

Secondary School Students' Self-Directed Learning with Technology: Levels, Perceptions, and Influencing Factors

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Keywords	Abstract
self-directed learning, self-directed learning with technology, factors influencing self-directed learning with technology	Self-Directed Learning (SDL) with technology plays a significant role in preparing secondary school students to become lifelong learners in today's technological world. Yet, less research has been conducted to investigate this construct among this group of students. This study, therefore, aimed to investigate the levels of secondary school students' SDL with technology, their perceptions of the roles of technology in their SDL, and the factors influencing it. A survey questionnaire was adopted to collect the data from 238 students, followed by semi-structured interviews with 12 students studying at a public secondary school in Cambodia. The study found that although students had positive perceptions of the role of technology in their SDL, particularly in terms of flexibility in learning, offering various learning resources, and enhancing cross-cultural knowledge, the level of students' SDL with technology was not very high. The study yielded four main factors influencing this: a reliable internet connection, classroom experience with technology integration, knowledge of educational technology that could enable their SDL, and supporting technological devices. The findings of this study could provide an overall view of factors contributing to the promotion of SDL with technology among Cambodian secondary school students.

Introduction

Self-directed learning (SDL), necessitating students to independently explore and determine their learning objectives and strategies while integrating diverse learning opportunities and resources throughout their educational journey, has become a cornerstone of lifelong learning. SDL enables personalised and adaptable learning, and, thus, students, as self-directed learners, actively discover and customise their personal learning processes and outcomes (Aulakh et al., 2025; Knowles, 1975; Netasit et al., 2025; Shouchao et al., 2026; Zhao et al., 2024). This is highly significant for lifelong learners who continue to learn beyond the school setting. In Cambodia, to prepare students for a constantly changing world, fostering lifelong learners through SDL has become the main agenda in education policies (e.g., the Ministry of Education, Youth and Sport [MoEYS], 2004, 2019, 2021, 2024).

In this digital age, technology has become an important component of teaching and learning. For instance, with technology students can develop their intercultural knowledge (Bon



& Inpin, 2024), which is essential for students in today's world of mobility, migration, and globalisation (Bon, 2022). However, Shouchao et al. (2026) noted that there is ongoing discussion in academia over the effectiveness of digital technology in supporting students' SDL. In addition, students' perception of technology could determine their behaviour in adopting technology, but little is known about how Cambodian students actually utilise these tools in their SDL and the factors associated with their SDL using technology. Therefore, this study aimed to investigate three main variables: secondary school students' perceptions of technology in their SDL learning, the levels of their SDL with technology, and the factors influencing their SDL using technology.

This study is based on Knowles' (1975) conceptualisation of SDL as a cognitive process, wherein individuals independently or with limited assistance from others engage in activities such as identifying their learning needs, setting their learning goals, selecting learning resources, implementing suitable learning strategies, and evaluating the outcomes of their learning endeavours.

While extensive research (Curran et al., 2019; Lee, 2017; Mohammadi, 2024; Nasri et al., 2020; Rashid & Asghar, 2016; Sumuer, 2018; van Woezik et al., 2019) has investigated SDL at the university level, the research conducted at the secondary education level remains scant, in particular concerning the integration of SDL with technology. Furthermore, students' perceptions of the roles of technology in their SDL could determine their behaviour in using technological tools in their SDL. Yet, this has not been explored in the novel context of Cambodia at the secondary education levels. Therefore, the study aims to fill this gap by providing empirical evidence from a less developed context.

Literature Review

Self-Directed Learning

Self-directed learning (SDL) has become a prominent concept in the field of adult education since the 1970s (Lee, 2017; Loeng et al., 2020; Saks & Leijen, 2014; Voskamp et al., 2022). Parker and Roessger (2020) asserted that the background of SDL could be traced to the influential works of Knowles (1975), while its formalisation as a conceptual framework occurred in the 1970s under the guidance of Tough (1979). SDL presents a contrasting perspective on learning compared to traditional content-centred approaches, in which the teacher is considered to hold all the knowledge and the learner's experience is less important (Loeng et al., 2020; Robinson & Persky, 2020).

There have been some debates in the literature concerning the differences between SDL and self-regulated learning (SRL). As mentioned, SDL has been recognised as a significant concept in adult education since the 1970s. In contrast, SRL, a relatively newer concept, has its roots in educational psychology and cognitive psychology (Saks & Leijen, 2014). These two learning modes differ based on the learners' responsibility (Boroughani et al., 2023). In SDL, students are accountable for the entire learning process (Voskamp et al., 2022), while SRL does not necessitate learners specifying their learning objectives, as they are determined by the instructor (Robinson & Persky, 2020). This could explain why the concept has been a topic of discussion in the field of adult education. Adults are expected to demonstrate greater initiative and assume more responsibility than children (Chukwunemerem, 2023).

Self-Directed Learning (SDL) with Technology

The advent of contemporary mobile learning technologies presents students with the prospect of assuming control over the learning process, both within the confines of the classroom and beyond (Gokcearslan, 2017; Jaleel & Om, 2017). Students' SDL is enhanced by utilising online technologies, viz. Wiki spaces, Moodle, Google Docs, and Facebook, which serve as the primary learning platforms (Sze-Yeng & Hussain, 2010); these enable them to acquire knowledge as and when required (Song & Bonk, 2016). Research has revealed that SDL exerts a substantial influence on the enduring societal requirements of our forthcoming labour force and our perception of the learning process (Timothy et al., 2010). Since SDL with technology is critically significant for students in the digital era, identifying the factors associated with it could offer insightful guidelines on how to promote SDL with technology among students.

Factors Influencing SDL with Technology

Various factors could contribute to SDL with technology. Students' competence in managing their learning needs and space, and accessing and making use of learning resources, could be one factor. The students' abilities to independently guide their learning and effectively utilise available learning and accessible technology can significantly influence their overall learning effectiveness (Geng et al., 2019). In addition, students' perception of the roles of technology in their learning could be another factor. The existing literature indicated that students' perception of the roles of technology in enhancing their learning was a crucial factor (Peart et al., 2017; Popovici & Mironov, 2015). Teaching practice could be another factor influencing students' SDL with technology. Teachers are significant social actors who can affect students' SDL with technology for learning outside of the classroom (Lai et al., 2017). Students often need assistance, particularly when it comes to planning and reviewing SDL, and seek guidance on how to effectively utilise digital technologies for educational purposes (Morris & Rohs, 2023). Teachers can provide such assistance and guidance to support students' SDL with technology. Although the existing literature indicates some factors influencing students' SDL with technology, the factors associated with this construct could vary in different contexts, thereby suggesting the need for a study to be conducted in a novel setting.

Research Objective

The current study aimed to investigate Cambodian secondary school students' level of SDL with technology, their perceptions of the roles of technology in their SDL, and the factors influencing it.

Research Questions

To attain the mentioned objectives, the study addressed the following questions:

1. What are the levels of secondary school students' self-directed learning with technology?
2. What are secondary school students' perceptions of the roles of technology in their self-directed learning?
3. What are the factors influencing secondary school students' self-directed learning with technology?

Methods**Design**

This study employed a mixed-method case study design. The current study involved two designs, namely convergent and explanatory sequential. In the convergent design, the data from a survey

and semi-structured interviews were integrated to examine the students' SDL with technology. In the explanatory sequential design, an interview was also employed to explore the factors influencing their SDL with technology. In the interview, students were also invited to share their perspectives on the role of technology in their SDL.

Research Site and Participants

Two hundred thirty-eight (238) students studying at a public secondary school located in Takeo Province, the Kingdom of Cambodia, were selected using a snowball sampling technique to obtain quantitative data through the survey questionnaire. Among the 238 students who completed the survey questionnaire concerning the level of SDL with technology, 133 (55.9%) were females, and the other 105 (44.1%) were males, and all 238 participants came from six distinct grades: Grade 7 (48), Grade 8 (62), Grade 9 (25), Grade 10 (35), Grade 11 (32), and Grade 12 (36). Twelve ($N = 12$) students were selected through stratified sampling to be interviewed about the factors influencing the level of SDL with technology. The stratified sampling was adopted to select a gender and grade level balance.

Instruments

The survey was employed to investigate levels of SDL with technology. A face-to-face interview was adopted to explore the factors influencing SDL with technology. The survey was developed by Timothy et al. (2010). The survey consisted of six items measuring two aspects, viz. self-management and intentional learning, with a 6-point Likert scale (1 = not at all to 6 = all the time). Since most students encountered difficulties understanding the English language, the research team translated the survey questionnaires into the participants' mother tongue (Khmer). Thus, Cronbach's alpha was also included to test the reliability of the data. Cronbach's alpha is the most popular method employed to examine this reliability (Hinton et al., 2014). Accordingly, the value of Cronbach's alpha was .90 for *Self-Management* and .83 for *Intentional Learning*, which indicated high reliability (Hinton et al., 2014).

The researchers developed semi-structured interview questions. As mentioned, semi-structured interviews were utilised to collect data regarding the factors influencing students' SDL with technology. The interviews were also conducted in the participants' and researchers' native language (Khmer). The semi-structured interview questions were reviewed by the research committee for content validity. Creswell and Creswell (2018) proposed that during an interview, researchers could document information through various methods, including handwritten notes or audio or video recordings. In this study, both handwritten notes and audio recordings were utilised. Three researchers transcribed and translated the recorded data into English. Guest et al. (2012) claimed that validity was more essential than reliability in qualitative research, since qualitative studies seldom repeat their results and unstructured data-gathering does not yield consistent outcomes across participants or time. To ensure validity, we adopted a prolonged time period in the field and peer debriefing as suggested by Creswell & Creswell (2018).

Data Management and Analysis

The Statistical Package for the Social Sciences 20 (SPSS 20) was adopted to analyse the data obtained from the survey questionnaires regarding the levels of secondary school students' SDL with technology. Statistics, including Frequency Count, Percentage (%), Mean (M), and Standard Deviation (SD), were used to report the findings. The key interpretation concerning the levels of SDL with technology divided the 6-point Likert Scales (1-6) into six equal intervals (each ≈ 0.83 units wide), ranging from very low to very high, as seen in Table 1.

Table 1: Key Interpretation of the Levels of Students' Self-Directed Learning with Technology

Range of Mean Scores	Interpretation
1.00 – 1.83	Very Low
1.84 – 2.66	Low
2.67 – 3.49	Moderately Low
3.50 – 4.32	Moderately High
4.33 – 5.15	High
5.16 – 6.00	Very High

Coding was utilised to analyse the data from the interviews. The process of coding involves breaking down text or visual data into smaller categories, searching for evidence in different databases and ultimately assigning a label to each code (Creswell, 2012). Creswell and Creswell (2018) advised researchers to utilise computer software or manual coding; however, hand coding is time-consuming, even for multiple coders working together. Therefore, the researchers utilised the computer software MAXQDA to store the qualitative data gathered from the interviews and facilitate the coding process.

Ethical Clearance

The researchers received approval for data collection from the school principals. All student participants were informed about the purpose of the research, and they were also informed that they could refuse to participate in the research if they wished to. In addition, to preserve confidentiality, the participants' pseudonyms (Students A, B, C, etc.) were used to report the qualitative findings.

Results

RQ1: Levels of Students' Self-Directed Learning with Technology

The first objective of the study was to examine the levels of students' SDL with technology. As seen in Table 2, all participants (N = 238) rated their level of SDL with technology in *Self-Management* (M = 3.43; SD = .69). The results revealed that the level of students' SDL with technology in this component was moderately low. Likewise, the M score of the two items were also similar to each other (M = 3.42 and 3.45). The students also rated the M score in *Intentional Learning* moderately high (M = 3.62; SD = .62). The M scores of the three items of intentional learning included Item 3 (M = 3.55; SD = .79), Item 4 (M = 3.61; SD = .74), Item 5 (M = 3.63; SD = .78), and Item 6 (M = 3.70; SD = .71).

Table 2: The Levels of Students' Self-Directed Learning with Technology

No.	Dimensions of SDL with Technology	M	SD	Levels
	Self-Management	3.43	.69	Moderately Low
1	I go online to ask my teachers questions about my lessons when I am not in school.	3.42	.72	Moderately Low
2	I use the computer to share my thoughts and ideas about my schoolwork (e.g., through multimedia storytelling, voice recording, and blogs).	3.45	.72	Moderately Low
	Intentional Learning	3.62	.62	Moderately High
3	I find out more information on the Internet to help me understand my lessons better.	3.55	.79	Moderately High

No.	Dimensions of SDL with Technology	M	SD	Levels
4	I use the computer to work with information for my learning.	3.61	.74	Moderately High
5	I use the computer to become better at a skill that I am interested in, e.g., learning a language.	3.63	.78	Moderately High
6	I use the computer to get ideas from different websites and people to learn more about a topic.	3.70	.71	Moderately High

In the interview, students were also invited to report how often they engaged in their SDL with technology, “How often do you engage in self-directed learning with technology?” The frequency was categorised as *never*, *rarely*, *sometimes*, *often*, and *always*. The result was comparable to the one found in the survey questionnaires. That is, among 12 students, only one (8.33%) reported that he always engaged in SDL with technology, and five (41.67%) reported that they often engaged in SDL with technology. The rest reported that they never, rarely, or only sometimes engaged in this learning construct.

RQ2: Students’ Perceptions of the Roles of Technology in SDL

This section describes the second purpose of the study, which was to investigate the students’ perceptions of the roles of technology in their SDL. Students’ perceptions of the roles of technology could determine their SDL with technology. Three main themes concerning the advantages that technology offered to SDL were found, namely flexibility in learning, offering various learning sources, and enhancing cross-cultural knowledge.

Flexibility in Learning

Nine students cited the usefulness of technology in SDL in terms of flexibility in learning. That is, with technology, they could learn their school subjects or other things they wished to know at any time and from any place. For example, when asked to share their perceptions of the role of technology in their SDL, Student L responded, “For me, technology is very important for self-directed learning [SDL] because I can learn it whenever I have free time and wherever I feel comfortable learning”. To the same question, Student L replied, “With technology, I can choose my available time to explore more. For example, I can learn an English language subject at night”.

Offering Various Learning Resources

It is commonly acknowledged that with the advancement of technology, learners now have access to a wide range of learning resources to support their educational needs. Seven students accepted that technology made their SDL more convenient, as it provided them with various learning resources. For instance, Student D from Grade 8 said, “Technology is important for my self-directed learning [SDL] because it can help me search for lessons and many documents easily and at any time I want”. Likewise, Student K from Grade 12 shared a comparable perspective: “There are websites where I can search for documents and lessons easily”.

Enhancing Cross-Cultural Knowledge

The advent of digital technology has also allowed learners to learn about the different cultures of different countries around the globe. At least five students acknowledged that technology could provide them with the opportunity to gain cross-cultural knowledge. For example, Student H from Grade 10 remarked, “Because of technology, I can also learn anything I want to know, such as different cultures, different types of foods, and so on”. Similarly, Student I from Grade 11

said, “I also learn about the various cultures and languages of different countries around the world on websites and YouTube...”.

RQ3: Emergent Factors Influencing Students’ SDL with Technology

The third purpose of the study was to identify the factors influencing students’ SDL with technology. Twelve students were invited to be interviewed. Four main themes were generated from the data coding, namely, reliable internet connection, classroom experience with technology integration, knowledge of useful technology, and supporting technological devices.

Reliable Internet Connection

While technology has certainly made it more convenient for students to engage in their SDL, a reliable internet connection is essential for accessing valuable video lessons. Seven students reported experiencing difficulties while attempting to play a video lesson on Facebook and YouTube due to a subpar internet connection. For instance, when asked what the factors were that enhanced their SDL with technology, Student E from Grade 9 replied, “A Good internet connection is very important”. She added that, “Sometimes, I find it difficult to play videos on Facebook or YouTube because the internet connection at my home is not good”. Student J from Grade 11 also remarked, “I usually have a problem with the internet connection on my phone. It is very slow, which makes it difficult to watch video lessons”.

Experience in the Classroom with Technology Integration

Experience in the classroom with technology integration served as a positive factor influencing students’ SDL with technology. At least four students acknowledged that they often searched for lessons on the internet and social media when they were at home, because their teachers often introduced and used technology in teaching and learning. Student E from Grade 9 said, “My teacher recommended Facebook pages such as the Ministry of Education, Youth and Sports [MoEY] and E-School Cambodia that post video lessons”. Student G from Grade 10 also remarked, “I often try to find more video lessons on social media such as Facebook and TikTok that other teachers post.” He added that, “I know it from my teachers who introduced it in class”.

Knowledge of Useful Technology

Lack of knowledge regarding what types of technology could assist the SDL was the other negative factor influencing students’ SDL with technology. Two students, Student D from Grade 8 and Student B from Grade 7, reported that they did not know what websites or other types of technology were useful for SDL, so they rarely engaged in their SDL with technology. For example, Student D responded, “I use Facebook and Telegram every day to chat with my friends. However, I rarely use them for my self-directed learning [SDL] because I do not know what kinds of Facebook pages or websites can help my self-directed learning [SDL]”. Likewise, Student B responded, “I don’t search for the lesson I want to learn very often. After all, I don’t know many websites that can help me find what I want to learn”.

Supporting Technological Devices

Technological devices are of utmost significance in facilitating students’ SDL with technology in the modern world. The lack of supporting technological devices is a negative factor influencing students’ SDL with technology. In this study, although acknowledging that technology played a crucial role in his SDL, Student A from Grade 7 admitted, “I never searched for websites for learning or asked my teacher when I was not at school because I don’t have a smartphone”.

Discussion and Implications

The study found a significant discrepancy between students' perceptions and actual practice, despite the fact that SDL is crucial for students' lifelong learning. Their SDL with technology was still low, notwithstanding their positive perceptions of technology in terms of learning flexibility, providing a variety of learning materials, and improving cross-cultural understanding. In addition, while the previous study by Hu et al. (2024) indicated that blended learning platforms promoted students' SDL in higher education, the current study found that the availability and accessibility of technology alone did not guarantee the use of technology for purposeful learning among secondary school students. The original contributions of the current study suggested that 'knowledge of useful technology' is another critical determinant of secondary school students' SDL development. In addition to knowledge of useful digital tools and a dependable internet connection, the current study identified other associated factors, including prior classroom experience with technology integration and supportive technology equipment. This finding is in accordance with the previous study, which indicated that students' SDL with and without technology was strongly correlated with classroom environment (Labonté & Smith, 2022). In particular, digital technology-supported teaching can promote SDL development (Shouchao et al., 2026). Likewise, another study (Morris & Rohs, 2023) suggested that students frequently needed assistance, particularly with the planning and evaluating parts of SDL, as well as direction on how to use digital devices for learning.

The current finding could build on the scant literature on SDL learning with technology in less developed contexts. The study identified the context-specific factors influencing SDL with technology, namely infrastructure (internet access/supporting devices), pedagogy (classroom with technology integration), and digital literacy (knowledge of useful tools). This finding also builds on a new dimension to Knowles' (1975) framework, in that SDL in developing contexts is associated with not only internal but also external support. The study by Woon and Tee (2025) also suggested that when learners were just beginning their SDL journey, external structures were crucial in offering the resources and direction required to support SDL. Since the current study found that the lack of knowledge of useful technology is a primary hindrance, MoEYS should promote SDL literacy in the national curriculum beyond availability and accessibility. Furthermore, teachers should use technology to support students' SDL and model SDL habits rather than utilising it only to deliver material. Finally, parents should be aware of the significance of home support, such as technological devices and internet access, for enhancing their children's SDL.

The study was subject to some limitations, suggesting the need for further investigation. Future studies may employ a bigger sample size, including different types of schools, and use observational methods. The prospective research should also aim to explore the strategies utilised by teachers to enhance SDL with technology. Finally, investigating the influence of students' characteristics, such as gender and age group, on SDL with technology could be another interesting topic for further investigation.

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