International Journal of Evaluation and Research in Education (IJERE)
Vol. 14, No. 4, August 2025, pp. 2781~2789
ISSN: 2252-8822, DOI: 10.11591/ijere.v14i4.32610

Assessing education students' self-directed learning experiences for optimal online learning

Marisol Jane M. Beray, Angelica M. Cubero, Robegine G. Casidsid, Rhessan Jade B. Codenera
Department of Teacher Education, College of Industrial Technology and Teacher Education,
Caraga State University-Cabadbaran Campus, Cabadbaran City, Philippines

Article Info

Article history:

Received Aug 28, 2024
Revised Dec 27, 2024
Accepted Mar 1, 2025

Keywords:

Education
Distance learning
Online learning experience
Self-directed learning
Teacher education

ABSTRACT

The advancement of technology enabled the success implementation of online platforms and distance education. Despite its advantages, learners are faced with challenges in the implementation. The study focused on assessing the self-directed learning experiences of education students at Caraga State University Cabadbaran campus, Cabadbaran City, Philippines, in online learning environments. It aimed to assess the self-directed learning experiences concerning learners' learning motivation, learning style, and technology preparedness. The participants of the study were 154 education students at the College of Industrial Technology and Teacher Education utilizing the descriptive survey research design. The study revealed that students are accountable for their learning, completing activities despite distractions and setting attainable goals. Further analysis showed that learners favor audio-visual learning modalities and have strong self-management skills. However, they may feel less motivated when instructors are not available online to supervise them and felt intimidated when using technological devices. It is suggested that the university should continue promoting and implementing self-directed learning approaches when necessary and offer support like training and resources that cater to learners' preferences and needs, ensuring a consistent and inclusive application of self-directed learning methodologies for all the participants.

Corresponding Author:

Marisol Jane M. Beray
Department of Teacher Education, College of Industrial Technology and Teacher Education
Caraga State University-Cabadbaran Campus
T. Curato Street, Cabadbaran City, Agusan del Norte, Philippines
Email: mmberay@csucc.edu.ph

1. INTRODUCTION

The internet, along with advancements in computer technology and online learning platforms like learning management systems, has been fueling the growth of distance education. Moreover, the COVID-19 pandemic that started in early 2020 has fast-forwarded the adoption of distance education [1], [2]. This abrupt transition created a stressful and uncertain environment for faculty and students in conducting classes [3] at the university and various institutions, consequently impacting the teaching and learning experiences of the students [4]. Reported challenges include limited in-person support, communication difficulties, the absence of internet connectivity in remote areas, reduced peer interaction, and the rapid adoption of online technologies [4]–[6]. Due to escalating COVID-19 cases, many schools temporarily closed, prioritizing students' welfare and leading to practicing social distancing while continuing education; some institutions adopted e-learning. However, adapting face-to-face courses to online platforms presented challenges for faculty and students [7]. Moreover, stringent infection control measures, such as quarantine and isolation, hindered student-centered

teaching and learning practices [8]–[10]. The landscape of online education reveals multiple critical gaps that need addressing. The digital divide presents a fundamental challenge, with unequal access to high-speed internet and advanced computing devices creating significant barriers to educational access [11]. Students from diverse backgrounds particularly struggle with accessing digital resources, while educators require continuous professional development to overcome technological barriers and adapt to virtual environments [11]. Mental health support and student engagement have become pressing concerns in remote settings, largely due to limited face-to-face interaction [12]. Furthermore, there is a crucial need to ensure online students receive equitable support services, including academic counseling and mental health resources, matching the level of support available to traditional students [13], [14]. These challenges require coordinated efforts between educational institutions and policymakers to implement comprehensive solutions [11].

Self-directed learning is essential in today's rapidly evolving digital landscape [15]. It empowers individuals to take ownership of their learning by setting goals and determining learning priorities [16]. It can occur within or outside formal educational settings, and digital learning is a critical approach that engages students, unlocks their potential, and combines traditional teaching with independent learning for a more effective, student-focused experience [17], [18]. It involves independently acting, acquiring resources, and evaluating outcomes [6]. However, studies on self-directed learning present several gaps that need to be addressed to improve our understanding of its impact on students' learning experiences. Studies in scientific reasoning revealed that learners under self-directed learning, even adults, often struggle with experimentation. This difficulty usually leads them to draw inaccurate or incomplete conclusions from the information they gather [19]. Moreover, some institutions rely heavily on behavioristic teaching methods. Didactic instruction, such as lectures, remains prevalent across some academic programs nationally and continentally because of large class sizes, learners' expectations, and content coverage.

Meanwhile, traditional methods can be perceived as more convenient and less time-consuming, particularly when adapting existing lecture materials and assessments [20]. Thus, there is a need to deepen our understanding by investigating the self-directed learning experiences of students in specific contexts, such as online learning environments. We must examine how diverse student populations experience and engage in self-directed learning, and the potential of technology to both support and impede these practices requires further exploration [21]. Addressing these research gaps will lead to a more nuanced comprehension of self-directed learning, enabling the development of effective educational strategies that foster student autonomy and lifelong learning. There is a critical need for research examining the impact of various online pedagogical approaches on technology education students' self-leadership behaviors, self-directed learning skills, and attitudes toward online learning in these evolving learning environments.

2. METHOD

2.1. Research design and sampling procedure

A quantitative survey research design [22] was employed to assess the self-directed learning experiences of education students within an online learning context. The study was conducted at Caraga State University Cabadbaran Campus in July 2023. It utilized total enumeration sampling [23] which is a type of purposive sampling technique [24], where the researchers chose to study the entire population [23]. The study selected all 154 participants from the first year, second year, and fourth year enrolled during the academic year 2022-2023. These education students are enrolled in the university's Bachelor of Technical-Vocational Teacher Education (BTVTEd) and Bachelor of Technology and Livelihood Education (BTLEd) programs. They were selected because they have the experience and background required for this study. The third-year teacher education students were not included because they were the participants during the pilot testing of the research instrument.

2.2. Research instrument and validation

This study employed a research instrument that synthesized and adapted from four distinct studies. For parameter 1 (learning motivation), questions were drawn from Yang *et al.* [25] study on self-directed online learning. The learning styles questionnaire was adopted from the University of California, Merced student advising and learning center, and previous studies were employed to assess learning style (parameter 2) [26], [27]. Lastly, for technology preparedness (parameter 3), questions were sourced from Khiat [28] study on measuring self-directed learning. Before the main study, the instrument underwent a rigorous pilot test with third-year BTVTEd and BTLEd students. The pilot testing phase allowed researchers to identify and address ambiguous or unclear items, resulting in significant refinements to the questionnaire's clarity and comprehensibility. Through this iterative process, the researchers ensured that the instrument was well-suited to measure the intended constructs and provided a reliable and valid foundation for the subsequent data collection and analysis.

2.3. Quantification of data

Table 1 shows the scoring and quantification of data for the quantitative analysis of the study which presents the 4-point Likert rating scale for data interpretation. In assessing education students' self-directed online learning experiences, recent research suggests that 4-point Likert scales offer distinct advantages [29]. The measurement framework encompasses distinct numerical ranges with corresponding qualitative descriptors: a score of 1.00 signifies "little extent," while 4.00 represents "very great extent." Intermediate measurements are categorized as: scores ranging from 1.50 to 2.49 indicate "moderate extent," while values between 2.50 and 3.49 denote "great extent." While traditional 5- and 7-point scales include neutral options, the 4-point format encourages definitive responses, potentially providing clearer insights into students' learning patterns and preferences. Current literature indicates that 4-point scales maintain reliability while reducing response burden-particularly valuable in online educational contexts where survey fatigue is a concern [29], [30]. This format can help minimize central tendency bias, leading to more decisive feedback about self-directed learning experiences. However, the researchers carefully weighed the benefits against potential limitations. While forcing choice can yield more definitive data, it is important to ensure this approach does not compromise the authentic representation of students' online learning experiences and attitudes [30].

Table 1. Scoring and quantification of data

Scale options	Score ranges	Interpretation
1	1.00–1.49	Little extent
2	1.50–2.49	Moderate extent
3	2.50–3.49	Great extent
4	3.50–4.00	Very great extent

2.4. Data gathering procedure

The researchers initiated the data collection process by submitting a formal letter of request to the Chancellor of Caraga State University Cabadbaran City. This letter sought authorization to conduct the survey among education students. Upon receiving official approval from the Chancellor's office, the researchers proceeded with the questionnaire distribution through electronic means, specifically using Google Forms [31], [32] to reach the participants. It was utilized because it can easily be accessed online. The Google Form was shared via the class group using the Messenger application. The information needed in the study was collected in eight weeks through the self-administered survey questionnaire to obtain responses that provided reliable participant information [33], [34]. Subsequently, the data was analyzed to determine the participants' responses related to their self-directed experiences.

3. RESULTS AND DISCUSSION

3.1. Learning motivation

The learners' motivation is fundamental to achieving positive results [35], especially in self-directed online learning. Table 2 presents the learning experiences of education students regarding learning motivation. The results revealed that participants reported a high level of online learning experience about motivation, with an overall mean rating of 3.35 on a scale indicating "great extent." The study suggests that participants are generally motivated in their online learning. Notably, the item "My successes and failures inspire me to continue learning" garnered the highest rating of 3.66, indicating that academic achievements, both positive and negative, significantly contribute to maintaining motivation during online classes. It was also followed by "My interaction with others helps me plan for further learning," with a rating of 3.50, which implied that learners' interaction with others during online learning positively improves their motivation [36]. Conversely, the lowest mean rating of 3.08, to the item, "My instructor is available online to supervise me," suggests that the instructor's presence is a crucial factor influencing motivation levels [37], [38].

Further data analysis revealed that participants who reported higher motivation levels also tended to have more positive experiences with online learning overall. Meşe and Sevilen [36] highlighted that a well-designed blended course including online and offline elements will be more efficient than a well-designed face-to-face or a well-designed online course to enhance the students' ability in maximizing their motivation along with proficiency in their enrolled course subjects. These participants were more likely to feel engaged in their coursework, to collaborate effectively with their peers, and to develop strong relationships with their instructors [36], [37]. Moreover, when students are motivated, they generally achieve higher scores on tests or quizzes, showing a deeper understanding of the material and remembering what they have learned for a longer time [39]. In contrast, participants who reported to have lower levels of motivation were more likely

to feel disengaged, isolated, and unsupported in their online learning, which affected their academic performance [40]. These findings highlight the complex interplay between learning experiences and motivation in the online learning environment. While academic achievements can be a powerful motivator, a supportive instructor is also essential for fostering student engagement and motivation by creating an environment that supports students' learning [41]. Additionally, the study implied the critical importance of motivation in shaping online learning experiences by prioritizing motivational strategies, providing proactive support to struggling students, investing in instructor development, and leveraging technology, educators can create online learning environments that foster student engagement, connection, and success [35], [42].

Table 2. Learning experiences in terms of learning motivation

No	Statement	Mean rating	Interpretation
1.	I was able to remain motivated even though the instructor was always not online.	3.08	Great extent
2.	I was able to complete my work even when there were online distractions (e.g., friends, sending emails).	3.32	Great extent
3.	I set targets to achieve for assignments and examinations for each course.	3.31	Great extent
4.	I know what I want to achieve in learning from the program.	3.29	Great extent
5.	I was able to make decisions about my online learning (e.g., selecting online project topics).	3.17	Great extent
6.	The process of writing and posting messages helped me articulate my thoughts.	3.27	Great extent
7.	Regardless of the result or effectiveness of my learning, I still like learning.	3.47	Great extent
8.	My interaction with others helps me plan for further learning.	3.50	Very great extent
9.	I know what I want to achieve in terms of learning from the program.	3.45	Great extent
10.	My successes and failures inspire me to continue learning.	3.66	Very great extent
	Total	3.35	Great extent

3.2. Learning style

Table 3 presents the learning experiences of education students in terms of learning style. The learning style is the condition under which learners can best understand, process, remember, and retrieve the information they are trying to learn [43]. The results overwhelmingly indicated that the participants' learning experiences aligned with their preferred styles, with an overall mean rating of 3.10, which indicated a "great extent." This implied a robust connection between individual learning preferences and overall learning outcomes. Such a finding emphasizes the importance of tailoring educational approaches to accommodate diverse learning styles. On the other hand, item number 9 received the lowest rating of 2.60, which implied that learners have difficulty following oral directions.

Item number 3, "I can remember best by listening to a lecture that includes information, explanations, and discussions," garnered the highest mean score of 3.33. This statistically significant result provides compelling evidence for the participants' prevalence of auditory learning styles. Auditory learners, characterized by their aptitude for processing information through auditory channels, exhibited exceptional recall abilities. This outcome aligns with established cognitive theories that posit distinct learning channels and their corresponding strengths [43]–[45]. The prominence of auditory learning in this context highlights the potential benefits of incorporating auditory elements into instructional designs. Lectures, audio recordings, and group discussions could be particularly effective in facilitating knowledge acquisition and retention of the learners when appropriately utilized [46]. In contrast, audio learning offers limitations in information acquisition and offer challenges to learners with poor internet connectivity [47]. The study further revealed in item number 6 that some participants need help understanding course-related information when presented in audio recording formats, with a mean rating of 2.90. Audio files include the fact that they are not interactive and do not provide the visual elements that learners desire [48].

Thus, to enhance the online learning experience of students, educators should adopt a multimodal approach that incorporates a diverse range of instructional methods, including visual aids, interactive quizzes, written materials, and audio recordings, catering to the varied learning styles of students [49], [50]. While leveraging the strengths of auditory learning through lectures, audio recordings, and group discussions, it is crucial to address the limitations of audio-only formats by supplementing them with visual aids and interactive elements such as transcripts, diagrams, and quizzes. By offering flexibility and empowering learners to choose instructional formats that align with their preferences [51] online educators in the university can foster a more inclusive and effective learning environment, leading to increased student engagement, motivation, and, ultimately, improved learning outcomes. The key lies in recognizing learners' diversity and providing various options, moving away from a one-size-fits-all approach [52].

Table 3. Learning experiences in terms of learning style

No	Statement	Mean rating	Interpretation
1.	In the classroom or on my own, I am able to follow my own plan of learning.	3.24	Great extent
2.	I approached online learning in my own way.	3.14	Great extent
3.	I can remember best by listening to a lecture that includes information, explanations and discussions.	3.33	Great extent
4.	I require explanations of diagrams, graphs, or visual directions.	3.31	Great extent
5.	I was able to understand course-related information when it was presented in video formats.	3.22	Great extent
6.	I was able to understand course-related information when it was presented in audio recording formats.	2.90	Great extent
7.	I was able to take notes when the topic was presented through PowerPoint presentation.	3.08	Great extent
8.	I was able to learn better when I take notes during online discussions.	3.21	Great extent
9.	I have difficulty following oral directions.	2.60	Great extent
10.	I learn better when the discussion involves problem solving.	3.01	Great extent
	Total	3.10	Great extent

3.3. Technology preparedness

The study revealed that participants demonstrated exceptional technological proficiency for academic purposes. It is evident in Table 4 which presents the learning experiences of education students in terms of technology preparedness. The results showed that the internet was an invaluable resource, contributing significantly to their assignment success, as evidenced by the highest mean rating of 3.51, respectively. Its accessibility to a wealth of information is beneficial to the learners. However, while the Internet enhances learning, participants highlighted challenges in discerning, and utilizing relevant online content and felt intimidated when using technological devices with the lowest ratings of 2.32 and 2.41, respectively. Notably, the study indicated that technology readiness is a crucial factor influencing online learning experiences [53], and the learners' self-directed online learning experience reflects their extent of technology preparedness [53].

It is evident that the study further implied that to optimize the learning experiences of students, it is essential to proactively support them in developing their information literacy skills [54], [55] and ensuring technological readiness by providing them with the necessary hardware, software, and internet connectivity to participate fully in online learning. Students who readily embrace technology are more willing to explore and adopt new learning tools and digital communication platforms. This openness often translates into a more positive attitude towards technology-mediated learning experiences. On the other hand, students who experience discomfort or apprehension when interacting with technology may encounter a steeper learning curve when utilizing online learning platforms effectively. Their initial reservations might hinder their ability to navigate digital interfaces and engage with online resources efficiently. Therefore, providing additional support and scaffolding may be necessary to facilitate their transition and ensure they can fully participate in online learning environments [53].

Table 4. Learning experiences in terms of technology preparedness

No	Statement	Mean rating	Interpretation
1.	Internet and technology make learning more interesting	3.49	Great extent
2.	The Internet provides me with a wealth of resources for my assignments.	3.51	Very great extent
3.	I have problems using computer software and hardware.	2.55	Great extent
4.	I feel confident using online learning resources.	3.04	Great extent
5.	I experience difficulties while using online learning materials.	2.69	Great extent
6.	I am very comfortable using a computer.	3.05	Great extent
7.	I do not know how to evaluate and extract relevant information from the Internet for my assignments	2.32	Moderate extent
8.	I feel intimidated whenever I use technological devices.	2.41	Moderate extent
9.	I have difficulty accessing educational sites because of weak internet connection.	2.86	Great extent
10.	I have difficulty keeping up with online discussions because of the lack of access to technological devices.	2.77	Great extent
	Total	2.87	Great extent

4. CONCLUSION

The study centers on assessing education students' self-directed learning experiences for optimal online learning. The findings of the study revealed that learners were generally motivated and accountable for their learning, could set goals, and complete assigned tasks despite distractions. Moreover, they demonstrated high technological preparedness, utilizing the Internet to access and complete their assignments. However, it was also evident that they still prefer to have audio-visual because some learners expressed difficulties in understanding information presented solely in audio formats. Furthermore, it was highlighted that the learners' motivation could be influenced by the lack of online instructor supervision, leading to potential

challenges in maintaining focus and staying engaged in the learning process. The study recommends that the university should continue supporting and implementing self-directed learning approaches to the course subjects offered, provide resources that cater to diverse learning styles and needs of the education learners, and provide training to students enhancing information literacy and technological skills. Additionally, a study on assessing the teachers' strategies for the academic performance of students during the implementation of self-directed online learning is suggested to further support the findings of the study.

ACKNOWLEDGEMENTS

The researchers would like to thank all the people and institutions whose contributions and support have been important in completing this study. Also, we are thoroughly grateful to the participants for their willingness to share their experiences and insights, which have constituted a basis in the shaping of our understanding of them during their self-directed learning journey.

FUNDING INFORMATION

The Caraga State University in Cabadbaran City provided financial support by covering the publication fee for this study. The university's assistance played an important role in ensuring the successful dissemination of the research findings. Its contribution is greatly appreciated, as it facilitated the accessibility of this work to a broader academic audience.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Marisol Jane M. Beray	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	
Angelica M. Cubero	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			
Robegine G. Casidsid	✓		✓	✓	✓	✓	✓		✓		✓			
Rhessan Jade B. Codenera	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest in this study.

ETHICAL APPROVAL

The University currently does not have an institutional board or its equivalent committee for ethical approval; however, this research study complied with all the relevant national regulations and institutional policies in accordance with the tenets of the Helsinki Declaration. Its scholarly work has undergone a rigorous review and evaluation by experts from the Research, Innovation, and Extension Office. The University President approved the scholarly work through the recommendation of the Office of the Vice President for Research, Innovation, and Extension (OVPRIE).

DATA AVAILABILITY

The data supporting this study's findings are available from the corresponding author [MJMB], upon request. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

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BIOGRAPHIES OF AUTHORS

Marisol Jane M. Beray is an instructor III, the technical expert for technology transfer and licensing office (TTLO)/innovation and technology support office (ITSO) of Caraga State University Cabadbaran Campus, Cabadbaran City, Agusan del Norte, Philippines. Marisol is taking her Doctorate at the University of Science and Technology of Southern Philippines in Cagayan de Oro City, Philippines. She researches electronics, techno-vocational education, educational technology, education management, and emerging technologies. She can be contacted at email: mmberay@csucc.edu.ph.

Angelica M. Cubero graduated with a bachelor of Technical-Vocational Teacher Education, majoring in Garments Fashion and Design Technology, from Caraga State University Cabadbaran Campus, Cabadbaran City, Philippines. She holds an NC II certification in Dressmaking. She can be contacted at email: angelica.cubero@csucc.edu.ph.

Robegine G. Casidsid is a bachelor of Technical-Vocational Teacher Education graduate majoring in Food Service Management at Caraga State University Cabadbaran Campus, Cabadbaran City, Agusan del Norte, Philippines. She can be contacted at email: robegine.casidsid@csucc.edu.ph.

Rhessan Jade B. Codenera is a bachelor of Technical-Vocational Teacher Education graduate majoring in Food Service Management at Caraga State University Cabadbaran Campus, Cabadbaran City, Agusan del Norte, Philippines. He can be contacted at email: rhessanjade.codenera@csucc.edu.ph.