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# THE MEDIATING ROLE OF SELF-DIRECTED LEARNING IN THE RELATIONSHIP BETWEEN COMPUTER SELF-EFFICACY, ONLINE LEARNING MOTIVATION, AND ONLINE LEARNING SATISFACTION AMONG CAMBODIAN COLLEGE STUDENTS

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**Abstract**
This study investigated the effects of computer self-efficacy and motivation in online learning on online learning satisfaction in Cambodian college students, with a particular focus on the mediating role of self-directed learning. Using Google Forms, data were collected from students enrolled in public and private universities in Cambodia, with 376 responses were included in the final analysis. The study employed a mediation regression model to assess the direct and indirect relationships among the variables. The results indicated that both computer self-efficacy and motivation for online learning had a significant positive effect on online learning satisfaction. In addition, these two factors significantly influenced self-directed learning. Most notably, self-directed learning was found to partially mediate the relationship between both computer self-efficacy and motivation and online learning satisfaction. These findings suggest that self-directed learning plays a crucial role in enhancing students' satisfaction with online learning environments. However, this study has several limitations. The sample was limited to undergraduate students, which may reduce its generalizability. Future studies should consider broader and more diverse samples across educational levels. Moreover, only a few variables were examined; future research should explore additional predictors for online learning satisfaction and test a more integrated model.

**Keywords**: computer self-efficacy; motivation for online learning; self-directed learning; online learning satisfaction; Cambodian college student

## 1. Introduction

Education is essential to human development and to modern life itself. It helps individuals become independent people and responsible citizens, and it equips them with the skills they need to obtain well-paying jobs. Globalization has reduced traditional barriers, fueling growing global demand for education. In particular, globalization has led to the expansion of online learning, and the COVID-19 pandemic has significantly accelerated its global adoption (Zhu et al., 2024).

Online learning refers to educational programs that are delivered through digital platforms, encompassing a wide range of formats, including web-based courses, video conferences, self-paced learning materials, interactive simulations, virtual classrooms, mobile learning apps, and adaptive learning environments (Culduz, 2024). Online education has become popular due to its flexibility and convenience: students can access learning content from anywhere, at any time, without needing to be physically present in their classroom. This flexibility allows them to customize their educational experience according to their schedules and needs and in response to the requirements of any work, family, or other commitments (Guo et al., 2023).

The COVID-19 pandemic brought about a sudden and significant shift to online learning. Due to the widespread transmission of the disease among humans, people were unable to gather in enclosed spaces for nearly 3 years. This extended even to students who required education and developmental interventions. Educators across institutions worldwide needed to adapt to this new mode of instruction, in which in-person classes transitioned to digital platforms to mitigate the spread of the virus. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), over 1 billion students in 188 countries were affected by school

closures. This was an abrupt change and deprived many students of the traditional classroom experience and face-to-face interaction with their peers, significantly affecting the quality of the education they received (UNESCO, 2020).

This global shift to online learning has affected students worldwide, and its impact has been especially profound in developing countries, including Cambodia, where limited infrastructure and a lack of preparedness for digital education posed significant challenges. In response, the Cambodian government, in particular the Ministry of Education, Youth and Sport, in collaboration with the Ministry of Information, provided recorded lesson videos through platforms such as Facebook, television, and YouTube to support students' learning during the pandemic (Kakada, 2020). However, Chhoeurm (2021) reported that over 1.4 million Cambodian students were unable to access online learning platforms in 2020. A total of 16,525 individuals in public and private higher education institutions were affected, and 222,879 students struggled with remote learning. Overall, 81.4% of students expressed reluctance to continue with online education, citing declining academic performance during the pandemic (Chet et al., 2022).

Cambodia's lack of preparation for online education made it particularly difficult for students—especially in higher education—to engage effectively in their learning. This reality stands in stark contrast to the vision of Sustainable Development Goal 4 (SDG 4), which highlights "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all." Technological, geographical, and socioeconomic barriers prevented many Cambodian students from accessing digital learning platforms, which exposed critical gaps in the achievement of SDG 4's inclusive educational aims.

However, the COVID-19 pandemic not only presented challenges but also created opportunities for the Cambodian education system. It accelerated the integration of information and communication technology (ICT) and other newer technologies into education. The Cambodian government has the chance to capitalize on this momentum to promote the incorporation of ICT in online learning, in particular in higher education. This initiative has the potential to significantly enhance the standards and quality of higher education in Cambodia by fostering the digital literacy that is needed to thrive in the digital age. Further, it is equipping the next generation with the knowledge and skills that are essential for global competitiveness and long-term success, providing a hopeful vision for the future of education in Cambodia (Em, 2023).

This study proposes a theoretical framework to examine the mediating effects of self-directed learning (SDL) on the relationship between computer self-efficacy (CSE), motivation for online learning (MOL), and online learning satisfaction (OLS) amongCambodian college students. Earlier studies have identified a correlation between CSE on the one hand and OLS one the other (Kumar, 2021) as well as between MOL and OLS (Thanh et al., 2024) in undergraduates. Correlations have also been found between students' CSE and SDL (Arzeen et al., 2023). SDL was found to affect CSE and MOL, both of which impacted OLS. For instance, Wei and Chou (2020) examined online learning performance and satisfaction in a sample of 356 undergraduate students in Taiwan. Their findings indicated that both CSE and MOL positively influenced OLS; hence, this study postulates that SDL mediates the relationship between CSE and OLS as well as the relationship between MOL and OLS.

Despite the popularity of online learning in Cambodia, which has been growing since 2019, comprehensive studies on the ways that students engage with this mode of learning remain

limited. It is crucial to assess students' satisfaction with online learning and their use of effective learning strategies in this relatively unfamiliar environment. Furthermore, understanding the factors that influence students' learning satisfaction can inform strategies to improve the quality of their learning experiences. In particular, the roles of CSE, MOL, and SDL should be considered as key influencing factors on OLS.

Accordingly, this study examines the relationships among CSE, MOL, and OLS to validate the mediating effects of SDL for developing the online learning of college students in Cambodia. The specific study objectives were to verify the mediating effects of SDL on the relationships among CSE, MOL, and OLS. Thus, the following questions were addressed:

1. Are there relationships among CSE, MOL, SDL, and OLS?
2. Does SDL have a mediating effect on the relationships among CSE, MOL, and OLS?

## 2. Literature Review

### 2.1 Concepts of the Main Variables

CSE refers to learners' belief in their own ability to use computers and digital tools effectively to accomplish academic tasks. CSE has been an important construct in educational and information systems research for decades and is recognized as a significant factor in learners' performance in online environments (Karsten et al., 2012). CSE goes beyond simple technical proficiency, reflecting confidence in managing digital tasks and being closely tied to academic success (Schelebusch, 2018). It also has a crucial role to play in addressing the digital divide, as those with higher CSE are more likely to engage productively in online learning (Eastin & LaRose, 2000).

Research shows that students who have higher CSE tend to perform better in online learning contexts (John, 2013; Tsai & Tsai, 2003). CSE positively affects learner readiness to handle online tasks, including navigating learning platforms or using tools such as Microsoft Office and search engines (Chung et al., 2020; Hung et al., 2010). In the case of Cambodia, Raksmey and Seangmeng (2020) found that many students are generally satisfied with their online learning experience, demonstrating not only technological competency but also time management and study planning skills. These findings emphasize that CSE is the foundation for digital learning success, especially in developing contexts.

Motivation is a key psychological factor, which drives learner behavior and performance, particularly in online environments where self-regulation and autonomy are essential. It influences the amount of effort that students invest in their learning tasks and their persistence in completing them (Keller, 1983). Hartnett et al. (2011) argued that motivation is shaped by individual personality traits and by situational factors, making it a dynamic component of online learning. Studies show that learners with higher motivation tend to be more prepared for online education and show greater self-direction and engagement (Horzum et al., 2015; Heo& Han, 2018).

Motivation also directly affects online learning satisfaction and academic performance. Students who are highly motivated tend to achieve better results, in particular in tasks that require participation and collaboration, such as online discussions (Wei & Chou, 2020). In the COVID-19 pandemic, motivation mediated the relationship between learning conditions and satisfaction (Rahman et al., 2021). Other studies confirm that learning satisfaction is closely tied to motivation (Harahap et al., 2021; Shih et al., 2013; Kirmizi, 2015). Additionally, research by

Chang and Chang (2012) and Todorova and Karamanska (2015) showed that students who are motivated not only outperform their peers but also report more positive emotions in online classes.

SDL is the process whereby learners take the initiative and responsibility for their own learning, including setting goals, choosing strategies, and evaluating outcomes (Knowles, 1975; Towle & Cottrell, 1996). SDL is essential for online learning, where learners are often required to navigate content independently and manage their own time. It requires the use of both cognitive and behavioral skills, including metacognition, self-regulation, and persistence (Baumgartner, 2003; Maclean & Wilson, 2009). Hung et al. (2010) identified SDL as a major factor in online learning readiness, influencing the ways that learners interact with content and resources.

Despite its importance, the SDL remains a challenge for some learners. Raksmey and Seangmeng (2020) reported that, although Cambodian students understood their academic responsibilities, many struggled with focus and discipline in online classes. Some admitted to rarely reviewing recorded materials when given the option. Morris and Rohs (2023) emphasized that effective SDL requires more than planning and reflection, calling upon resilience and the motivation to learn throughout life as well. Rashid and Asghar (2016) further argued that SDL enhances the benefits of technology use in education, even when use of digital tools themselves does not directly predict academic success.

OLS refers to students' perceived contentment with their experience in digital learning environments. It is a complex and multidimensional construct, influenced by instructor interaction, peer collaboration, technical support, and course structure, among other factors (Elkhemisy& Sharif, 2023). Wu et al. (2015) posited that students should be viewed as consumers of educational services, with satisfaction that is shaped by the quality of educational delivery and in terms of the alignment between learning expectations and outcomes.

Lee (2017) defined learning satisfaction as the degree to which students consider that their learning experience meets their expectations. Narrow gaps between anticipated and actual learning outcomes lead to high satisfaction, whereas greater discrepancies reduce it. Chen (2012) added that satisfaction is closely tied to learners' emotional engagement and perceived success in achieving their academic goals. When it is supported by strong motivation and self-directed behavior, satisfaction with online learning tends to be higher. Thus, OLS is both an indicator of learning effectiveness and a crucial element in evaluating the quality of the digital education being provided.

### 2.2 Relationships between Study Variables

Arzeen et al. (2023) performed a study on online learning readiness in terms of the relationship between CSE and student satisfaction, mediated by SDL. Their study involved 300 middle and late adolescents in Islamabad and Rawalpindi. The findings indicated positive correlations among CSE, SDL, online learning readiness, and learning satisfaction. Moreover, both SDL and online learning readiness mediated the relationship between CSE and OLS. This study offers valuable insights into how these factors influence online engagement and satisfaction, producing a significant contribution to the literature on online learning and student outcomes. Annuar and Shaari (2014) also examined the factors contributing to SDL among distance education students at public universities in Malaysia. Their findings indicated that students' levels of motivation and satisfaction are positively associated with their degree of SDL.

Karen et al. (2018) investigated the relationship between emotional intelligence (EI) and SDL and their combined impact on students' learning outcomes in higher education. That study was conducted to assess how EI influences SDL and how both factors can contribute to learning satisfaction. A key finding in this context was that motivation—a core component of EI—indirectly affected learning satisfaction in its influence on the SDL. That study underscored the mediating role that SDL plays in the relationship between EI and satisfaction, suggesting that both EI and SDL are critical for enhancing students' academic experience and outcomes. These results provide useful implications for higher education professionals and researchers as they develop strategies to improve student satisfaction and academic performance.

Drawing on previous literature, this study proposes a research model in which CSE and MOL are treated as independent variables, OLS is the dependent variable, and SDL serves as the mediating variable. The research model for the current analysis is presented below (Fig. 1).

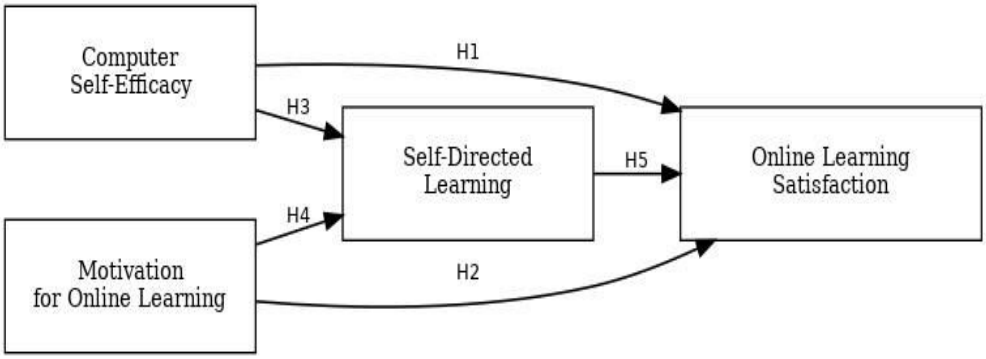


**Figure 1**. The research model

Based on the research model, the hypotheses have been established as follows:

H1: CSE affects OLS.
H2: MOL affects OLS.
H3: CSE affects SDL.
H4: MOL learning affects SDL.
H5: SDL affects OLS.
H6: SDL mediates the relationship between CSE, MOL, and OLS.

## 3. Methods

### 3.1 Data Collection and Measures

To ensure the homogeneity of the students' backgrounds, the target population were only bachelor's degree students enrolled in private and public universities in Cambodia. This sample was chosen because college students' familiarity with the internet make them an appropriate sample for online learning studies. Moreover, because university campuses were closed when the study was performed, the survey was administered online using Google Forms. Data collection was conducted over an 8-day period, from March 15 to March 22, 2022. Several lecturers were asked to assist in the random distribution of the questionnaire among their students, and 376 students ultimately received the survey link via Facebook Messenger. This survey was designed to gather in-depth information regarding Cambodian college students' personal feelings,

opinions, and online learning experiences to yield meaningful findings that contribute to the advancement of online learning.

The survey was prepared in both English and Khmer. It consisted of five sections. The first included demographic questions (collecting information on, e.g., age group, gender, school year, and major) to collect background information for student segmentation. The second section assessed students' CSE using the Online Learning Readiness Scale developed and validated by Hung et al. (2010) and consisted of three items measured on a 5-point Likert scale. The third section examined MOL with four items, also measured on a 5-point Likert scale and adapted from Hung et al. (2010). The fourth section evaluated SDL with five items measured on a 5-point Likert scale, again adapted from Hung et al. (2010). Finally, the last section measured OLS with the Satisfaction Scale, developed by Gunawardena and Zittle (1997), including nine items measured on a 5-point Likert scale.

### 3.2 Participants

As part of the national response to the COVID-19 pandemic, Cambodian students transitioned to fully online learning in late 2020. Before this, course lectures were primarily delivered via Zoom accompanied by recordings made available for later reference. The students were evaluated using a variety of methods, including homework, quizzes, a midterm exam, and a final exam. The diverse sample used in this study included students with a wide range of majors, including engineering, English literature, Khmer literature, management, accounting, and business. Data collected from 376 students were used for analysis. The frequency analysis of the respondents' demographic characteristics is given in Table 2. Among the respondents, 172 were female (45.7%) and 204 were male (54.3%); 79 students (21.0%) were in their teens, while the majority, 293 students (77.9%), were in their twenties, and only 4 students (1.1%) were in their thirties. All participants (100%) were bachelor's degree students, distributed across academic years as follows: Year 1, 72 students (19.1%); Year 2, 106 students (28.2%); Year 3, 106 students (28.2%); and Year 4 and later, 92 students (24.5).

**Table 1.** Participant characteristics**.**

| Characteristics | | Frequency | Percentage |
|---|---|---|---|
| Gender | Female | 172 | 45.7 |
| | Male | 204 | 54.3 |
| Age group | 10s | 79 | 21 |
| | 20s | 293 | 77.9 |
| | 30s | 4 | 1.1 |
| Year | Year 1 | 72 | 19.1 |
| | Year 2 | 106 | 28.2 |
| | Year 3 | 106 | 28.2 |
| | Year 4 and later | 92 | 24.5 |
| Total | | 376 | 100 |

3.3 **Data analysis**

IBM Statistical Package for the Social Sciences version 23.0 was used to analyze the data collected for the empirical analysis of this study. A descriptive analysis was first conducted to provide a general overview of the results of the study. Pearson's correlation analysis, a robust statistical tool, was used employed to examine the relationships among CSE, MOL, SDL, and OLS. Following this, a mediating regression analysis was performed to assess the statistically significant mediating effect of SDL on the relationships among CSE, MOL, and OLS. Finally, the Sobel test was adopted to verify the significance of the mediating effect of SDL in these relationships.

## 4. Results

### 4.1 Descriptive Statistics

Descriptive analysis, including the mean and standard deviation, was conducted to provide a general overview of the study results. The mean and SD values for CSEMOL, and OLS are presented in Table 2.

In Table 2, the results indicated that among the variables, CSE had a lower mean value (M = 3.647) with a standard deviation of SD = 0.775, while the mean value of MOL was much higher (M = 3.25) with a standard deviation of SD = 0.800. The mean value of SDL (M = 3.741) with a SD of SD = 0.687 was similar to the mean of OLS (M = 3.726) with a SD of SD = 0.730.

**Table 2.**Mean and standard deviation for computer self-efficacy, motivation for online learning, self-directed learning and online learning satisfaction (N = 376).

| Measure | M | SD |
|---|---|---|
| Computer self-efficacy | 3.65 | 0.78 |
| Motivation for Online Learning | 4.06 | 0.8 |
| Self-directed learning | 3.74 | 0.69 |
| Online Learning Satisfaction | 3.73 | 0.73 |

### 4.2 Results of Correlation Analysis

To answer research question 1, Pearson's correlation analysis was performed for each factor, and the results are presented in Table 3. Students' OLS was positively correlated with CSE (r = .598, $p < 0.001$), MOL (r = .675, $p < 0.001$), and SDL (r = .650, $p < 0.001$). These findings indicate a significant relationship among CSE, MOL, SDL, and OLS.

**Table 3.**Results of Pearson's correlation analysis between the variables.

| Factors | CSE | MOL | SDL |
|---|---|---|---|
| CSE | | | |
| MOL | .492*** | | |
| SDL | .571*** | .701*** | |
| OLS | .598*** | .675*** | .650*** |

### 4.3 Results of Hypothesis Testing

To address research question 2, a mediating regression analysis was conducted to examine the

mediating role of SDL in the relationship between CSE, MOL, and students' OLS. The results are presented in Table 4.

**Table 4.** The Results of the mediating regression analysis of the model.

| D.V. / I.V. | Step 1 | | | | Step 2 | | | | Step 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | | | | SDL | | | | OLS | | | |
| | B | SE | β | t | B | SE | β | t | B | SE | β | t |
| CSE | .33 | .04 | .35 | 8.808*** | .27 | .04 | .30 | 7.554*** | .27 | .04 | .29 | 6.814*** |
| MOL | .45 | .04 | .50 | 12.559*** | .48 | .03 | .55 | 14.020*** | .34 | .04 | .38 | 7.850*** |
| SDL | | | | | | | | | .24 | .05 | .22 | 4.349*** |
| R2 | .549 | | | | .559 | | | | .571 | | | |
| Adj R2 | .546 | | | | .556 | | | | .567 | | | |
| F-Value | 226.900*** | | | | 235.926*** | | | | 164.834*** | | | |

To verify the mediating effect of SDL on the relationship between CSE, MOL, and OLS, a three-step mediated regression analysis, as suggested by Baren and Kenny (1986), was conducted. The results of step 1 indicated that CSE ($\beta = .352$, $p < 0.001$) and MOL ($\beta = .502$, $p < 0.001$) exhibited a significant positive effect on OLS. Hypotheses H1 and H2 were supported. The results of step 2, CSE ($\beta = .298$, $p < 0.001$) and MOL ($\beta = .559$, $p < 0.001$), were identified as having significant positive effects on SDL. Hypotheses H3 and H4 were supported. In step 3, the result of identifying the impact on OLS by inputting independent parameters, SDL was found to have a significant positive effect ($\beta = .222$, $p < 0.001$), CSE ($\beta = .285$, $p < 0.001$) and MOL ($\beta = .378$, $p < 0.001$), the independent variables were also found to have a significant effect on OLS. However, the effect was less than the effect found in step 1. Hypotheses H5 and H6 are supported. This finding indicated that SDL partially mediates the relationships among CSE, MOL, and OLS. The explanatory power of CSE for OLS was 54.9%, and the explanatory power of CSE and SDL for OLS increased to 57.1%.

As a result of the Sobel tests presented in Table 5, the effect of CSE ($t = 3.773$, $p < 0.001$) and MOL ($t = 4.155$, $p < 0.001$) on OLS under the mediation effect of SDL confirmed the partial mediation effect of SDL on the relationships among CSE, and online learning satisfaction.

**Table 5.** The Result of Sobel Test of Research Model.

| Mediating Effects | t-value |
|---|---|
| Computer Self-efficacy→ Self-Directed Learning→ Online Learning Satisfaction | 3.773*** |
| Motivation for Online learning→ Self-Directed Learning→ Online Learning Satisfaction | 4.155*** |

## 5. Conclusion and Discussion

This study examined the mediating role of SDL in the relationship between CSE, MOL, and OLS. The results of the mediating regression analysis showed that CSE, MOL, and SDL significantly influence OLS, with SDL serving as a partial mediator in the relationships among

CSE, MOL, and OLS. Thus, higher levels of CSE and MOL are associated with increased SDL and, consequently, greater OLS. These results suggest that strengthening students' positive CSE and MOL as well as SDL can produce an effective strategy to adapt to change in online learning and enhance students' OLS.

We explored the mediating effect of SDL on the relationship between CSE, MOL, and OLS of college students in Cambodia. The findings revealed that students' OLS is impacted by CSE and MOL being mediated by SDL and provided practical implications as well. Increasing CSE and MOL along with expanding SDL would subsequently improve OLS. Students should be provided with foundational computer skills and should become familiarized with essential technological tools. Furthermore, providing comprehensive orientation sessions and ongoing support services can help students navigate the transition to online learning environments (Saing et al., 2023). Gedera et al. (2015) recommended that students should share valuable resources, lectures, and tips to enable effective online learning between peers. Further, students should offer technological support for their peers to enable them to achieve their own academic goals.

This study was conducted to provide valuable insights, but it acknowledges the limitations that are inherent in examining online learning in Cambodia. This study had considerable limitations. First, the study sample was not representative, as it consisted solely of undergraduate students from public and private universities in Cambodia. Thus, it should be broader to include a greater range of students taking online courses in Cambodia. This makes it difficult to generalize the findings of this study to other student populations, such as graduate students. In 2019, with the sudden onset of the COVID-19 pandemic, all students at all levels, not only undergraduate students, were taking courses online. Therefore, beyond undergraduate students, future research should consider the students at various levels of education.

Furthermore, this study exclusively investigated the relationship between CSE and OLS, as well as the relationship between MOL and OLS with respect to the mediating effect of SDL. Other variables that could serve as mediators in these relationships. Future research should explore other factors that could significantly impact the relationship between CSE, MOL, and OLS.

Another critical limitation is that the models adopted this study were split into two distinct models. Future research is strongly encouraged to integrate this pair into a single model. Despite these limitations, this study makes a valuable contribution to the literature on online learning in Cambodia. It can be developed into a basic form of research to improve online learning practices in Cambodia and other similar contexts, with the potential to significantly improve the overall effectiveness and convenience of online learning, bringing optimism and a hopeful sense of encouragement to the field.

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