may have more confidence variability[14]. The findings' efficacy may also depend on female student numbers. Although gender differences in online learning self-

efficacy are inconsistent, some studies suggest that female nursing students may experience increased psychological distress in online learning settings, which may undermine their confidence despite strong academic abilities. According to an Indonesian study, psychological distress was adversely connected with online learning self-efficacy, suggesting that female-dominated groups may be more susceptible to external pressures influencing academic confidence[18].Other evidence suggests that female pupils are self-regulated and driven. The Saudi emergent transition study found that female students were more diligent and experienced with collaborative learning techniques, which led to greater engagement and adaptation to online learning. These data imply that gender interacts with institutional, cultural, and psychological factors in different circumstances[19]. Young adult learners and primarily female students make up your cohort, which matches global nursing student demographics. Their age and gender help explain the moderate-dominant self-efficacy trend. Younger students may still be building digital learning identities, and the largely female groups' emotional dynamics may affect self-efficacy. Consequently, the demographic context contextualizes the study's findings within wider global trends and facilitates the creation of customized treatments that cater to the distinct requirements of young, primarily female nursing students engaged in online education.

Table 2. Distribution and average value of self-efficacy of the respondents (n=295)

Variable		n	%	Mean	SD	Median	Range min-max
Self-efficacy	High	70	23.7	56.47	9.019	57.00	21-75
	Moderate	157	53.2				
	Low	68	23.1				
Total		295	100				

Table 2 reveals that as many as 157 (53.2%) students have moderate self-efficacy, with comparable numbers in the high (n = 70; 23.7%) and low (n = 68; 23.1%) categories, suggesting a predominant average confidence profile with significant extremes at both ends. The mean self-efficacy score was 56.47 (SD = 9.019; median = 57; range = 21–75), indicating that performance generally concentrated in the mid-to-upper range of the scale, with sufficient variability to reflect individual differences. These results align with the broader literature, indicating that nursing students often report mid-range self-efficacy levels during online or hybrid learning. Previous study[7] found that academic self-efficacy among nursing students was moderately high and significantly related to e-learning readiness, suggesting that students with stronger technological and learning readiness tend to exhibit higher academic confidence.

Likewise, the Indonesian study among first-year nursing students reported 72.5% at a moderate level of academic self-efficacy, though with a lower proportion at the low (13%); the authors also noted that moderate self-efficacy co-occurred with substantial burnout, highlighting the vulnerability of students who are not yet confident enough to buffer stressors in online learning[8]. Further, a study of undergraduates in Yogyakarta found student self-efficacy profiles dominated by the moderate category, reinforcing that moderate—not high—tends to be the central tendency in many Indonesian settings[18]. Conversely, Demirelli & Karaçay (2024) found elevated total online learning self-efficacy scores among nursing students (M = 74.54 ± 14.42). Their participants exhibited greater digital learning readiness, suggesting that their confidence levels were typically superior to the moderate levels noted in the current study[10]. The disparity may indicate variations in technology assistance, digital literacy, or institutional proficiency in online education.

Table 3. The average value of self-efficacy indicators for nursing students (n=295)

Dimensions	Mean	SD	Median	Range min-max	Skewness
Magnitude (Level)	18.46	3.185	19.00	8-25	-0.494
Strength	19.61	3.509	20.00	5-25	-0.830
Generality	18.40	3.265	19.00	6-25	-0.356
Overall Self-efficacy	56.47	9.019	57.00	21-75	-0.615

Table 3 demonstrates that, among the three dimensions, strength had the greatest mean (M = 19.61), followed closely by size (M = 18.46) and generality (M = 18.40). This indicates that respondents exhibit strong motivation and persistence (strength), moderate confidence in executing tasks of differing difficulty (magnitude), and comparatively lower confidence across diverse situations (generality).The present study identified the strength component, encompassing motivation, persistence, and determination, as the highest-

scoring dimension. This indicates that students are typically motivated and inclined to persevere through academic difficulties, even in virtual environments. This conclusion is partially consistent with Purwandari et al. (2023), who observed elevated strength ratings but indicated lower overall levels compared to the current study[20]. Their students exhibited only somewhat elevated motivational resilience, whereas the current study's group consistently achieved superior scores across all strength items. This disparity may result from environmental factors, support, or variations in therapeutic expectations. Moreover, the results from Zhou et al. (2025) corroborate the robust efficacy of the strength dimension[12]. The study revealed that accomplishment motivation and learning engagement, which are theoretically linked to the strength dimension, significantly influenced the association between self-efficacy and learning engagement among registered nurses.

This underscores that motivational resilience is a fundamental strength among nursing students, aligning with the findings of the current study.In the present study, magnitude and generality received lower scores than strength, with students demonstrating diminished interest in scheduled learning (magnitude) and reduced confidence in novel or untaught activities (generality). Zhou et al. (2025) discovered that online learning self-efficacy significantly predicted learning engagement, partially mediated by achievement motivation and flow, indicating that the students in their study exhibited elevated adaptive confidence across many learning contexts, a factor associated with universality[12]. Their findings suggest that students might not encounter as much difficulty with unfamiliar activities as participants in the current study. Similarly, Purwandari et al. (2023) identified generality as the lowest-scoring attribute, consistent with the present study, yet saw marginally higher magnitude ratings[20]. The current study's diminished size and generality scores underscore greater difficulties in time-structured learning and task adaptability relative to prior populations.The consistency observed in studies suggests that nursing students consistently demonstrate robust motivational self-efficacy (strength), whereas confidence based on variance (generality) remains the most deficient aspect. This pattern indicates that interventions ought to concentrate on improving adaptability, confidence in unexpected learning tasks, and the transfer of skills across various contexts.

Table 4. Responses to magnitude (level) dimension, all participant responses (n = 295)

Statements	5		4		3		2		1		Mean
	n	%	n	%	n	%	n	%	n	%	
I feel the need to decide on completing nursing tasks during online learning.	73	24.7	122	41.4	79	26.8	20	6.80	1	0.3	3.83
I have a great interest in learning according to the schedule set during online learning.	28	9.5	90	30.5	141	47.8	31	10.5	5	1.7	3.36
I am optimistic about doing nursing tasks during online learning.	53	18.0	150	50.8	70	23.7	20	6.8	2	0.7	3.79
I am developing my skills in nursing practice through online learning.	37	12.5	114	38.6	110	37.3	29	9.8	5	1.7	3.51
I am confident that I can perform and complete online learning nursing tasks.	78	26.4	151	51.2	48	16.3	18	6.1	0	0	3.98

Scale: Always=5, Frequently=4, Occasionally=3, Once time =2, Never=1

Table 4 shows the item range is 3.36 to 3.98, and the strongest support is for "I am confident that I can perform and complete online learning nursing tasks." (mean = 3.98); 77.6% chose "Frequently" or "Always". The mean score for confidence in completing nursing tasks is 3.83, and the mean score for optimism about doing nursing tasks is 3.79. The statement "I have a great interest in learning according to the schedule set during online learning" received a lower endorsement (mean = 3.36), with only about 40% selecting "Frequently/Always". This suggests that schedule-adherent interest is a less significant aspect of magnitude in this group. The majority of students believe they can complete assignments; yet, their enthusiasm for rigid timetables is minimal. This is an opportunity for time-management tools and engagement tactics in virtual classes.In the magnitude dimension, students showed mostly moderate to high confidence in performing online nursing duties, especially regarding performance expectations; nevertheless, their interest in following regimented schedules appeared to be lower than other magnitude indicators.

This pattern aligns with the findings of Demirelli and Karaçay (2024), who demonstrated that nursing students' self-efficacy in online learning is influenced by their happiness with the learning environment and the perceived advantages of online learning, such as flexibility and convenience. Their research found that beliefs in abilities were strong during normal tasks but showed fluctuation when structure and self-management were required[10]. In contrast, El-Gazar et al. (2024) found that students with strong e-learning readiness had a consistently higher level of self-efficacy, suggesting that digital preparedness may mitigate challenges associated with time-regulated learning[7]. The present findings indicate that, contrary to the aforementioned studies, students continue to struggle with adhering to their scheduled online activities, despite their confidence in their academic capabilities.

Table 5. Responses to the strength dimension, all participant responses (n = 295)

Statements	5		4		3		2		1		Mean
	n	%	n	%	n	%	n	%	n	%	
I am aware of my abilities during online learning.	75	25.4	141	47.8	57	19.3	19	6.4	3	1.0	3.90
I am determined to improve my performance during online learning.	74	25.1	145	49.2	54	18.3	17	5.8	5	1.7	3.90
I am committed to completing nursing tasks during online learning.	97	32.9	140	47.5	43	14.6	14	4.7	1	0.3	4.08
I am persistent in completing nursing tasks during online learning.	73	24.7	138	46.8	66	22.4	17	5.8	1	0.3	3.90
I am self-motivated to develop myself during online learning.	70	23.7	129	43.7	76	25.8	17	5.8	3	1.0	3.83

Scale: Always=5, Frequently=4, Occasionally=3, Once time =2, Never=1

Regarding Table 5, the means are always high (about 3.83–4.08), with the highest being "I am committed to completing nursing tasks during online learning." The mean was 4.08, and 80.4% of people said "Frequently/Always". The mean scores for awareness of abilities (3.90), determination to improve performance (3.90), persistence (3.90), and self-motivation to develop (3.83) are the same. The strength dimension constituted the paramount aspect of self-efficacy, as students expressed high levels of commitment, persistence, and self-motivation. The findings align with a previous study[12] who demonstrated that achievement motivation and flow significantly influenced the relationship between self-efficacy and learning engagement among registered nurses. Their findings underscore the importance of intrinsic desire in promoting prolonged engagement, similar to the strong motivational profile shown in the present investigation. In contrast to other studies[20] who reported more moderate strength scores among nursing students, the current cohort appears to demonstrate enhanced motivational resilience. This disparity may arise from variations in the educational environment, instructional methodologies, or the distinct obstacles of online learning that compel students to enhance their self-motivation.

Table 6. Responses to generality dimension, all participant responses (n = 295)

Statements	5		4		3		2		1		Mean
	n	%	n	%	n	%	n	%	n	%	
I respond positively to different situations during online learning.	51	17.3	145	49.2	77	26.1	18	6.1	4	1.4	3.75
I can calmly handle all situations during online learning.	47	15.9	137	46.4	91	30.8	17	5.8	3	1.0	3.71
I use my clinical experience to support my success during online learning.	108	36.6	128	43.4	42	14.2	14	4.7	3	1.0	4.10
I feel confident in performing new tasks during online learning.	39	13.2	133	45.1	105	35.6	15	5.1	3	1.0	3.64
I enjoy working on tasks that have not been taught during online learning.	26	8.8	86	29.2	130	44.1	28	9.5	25	8.5	3.20

Scale: Always=5, Frequently=4, Occasionally=3, Once time =2, Never=1

Table 6 demonstrates that the predominant support is attributed to the statement, "I utilize my clinical experience to excel in online learning." The mean score of 4.10 indicates that students can effectively transfer their clinical knowledge to online environments. Students exhibit moderately favorable perceptions of their ability to respond favorably to various scenarios (mean = 3.75) and to maintain composure in

challenging circumstances (mean = 3.71). They exhibit confidence in undertaking new tasks (mean = 3.64). The least favored item is "I enjoy working on tasks that have not been taught during online learning" (mean = 3.20). Approximately 38% of individuals selected "Frequently/Always", while a significant number indicated "Occasionally" or lower, demonstrating their discomfort or reluctance to undertake jobs for which they have not received instruction.These findings are consistent with a previous study[20] who similarly identified generality as the lowest dimension of self-efficacy among nursing students. Their participants likewise encountered difficulties in utilizing skills in novel or unfamiliar contexts. This indicates a prevalent trend among nursing students: flexibility and ease with novelty are consistently weaker domains. Zhou et al. (2025) demonstrated that students' self-efficacy facilitated their engagement in learning, especially in dynamic situations, partially mediated by motivation and flow[12]. In contrast to the present study, Zhou's cohort demonstrated a greater ability to adjust to diverse academic requirements, either attributable to enhanced involvement or superior resource assistance.

IV. CONCLUSION

This study's results reveal numerous essential variables for educational practice in nursing programs. Students exhibited considerable drive and tenacity, enabling teachers to leverage these characteristics through structured goal-setting activities, consistent feedback, and reflective exercises that maintain student engagement over time. Their lower ratings in adhering to timetables and engaging in scheduled learning routines indicate a need for additional assistance in time management and self-regulation. Incorporating digital planning tools, activity checklists, and structured study routines may enhance student engagement in online learning environments. The reduced confidence students display when faced with unfamiliar tasks highlights the need for scaffolded learning experiences that incorporate clinical case-based activities, sequential demonstrations, and low-stakes simulations to foster adaptability and increase comfort with difficult material.Although this study contributes to the existing body of information, it possesses certain limitations. This cross-sectional study, reliant exclusively on self-reported data, may not fully capture temporal shifts in self-efficacy or the complexities of students' learning experiences.

Self-reported assessments may induce response bias, leading individuals to overestimate or underestimate their confidence levels due to personal interpretation of the question or a desire to present themselves favorably to others. Moreover, the data were sourced from a single institution within a specific online learning environment, which may limit the generalizability of the results. Nursing programs exhibit significant variability in institutional resources, pedagogical approaches, and technological preparedness. The contextual variations may influence self-efficacy outcomes.The study was also unable to assess external factors—such as digital literacy, socioeconomic position, emotional well-being, or home learning environments—that could affect the magnitude, strength, and generality aspects. Future research should address these limitations by utilizing longitudinal methods to track changes in self-efficacy over time and by including a more diverse student population to enhance generalizability. Incorporating qualitative approaches may provide a more thorough knowledge of the factors influencing students' confidence and adaptability, thereby guiding the development of targeted interventions to enhance nursing students' success in increasingly digital learning environments.

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