

Effect of Parental Support on Learning Engagement in Mathematics Online Learning Environment: The Mediating Role of Online Self-Regulated Learning Strategies

Malathi Letchumanan, PhD

Institute for Mathematical Research, Universiti Putra Malaysia, Seri Kembangan, Malaysia

 <https://orcid.org/0000-0001-5709-3787>

Sharifah Kartini Said Husain, PhD

Institute for Mathematical Research, Universiti Putra Malaysia, Seri Kembangan, Malaysia

 <https://orcid.org/0000-0001-5675-941X>

Ahmad Fauzi Mohd Ayub, PhD

Institute for Mathematical Research, Universiti Putra Malaysia, Seri Kembangan, Malaysia

 <https://orcid.org/0000-0002-4313-2922>

Contact: malathi@upm.edu.my

Abstract

This study examines the effects of parental support on learning engagement and the mediating roles of self-regulated learning (SRL) in mathematics online learning environments. A sample of 112 undergraduate students from the mathematics departments of two public universities in Malaysia participated in the study. We analyzed the data using descriptive analysis and partial least squares structural equation modeling (PLS-SEM), and the study findings indicate that parental support significantly predicts online self-regulated learning (OSRL). In addition, OSRL is a significant predictor of students' engagement. The results also suggest that OSRL fully mediates the relationship between parental support and learning engagement. However, parental support had no significant effect on learning engagement. This study highlights the importance of considering parental support and fostering OSRL strategies to promote learning engagement among mathematics higher learning institution students.

Keywords: *SRL, parental support, learning engagement, university, mathematics*

Date Submitted: November 23, 2024 | **Date Accepted:** March 6, 2025 | **Date Published:** July 28, 2025

Recommended Citation

Letchumanan, M., Husain, S. K. S., & Ayub, A. F. M. (2025). Effect of parental support on learning engagement in mathematics online learning environment: The mediating role of online self-regulated learning strategies. *Higher Learning Research Communications*, 15(2), 1–16. <https://doi.org/10.18870/hlrc.v15i2.1642>

Note: The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Putra Research Grant, Universiti Putra Malaysia (GP-IPM/2022/9732000).

Introduction

SRL—the ability to successfully control the learning process—is considered a crucial factor for learning engagement in online learning environments (OLEs; Hanny et al., 2023). Past studies, however, indicate that many students find applying effective SRL strategies challenging when engaging in their learning activities. This problem is more pronounced among higher learning institution students as they gain increasing autonomy over their learning (Dent & Koenka, 2016; Miao & Ma, 2022). Consequently, many studies have focused on finding the factors that can support and enhance students' SRL strategies in OLEs (Bai & Gu, 2022; Gao et al., 2021).

From a social–cognitive point of view, SRL is the active and constructive process whereby students set up task-oriented learning goals, take responsibility for their learning, monitor, and, finally, evaluate their learning progress. Execution of SRL strategies is demanding and challenges students' motivational, behavioral, cognitive, and metacognitive domains (Arianto & Hanif, 2024). Successful implementation of SRL strategies relies on students' ability to coordinate these domains effectively to complete a task. In addition, Zimmerman (1989) indicated that SRL behaviors are shaped by interactions between a person and their environments, ranging from micro-systems (e.g., parental–student relationships) to macro-systems (e.g., cultures).

Mathematical knowledge is essential for various fields (e.g., science and engineering) and is a gatekeeper for many career opportunities (Osakwe et al., 2023; Roick & Ringeisen, 2018). Researchers argued that SRL strategies for learning mathematics through online platforms are essential for students; otherwise, lower learning efficiency and an unwillingness to learn can occur (Bannert & Mengelkamp, 2008; Yahya et al., 2021). In addition, appropriate external stimuli, such as parental involvement, are vital to maintaining students' self-regulation level. There is a greater chance that students can only participate in online learning effectively with these external stimuli (Kara et al., 2024).

Parental support and SRL also increase students' learning engagement (Aloka et al., 2023; Hanny et al., 2023). For example, parental support in OLEs assists students in having positive learning experiences, increased class participation, and enhanced content knowledge (Hanny et al., 2023). Additionally, online learners exhibiting SRL characteristics were actively involved in their learning activities (Aloka et al., 2023) because students with self-regulation skills can more effectively plan, control, and assess their learning activities. Students, therefore, must receive support from parents to maintain and improve SRL strategies in mathematics OLEs and successfully engage in learning tasks.

Nevertheless, scholars have highlighted that research investigating the relationship between motivating factors, such as parental support and SRL in OLEs on learning engagement, remains largely unexplored (Kara et al., 2024). To fill the identified research gap, in this study we investigate the effect of parental support on learning engagement in mathematics OLE of higher learning institution students. In addition, we also determine the mediating effect of SRL on the relationship between parental support and learning engagement.

This study contributes significantly to the literature, as it explicitly focuses on parental support and the unique role parents can play in supporting the higher learning institution students' self-regulation process in mathematics OLEs to enhance learning engagement. This study can also provide inputs for future researchers around a parental support association and its effect on SRL and learning engagement in the OLE.

Literature Review and Hypothesis

Parental Support (PSP)

Parental support is important for students' academic outcomes in higher learning institutions, as it promotes psychological well-being and facilitates learning engagement (Song et al., 2024). As highlighted by Gao et al. (2021), parental support involves environmental, emotional, and capability support. At higher learning institution levels, parents can support their children by engaging in reading activities, enquiring about the activities at university, interest and achievement in each course, complications the students face at their courses and institution, helping with assignments, communicating frequently and participating in academic programs, such as attending conferences and seminars (Burke, 2010). In an OLE, parental support also includes affordability in providing hardware and software facilities (Osorio-Saez et al., 2021).

Empirical research reported that students experience academic success if they receive adequate and appropriate support from parents in OLEs (Đurišić & Bunijevac, 2017). Parental support increases students' motivation, perception of control, and academic self-concept, which results in better academic outcomes (Pinquart & Ebeling, 2020; Rohmatillah et al., 2023). A study by Zulfiqar et al. (2023) provides widespread evidence for a significant relationship between parental support and university students' academic outcomes.

Malaysians' Collectivist Culture

It is essential to consider Malaysians' collectivist culture to determine the influence of parental support on learning engagement and the mediating effects of SRL on the relationship between parental support and learning engagement. Malaysians are well-known for having close-knit families (Azmi et al., 2023).

Empirical studies provide evidence that Malaysians' collectivist culture with family members dramatically impacts students' academic achievement from school to the university level (Choy et al., 2015; Letchumanan et al., 2023; Majid, 2008). Family support, especially parental support, plays a crucial role in helping university students develop intrinsic motivation and manage emotions and learning activities. In an online learning environment, where students are usually given full autonomy and work in isolation, they need appropriate support to regulate their learning activities and excel further in their studies (Song et al., 2024). In this context, parental support was relevant for the students seeking emotional and motivational support and engagement with their learning activities.

Although university students are believed to have the ability to manage their learning activities, studies in Asian and Malaysian contexts found that students still need parental support to engage and regulate their learning activities (Bakar et al., 2021; Song et al., 2024). Consequently, further research is needed to understand the dynamics of the parent-child relationship in the context of the online learning environment after the pandemic era among Malaysian higher learning institution students.

Student Engagement/Learning Engagement (LEN)

Student engagement is an important indicator of academic success and has three dimensions: behavioral, cognitive, and affective (Chapman, 2002; Fredricks et al., 2016; Mandernach, 2015). Behavioral engagement refers to active participation and positive conduct of learning activities by students. Cognitive engagement is active involvement in learning activities with adequate mental effort. Affective engagement is the emotional attachment to learning tasks that explains students' positive feelings, attitudes, and perceptions.

In past studies, sociocultural factors were found to influence learning engagement, including political, social, and teaching environments (Kahu, 2013). Also, three classroom interaction types were named: student-student interactions, student-instructor interactions, and student-content interactions, which are reported to

influence learning engagement, as well (Moore, 1993). According to Hollister et al. (2022), these three interaction types are often investigated by researchers. Consequently, scholars have been invited to conduct studies on the effect of SRL on learning engagement in the OLEs, especially among higher learning institution students, who usually play many roles in their institutions (Setiani & Wijaya, 2020).

The Relationship Between Parental Support and Learning Engagement

Unlike face-to-face learning environments, instructors' orchestration in OLEs is minimal. Students have more autonomy and are expected to self-regulate their learning process (Jansen et al., 2020). Transitioning from school to higher learning institutions presents students with numerous challenges, including academic pressures and increased autonomy (Arshad et al., 2016). Even after the lockdown, the widespread use of OLEs in higher learning institutions may burden students who learn through face-to-face learning environments in schools (Song et al., 2024). This invites distractions and risks that may impact students' engagement in academic activities. In this pursuit, the parental relationship remains a primary concern, and students seek guidance and support to stay engaged in academics at their higher learning institutions (Rohmatillah et al., 2023).

A past study reported that parents must be involved in university learning activities to enable students to stay engaged (Arshad et al., 2016). Similarly, parents' ability to solve learning difficulties by providing proper online learning equipment and giving constructive suggestions according to actual learning conditions increases students' learning competencies, motivation, and engagement in OLEs (Gao et al., 2021). Thus, we propose the following hypothesis:

H1: Parental support impacts (a) behavioral; (b) cognitive; and (c) emotional student engagement in an OLE.

The Relationship Between Parental Support and OSRL

In an OLE, students quickly lose focus and self-motivation (Musingafi et al., 2015) because most students face difficulties navigating their learning activities (Bahar et al., 2020). In addition, students may feel isolated and bored by the difficulties of reaching out and communicating with other students and lecturers. As a result, students exhibit a higher level of anxiety and depression.

Students also face complexities in managing their time effectively. For instance, understanding the concepts of a single unit in mathematics may demand more time. Hence, students need to search for adequate assistance to regulate their learning activities in an OLE. Previous studies reported that students can seek parental support in the absence of peer and facilitator support to promote OSRL (Song et al., 2024).

Parental support helps students recognize the value of learning, which leads to autonomous motivation of learning behavior (Williams et al., 2019). Parental support also creates an independent learning environment, which helps increase students' motivation and self-confidence to self-regulate their learning tasks. Some researchers have found that with parental support, students can develop purposeful and effective time management skills, which is one of the instrumental domains of SRL (Williams et al., 2019; Won & Yu, 2018). Thus, we propose the following hypothesis:

H2: Parental support impacts the OSRL.

The Relationship Between SRL and Learning Engagement

Scholars have highlighted that, in an OLE, students' learning engagement and learning participation is low (Li et al., 2024). Students are reported to struggle with completing their learning tasks and following the facilitators' teaching. Consequently, students' SRL ability becomes an essential factor in enhancing their participation and learning engagement in the OLE (Park & Yun, 2018).

Deng et al. (2021) reported that students with a greater level of SRL ability can plan, manage, and monitor their learning and time effectively. These students also have stronger learning motivation and find ways to spend more time studying (Liu et al., 2023), consequently affecting their self-confidence, increasing emotional and behavioral participation, and enhancing their learning engagement (Liu et al., 2023; C.-H. Wang et al., 2013). Thus, we propose the following hypothesis:

H3: SRL impacts (a) behavioral, (b) cognitive, and (c) emotional student engagement in an OLE.

The Mediating Role of SRL on the Link Between Parental Support and (a) Behavioral, (b) Cognitive, and (c) Emotional Student Engagement in an OLE

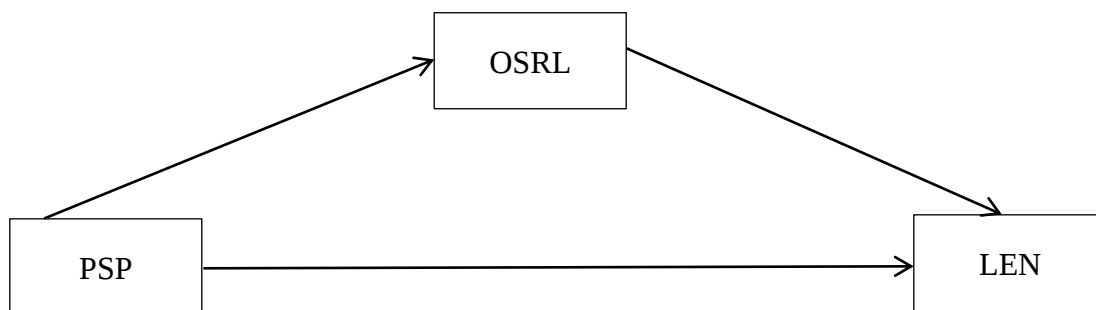
In a past study, Hammons (2017) emphasized that parental support helps students acquire SRL skills. The parents' competence in motivating students' participation and independence, as well as offering assistance, is reported to influence students' independent use of metacognitive behaviors (Asif et al., 2023). Parents also scaffold students at the beginning of the task until they can self-regulate their work. Additionally, parents can also provide students with constructive feedback and correct errors so students can assess themselves, which promotes SRL abilities.

Scholars have indicated the positive association of SRL abilities with learning engagement (Park & Yun, 2018). Students with high levels of SRL skills can diversify their self-regulation strategies with the support of parents to increase their learning ability and engagement (Song et al., 2024). As a result, the relationship between parental support and learning engagement should be more robust for students with greater SRL skills. Thus, we propose the following hypothesis:

H4: SRL mediates the relationship between parental support and students' learning engagement in an OLE.

Figure 1 illustrates the conceptual framework related to the hypothesis of this study.

Figure 1. *Conceptual Model*



Methods

Research Design and Study Sample

In this study, we used a descriptive research design and a quantitative research approach. The total respondents comprised 112 undergraduate students from two public universities in Malaysia. The respondents were from the mathematics departments and enrolled in online learning. The majority of the respondents

were female (70.5%). The mean age of the respondents was 21.5 ($SD = 0.90$). Table 1 shows the demographic distribution of the participants.

Table 1. *Respondent Demographics*

Demographic Item	Categories	Frequency	Percentage (%)
Gender	Male	33	29.5
	Female	79	70.5
Institution	A	80	71.4
	B	32	28.6
Semester	4	67	59.8
	5	30	26.8
	6	15	13.4

Data Collection

We used a convenience sampling technique to collect data for this study. A questionnaire was distributed electronically to 250 respondents across two universities. Before participants completed the survey, we clarified the study's aims and made sure they were aware that participation was voluntary. An invitation was sent to respondents to participate in the online questionnaire, and it was sent after we received the email address from students' respective lecturers. A total of 146 respondents across two universities completed the survey. We excluded 34 incomplete responses and, as a result, analyzed 112 survey responses.

Instrument

In this study, we used an online questionnaire comprised of four initial questions, which collected data regarding respondent demographic information, such as age, gender, university name, and semester. Questionnaire items in Sections 2–4 were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Following are descriptions of Sections 2–4 of the questionnaire.

Parental Support (PSP)

Section 2 of the questionnaire intends to collect data on parental support, which pertains to students' perceptions of the support they receive from parents during online learning. Student perception of parental support was measured along with emotional support, motivational support, and parents' behavior. This section includes 15 items adapted from Chen (2005).

OSRL Questionnaire

Section 3 of the questionnaire collected data regarding OSRL, which measures the students' SRL strategies in online learning. Six SRL strategies were assessed, including goal setting, environmental structuring, task strategies, time management, help-seeking, and self-evaluation. This questionnaire has been broadly used in assessing OSRL among higher learning institution students (Zhang et al., 2023). This section includes 24 items adapted from Barnard et al. (2009).

Student Engagement (LEN)

Section 4 of the questionnaire collects data on the learning engagement. In this study, student engagement was measured using dimensions that included behavioral, cognitive, and emotional aspects of student engagement. Measurement items for behavioral engagement focused on how students participated in learning activities and took time to understand and complete the assigned task. The measurement items for cognitive engagement focused on motivating students to spend time and effort on problem-solving. The measurement items for emotional engagement captured students' emotional reactions to the learning environment. This section includes 13 items adapted from M.-T. Wang et al. (2016).

Data Analysis

We analyzed the data for this study using descriptive analysis and PLS-SEM. Analysis was done with SPSS 28.0 and SmartPLS 4.0. During data analysis, we first tested the measurement model. Then, a structural model evaluation was performed to test the possible relationships among the three constructs: PSP, OSRL, and LEN. PLS-SEM was used in this study for two main reasons: (1) PLS-SEM can estimate models with smaller sample sizes without emphasizing the normality of the data sets (Hair et al., 2019); and (2) PLS-SEM is appropriate for mediation testing consistent with this study (Henseler et al., 2015).

Results

We analyzed the measurement model to determine the reliability and validity of the constructs. Before formal analysis, five items from parental support, six from OSRL, and three from learning engagement were removed due to factor loadings below 0.5 (Fornell & Larcker, 1981). After removal, the Composite reliability (CR) and Cronbach's alpha value were calculated to identify the reliability of the constructs. For all constructs, the Cronbach's alpha values were above 0.7 (Hair et al., 2014), which demonstrates satisfactory reliability. In addition, the average variance extracted (AVE) scores for all constructs were greater than 0.5. Hence, convergent validity was met. Table 2 shows the loading factors of the items, CR, Cronbach's alpha, and AVE.

Table 2. Descriptive and Measurement Assessment Results

Item	Loadings	Cronbach's α	CR	AVE
Learning Engagement (LEN)				
LEN1	0.783	0.944	0.944	0.628
LEN2	0.775			
LEN3	0.796			
LEN4	0.843			
LEN5	0.796			
LEN6	0.764			
LEN7	0.804			
LEN8	0.897			
LEN9	0.789			
LEN10	0.655			
OSRL				
OSRL1	0.665	0.948	0.948	0.507
OSRL2	0.805			
OSRL3	0.564			
OSRL4	0.588			
OSRL5	0.676			

OSRL6	0.755
OSRL7	0.775
OSRL8	0.668
OSRL9	0.776
OSRL10	0.829
OSRL11	0.677
OSRL12	0.774
OSRL13	0.751
OSRL14	0.712
OSRL15	0.760
OSRL16	0.643
OSRL17	0.681
OSRL18	0.650
Parental Support (PSP)	
PSP1	0.546
PSP2	0.840
PSP3	0.728
PSP4	0.658
PSP5	0.661
PSP6	0.707
PSP7	0.607
PSP8	0.698
PSP9	0.857
PSP10	0.733

Meanwhile, discriminant validity was tested using Fornell and Larcker's (1981) criterion and the Hetrotrait-Monotrait (HTMT) ratio of correlations technique. Tables 3 and 4 show that discriminant validity was also achieved, with square roots of AVEs greater than correlations between all constructs and HTMT values less than the recommended value of 0.85 (Henseler et al., 2015).

Table 3. *Fornell-Larcker Criterion Results*

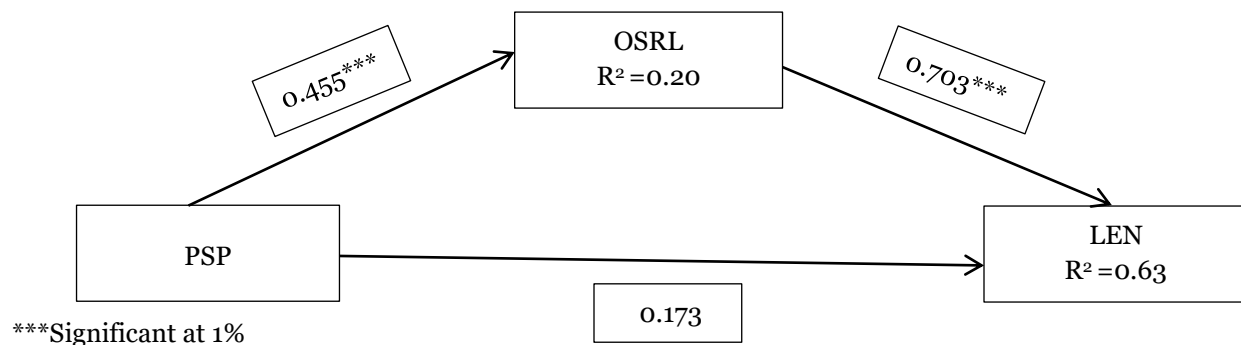
Factors	1	2	3
	LEN	OSRL	PSP
1 LEN	0.792		
2 OSRL	0.708	0.712	
3 PSP	0.492	0.459	0.709

Note. The square root of the AVE is represented by diagonals; other values represent the correlations.

Table 4. *Hetrotrait-Monotrait (HTMT) Results*

Factors	1	2	3
	LEN	OSRL	PSP
1 LEN			
2 OSRL	0.779		
3 PSP	0.490	0.456	

A bootstrapping procedure with 5000 samples was used to determine the significance of the hypothesized paths of the structural model (Streukens & Leroi-Werelds, 2016). Figure 2 shows the structural model. The results showed that the path from PSP to OSRL ($\beta = 0.455$, $t = 4.594$, $p < .01$) and the path from OSRL to LEN ($\beta = 0.702$, $t = 7.384$, $p < .01$) were significant. These results support H2 and H3. However, the path from PSP to LEN did not reach the significant level of 0.05 ($\beta = 0.173$, $t = 1.785$, $p > .05$) and does not support H1.

Figure 2. *Hypothesis Testing Results*

R-squared (R^2) represents the proportion of the variance explained by explanatory variables on dependent variables. In this model, parental support accounted for 20.7% of the variance in OSRL. In addition, OSRL accounted for 63.4 % of the variance in learning engagement, indicating a moderate explanatory power. Effect sizes (f^2) were also measured. Table 5 shows that OSRL strongly affected learning engagement ($f^2 = 1.069$). Parental support had a moderate effect on OSRL ($f^2 = 0.260$). However, parental support had a small effect on learning engagement ($f^2 = 0.065$).

Table 5. *Structural Assessment Result*

Hypothesis	Relationship	Std Beta	t-value	p-value	Decision	R^2	f^2	Q^2
H1	PSP → LEN	0.173	1.785	0.074	Rejected		0.065	
H2	PSP → OSRL	0.455	4.594	0.000	Supported	0.20	0.260	0.14
H3	OSRL → LEN	0.702	7.384	0.000	Supported	0.63	1.069	0.21
H4	PSP → OSRL → LEN	0.319	3.781	0.000	Supported			

To test the model's predictive power (Q^2), the Stone-Geisser approach—using blindfolding techniques—was used. A Q^2 greater than zero indicates good predictive significance (Hair et al., 2019). Table 5 shows that Q^2 values are more than zero. Thus, the research model has predictive significance.

A mediation analysis was done to identify the mediating role of OSRL in the relationship between parental support and learning engagement. Table 5 shows that the indirect effect of parental support (PSP) to OSRL to learning engagement (LEN) is significant ($\beta = 0.319$, $t = 3.781$, $p < .01$). Since there was no significant direct relationship between the peer learning (PSP) and learning engagement (LEN) ($\beta = 0.173$, $t = 1.785$, $p > .05$), the indirect effect found in this study is full mediation.

Discussion

The primary aim of this study was to determine the impact of parental support on learning engagement among students in higher learning institutions in mathematics OLEs. In addition, this study determined the mediating effect of OSRL on the path between parental support and learning engagement.

Data for this research could not prove the impact of parental support (PSP) on learning engagement (LEN), which indicates that PLP is not critical for students in higher learning institutions' learning engagement in online OLEs. This finding is consistent with the studies conducted by Bakar et al. (2021) and Arshad et al. (2016). These authors found that students at higher learning institutions welcome parental involvement in their learning activities. Nevertheless, these students also expect their parents to allow them to make their own decisions about their learning process and to arrange the learning activities in their own way. Another explanation for this is that the students who participated in this study are no longer affected by the lockdown environment. Hence, these students could attend their online classes from their hostels, where parents' involvement and supervision are minimal when compared to the lockdown environment. This may cause an insignificant relationship between PSP and learning engagement LEN.

This study showed that PSP significantly influences OSRL, which indicates that parental involvement and support in mathematics online learning environments affect students' adoption of self-regulated learning strategies. Malaysian students, bound to a collectivist culture (Minkov & Kaasa, 2022), are likely to respect their parents' opinions. These students also prefer to consult their parents' ideas before setting learning goals. In respect to this custom, parents express support for their children without reservation in all areas. As an instrumental motivating factor of OSRL's ability, such support and involvement from parents potentially promote students' OSRL, which corroborates the findings of Tus et al. (2024) and Munandar and Ruhaena (2023), who highlighted that parental involvement significantly affects students' OSRL.

This study also showed that OSRL significantly influences LEN among students in higher learning institutions in online mathematics classes. The finding corroborates those of Park and Yun (2018) and Dai et al. (2022), who suggest that students' learning engagement could increase significantly with self-regulation strategies. Learning in an online environment is more student-centered, which requires students to develop their abilities to manage their learning effectively. Students with SRL skills can set learning goals, control the learning environment, search for information, and evaluate their learning progress to be more engaged in learning activities. Additionally, SRL learners exhibit a high degree of learning motivation, which enables them to engage effectively in their learning activities (Dai et al., 2022).

This study confirms that PSP can predict LEN through the full mediation of OSRL. This finding implies that when the respondents' OSRL increased through support from parents, their learning engagement increased concurrently.

SRL skills are necessary for online learners to succeed in their learning activities. According to Zimmerman and Schunk (2001), students with SRL skills actively participate in their learning process. Additionally, these students are more inclined to explore the learning activities and resources, which increases their level of learning engagement. In this case, support received from parents (PSP) further increases the outcome acquired from OSRL because PSP increases students' motivation, which significantly improves students'

OSRL (Tus et al., 2024). This finding is consistent with Song et al. (2004), who reported that students with SRL abilities who receive support from parents can enhance their learning engagement level.

Conclusion

This study demonstrates the significance of the moderating effect of OSRL toward learning engagement. In addition, it highlighted the indirect impact of PSP on OSRL in promoting LEN. The result indicates no correlation between PSP and LEN. Nevertheless, OSRL significantly mediated the relationship between PSP and LEN, which implies that higher learning institution students who receive support from parents, and apply the underlying principles of SRL in mathematics OLE, would have better learning engagement. The result indicates that parental support (PSP) could be a crucial factor that enhances students' SRL abilities in mathematics OLE.

Although past studies report that students at higher learning institutions expect their parents to give them the freedom to make their own decisions regarding their learning process (Bakar et al., 2021), this study suggests that parental involvement remains relevant in the higher learning education context. PSP is believed to increase the student's motivation in pursuing goals (Suarsi & Wibawa, 2021), which subsequently leads to the adoption and promotion of effective SRL strategies. Thus, higher learning institution management should promote the involvement of parents in students' learning activities to obtain better learning outcomes.

From a practical perspective, the results indicated that OSRL is vital for improving learning engagement (LEN). Thus, instructors and parents should take adequate measures to foster students' OSRL strategies. SRL training and technology-enhanced interventions could be adopted to improve student SRL skills (Sui et al., 2024). SRL skills could also improve with opportunities for practice, scaffolding, and training (Berglas-Shapiro et al., 2017; Lai et al., 2018). Mastering effective SRL skills is important in OLE, as students have more autonomy in learning.

Limitations and Future Work

This study has several limitations. First, the study primarily focused on the context of higher learning institutions. Future research could be conducted across various educational levels to improve the generalizability of the results. Second, this study was conducted among mathematics students. Future studies could enhance this scope by including students from other faculties. Third, the study did not consider other external and contextual variables. Future studies could investigate the influence of external variables, such as instructor orchestration and perceived technology competency, and contextual variables, such as access to resources and experience with online learning.

References

- Aloka, P. J., Ooko, M., Ooko, P. A., & Onyango, P. (2023). Self-regulated learning and student success, retention, and engagement in online courses. In Jared Keengwe (Ed.), *Handbook of research on innovative frameworks and inclusive models for online learning* (pp. 238–255). IGI Global.
- Arianto, F., & Hanif, M. (2024). Evaluating metacognitive strategies and self-regulated learning to predict primary school students' self-efficacy and problem-solving skills in science learning. *Journal of Pedagogical Research*, 8(3), 301–319. <https://doi.org/10.33902/JPR.202428575>
- Arshad, M., Shahzadi, E., & Mahmood, A. (2016). Parents involvement at university level education: Students perception in under developing country. *European Scientific Journal*, 12(22), 294. <https://doi.org/10.19044/esj.2016.v12n22p294>
- Asif, M., Saifuddin, T., & Dilshad, W. B. (2023). Mediating role of parental involvement in implementation of self-regulated learning on students' achievement. *Periodicals of Social Sciences*, 3(1), 33–253.
- Azmi, S. F., Ma'rof, A. A., Abdullah, H., & Zarimohzzabeih, Z. (2023). Culture and communication styles: Collectivism vs individualism cultural orientations from Malaysian perspectives. *Business and Social Science*, 13 (16), 201–214. <https://doi.org/10.6007/IJARBSS/v13-i16/18738>
- Bahar, N., Wahab, S. N., & Ahmad, N. D. (2020, December). Understanding challenges faced in online teaching and learning among Malaysian universities' instructors during COVID-19 pandemic. In 2020 Sixth International Conference on e-Learning [Online conference] (pp. 154–157). IEEE. <https://doi.org/10.1109/econf51404.2020.9385474>
- Bai, X., & Gu, X. (2022). Effect of teacher autonomy support on the online self-regulated learning of students during COVID-19 in China: The chain mediating effect of parental autonomy support and students' self-efficacy. *Journal of Computer Assisted Learning*, 38(4), 1173–1184. <https://doi.org/10.1111/jcal.12676>
- Bakar, N. A., Ayub, A. F. M., Ahmad, N. A., & Abdullah, S. I. S. S. (2021). Mathematics achievement: The relationship between student engagement, parental involvement, and peer influence. *International Journal of Academic Research in Business and Social Sciences*, 11(5), 496–513. <https://doi.org/10.6007/IJARBSS/v11-i5/9973>
- Bannert, M., & Mengelkamp, C. (2008). Assessment of metacognitive skills by means of instruction to think aloud and reflect when prompted. Does the verbalisation method affect learning? *Metacognition and Learning*, 3(1), 39–58. <https://doi.org/10.1007/s11409-007-9009-6>
- Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S.-L. (2009). Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education*, 12(1), 1–6. <https://doi.org/10.1016/j.iheduc.2008.10.005>
- Berglas-Shapiro, T., Eylon, B.-S., & Scherz, Z. (2017). A technology-enhanced intervention for self-regulated learning in science. *Teachers College Record*, 119(13), 1–26. <https://doi.org/10.1177/016146811711901301>
- Burke, T. (2010, October 4). Benefits of parental involvement in education [Multimedia]. *The Gleaner*. <http://www.jamaicagleaner.com/gleaner/20101004/news/news7.html>
- Chapman, E. (2002). Alternative approaches to assessing student engagement rates. *Practical Assessment, Research, and Evaluation*, 8(8), Article 13. <https://scholarworks.umass.edu/pare/vol8/iss1/13/>
- Chen, J. J.-L. (2005). *Perceived Parental Academic Support Scale* (PPASS No. 999902755) [Database]. APA PsycTests. <https://doi.org/10.1037/t02755-000>

- Choy, S. C., Sedhu, D. S., Liew, Y. L., Lee, M. Y., Malenee, A., & Anuar, N. (2015). Influence of culture on students' awareness of how and why they learn. *Malaysian Journal of learning and Instruction*, 12(2015), 49–67. <https://files.eric.ed.gov/fulltext/EJ1134742.pdf>
- Dai, W., Li, Z., & Jia, N. (2022). Self-regulated learning, online mathematics learning engagement, and perceived academic control among Chinese junior high school students during the COVID-19 pandemic: A latent profile analysis and mediation analysis. *Frontiers in Psychology*, 13, Article 1042843. <https://doi.org/10.3389/fpsyg.2022.1042843>
- Deng, G. M., Xu, X. F., & Zhu, Y. H. (2021). Potential profile analysis and behavior process mining of online SRL in mixed learning environment. *Audio-Visual Educational Resources*, 42(1), 80–86.
- Dent, A. L., & Koenka, A. C. (2016). The relation between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. *Educational Psychology Review*, 28(3), 425–474. <https://doi.org/10.1007/s10648-015-9320-8>
- Đurišić, M., & Bunijevac, M. (2017). Parental involvement as an important factor for successful education. *Center for Educational Policy Studies Journal*, 7(3), 137–153. <https://files.eric.ed.gov/fulltext/EJ1156936.pdf>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- Fredricks, J. A., Filsecker, M., & Lawson, M. A. (2016). Student engagement, context, and adjustment: Addressing definitional, measurement, and methodological issues. *Learning and Instruction*, 43, 1–4. <https://doi.org/10.1016/j.learninstruc.2016.02.002>
- Gao, H., Ou, Y., Zhang, Z., Ni, M., Zhou, X., & Liao, L. (2021). The relationship between family support and e-learning engagement in college students: The mediating role of e-learning normative consciousness and behaviors and self-efficacy. *Frontiers in Psychology*, 12, Article 573779. <https://doi.org/10.3389/fpsyg.2021.573779>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. SAGE.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hammons, L. N. (2017). *Parents' roles in adolescent self-regulated learning: A mixed methods study*. Ohio LINK. https://rave.ohiolink.edu/etdc/view?acc_num=ucin1511861032843592
- Hanny, C. N., Graham, C. R., West, R. E., & Borup, J. (2023). “Someone in Their Corner”: Parental support in online secondary education. *International Review of Research in Open and Distributed Learning*, 24(1), 85–105. <https://files.eric.ed.gov/fulltext/EJ1380224.pdf>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hollister, B., Nair, P., Hill-Lindsay, S., & Chukoskie, L. (2022). Engagement in online learning: Student attitudes and behavior during COVID-19. *Frontiers in Education*, 7, Article 851019. <https://doi.org/10.3389/feduc.2022.851019>
- Jansen, R. S., van Leeuwen, A., Janssen, J., Conijn, R., & Kester, L. (2020). Supporting learners' self-regulated learning in massive open online courses. *Computers and Education*, 146, Article 103771. <https://doi.org/10.1016/j.compedu.2019.103771>

- Kara, A., Ergulec, F., & Eren, E. (2024). The mediating role of self-regulated online learning behaviors: Exploring the impact of personality traits on student engagement. *Education and Information Technologies*, 1–30. <https://doi.org/10.1007/s10639-024-12755-3>
- Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, 38(5), 758–773. <https://doi.org/10.1080/03075079.2011.598505>
- Lai, C.-L., Hwang, G.-J., & Tu, Y.-H. (2018). The effects of computer-supported self-regulation in science inquiry on learning outcomes, learning processes, and self-efficacy. *Educational Technology Research and Development*, 66(4), 863–892. <https://doi.org/10.1007/s11423-018-9585-y>
- Letchumanan, M., Husain, S. K. S., & Ayub, A. F. M. (2023). Determining the influence of cultural values on promotion of higher order thinking skills in technology enhanced learning environment. *Malaysian Journal of Mathematical Sciences*, 17(2). <https://doi.org/10.47836/mjms.17.2.01>
- Li, S., Jia, X., Zhao, Y., Ni, Y., Xu, L., & Li, Y. (2024). The mediating role of self-directed learning ability in the impact of educational environment, learning motivation, and emotional intelligence on metacognitive awareness in nursing students. *BMC Nursing*, 23(1), Article 789. <https://doi.org/10.1186/s12912-024-02457-z>
- Liu, Y., Hu, H., Wang, L., Mao, Y., Yang, K., Ma, L., & Li, H. (2023). Medical education environment perception and learning engagement in undergraduate nursing students: The mediating effect of self-regulated learning ability. *Nurse Education in Practice*, 72, Article 103793. <https://doi.org/10.1016/j.nepr.2023.103793>
- Majid, F. A. (2008). Culture and learner beliefs: A study of three Malay postgraduate students. *Asian Journal of University Education*, 4(1), 127–142.
- Mandernach, B. J. (2015). Assessment of student engagement in higher education: A synthesis of literature and assessment tools. *International Journal of Learning, Teaching and Educational Research*, 12(2), 1–14.
- Miao, J., & Ma, L. (2022). Students' online interaction, self-regulation, and learning engagement in higher education: The importance of social presence to online learning. *Frontiers in Psychology*, 13, <https://doi.org/10.3389/fpsyg.2022.815220>
- Minkov, M., & Kaasa, A. (2022). Do dimensions of culture exist objectively? A validation of the revised Minkov-Hofstede model of culture with World Values Survey items and scores for 102 countries. *Journal of International Management*, 28(4), Article 100971. <https://doi.org/10.1016/j.intman.2022.100971>
- Moore, M. G. (1993). Three types of interaction. In K. Harry, M. John, & D. Keegan (Eds.), *Distance education: New perspectives* (pp. 19–24). Routledge.
- Munandar, M., & Ruhaena, L. (2023). Self-efficacy, religiosity, and social support with undergraduate students' self-regulated learning in distance learning. *Journal An-Nafs: Kajian Penelitian Psikologi*, 8(2), 157–169. <https://doi.org/10.33367/psi.v8i2.3648>
- Musingafi, M. C. C., Mapuranga, B., Chiwanza, K., & Zebron, S. (2015). Challenges for open and distance learning (ODL) students: Experiences from students of the Zimbabwe Open University. *Journal of Education and Practice*, 6(18), 60–65. <https://files.eric.ed.gov/fulltext/EJ1079750.pdf>
- Osakwe, I. J., Egara, F. O., Inweregbuh, O. C., Nzeadibe, A. C., & Emefo, C. N. (2023). Interaction patterns: An approach for enhancing students' retention in geometric construction. *International Electronic Journal of Mathematics Education*, 18(1), Article em0720. <https://doi.org/10.29333/iejme/12596>
- Osorio-Saez, E. M., Eryilmaz, N., & Sandoval-Hernandez, A. (2021). Parents' acceptance of educational technology: Lessons from around the world. *Frontiers in Psychology*, 12, Article 719430. <https://doi.org/10.3389/fpsyg.2021.719430>

- Park, S., & Yun, H. (2018). The influence of motivational regulation strategies on online students' behavioral, emotional, and cognitive engagement. *American Journal of Distance Education*, 32(1), 43–56. <https://doi.org/10.1080/08923647.2018.1412738>
- Pinquart, M., & Ebeling, M. (2020). Parental educational expectations and academic achievement in children and adolescents—a meta-analysis. *Educational Psychology Review*, 32, 463–480. <https://doi.org/10.1007/s10648-019-09506-z>
- Rohmatillah, N., Musmulyadin, M., Maharaja, C. H., Sabri, S., & Ulwi, K. (2023). The impact of parental involvement in online learning on student academic success. *Journal of Computer Science Advancements*, 1(6), 327–343. <https://doi.org/10.70177/jsca.v1i6.926>
- Roick, J., & Ringeisen, T. (2018). Students' math performance in higher education: Examining the role of self-regulated learning and self-efficacy. *Learning and Individual Differences*, 65, 148–158. <https://doi.org/10.1016/j.lindif.2018.05.018>
- Setiani, S., & Wijaya, E. (2020, December 12). The relationship between self-regulated learning with student engagement in college students who have many roles. In *The 2nd Tarumanagara International Conference on the Applications of Social Sciences and Humanities* (pp. 307–312). Atlantis Press. <https://doi.org/10.2991/assehr.k.201209.045>
- Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The Internet and Higher Education*, 7(1), 59–70. <https://doi.org/10.1016/j.iheduc.2003.11.003>
- Song, L., Zhan, Q., Cao, L., & Luo, R. (2024). Parent autonomy support and undergraduates' academic engagement in online learning: The mediate role of self-regulation. *Psychology Research and Review*, 37(1), Article 45. <https://prc.springeropen.com/articles/10.1186/s41155-024-00330-1>
- Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. *European Management. Journal*, 34(6), 618–632. <https://doi.org/10.1016/j.emj.2016.06.003>
- Suarsa, K., & Wibawa, I. M. C. (2021). The impact of the COVID-19 pandemic on student learning motivation. *Jurnal Ilmiah Sekolah Dasar*, 5(2), 194–201.
- Sui, C.-J., Yen, M.-H., & Chang, C.-Y. (2024). Investigating effects of perceived technology-enhanced environment on self-regulated learning: Beyond p-values. *Education and Information Technologies*, 29(1), 161–183. <https://doi.org/10.48550/arXiv.2306.02392>
- Tus, M. C. M., Toring, E. E., Toring, K. N., Escarilla, C. C., Taño-An, E. L. T., Aquino, A. M., Gaviola, M. A., Sacapaño, N. N., Tus, J., & Maming, J. B. (2024). Correlation of academic achievement in tourism students: The role of self-regulated learning strategies and parental involvement. *Journal of Advanced Studies in Tourism, Hospitality, and Management*, 1, 36–44. <https://doi.org/10.5281/zenodo.11733567>
- Wang, C.-H., Shannon, D. M., & Ross, M. E. (2013). Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. *Distance Education*, 34(3)
- Wang, M.-T., Fredricks, J. A., Ye, F., Hofkens, T. L., & Linn, J. S. (2016). The math and science engagement scales: Scale development, validation, and psychometric properties. *Learning and Instruction*, 43, 16–26. <https://doi.org/10.1016/j.learninstruc.2016.01.008>
- Williams, P. E., Wall, N., & Fish, W. (2019). Mid-career adult learners in an online doctoral program and the drivers of their academic self-regulation: The importance of social support and parent education level. *International Review of Research in Open and Distributed Learning*, 20(1). <https://doi.org/10.19173/irrodl.v20i1.3789>

- Won, S., & Yu, S. L. (2018). Relations of perceived parental autonomy support and control with adolescents' academic time management and procrastination. *Learning and Individual Differences*, 61, 205–215. <https://doi.org/10.1016/j.lindif.2017.12.001>
- Yahya, N., Said, J., & Masrom, S. (2021). Self-regulated learning with open and distance learning for foundation of applied mathematics course. *Turkish Journal of Computer and Mathematics Education*, 12(5), 1765–1774. <https://turcomat.org/index.php/turkbilmat/article/view/2178>
- Zhang, Z., Maeda, Y., & Newby, T. (2023). Individual differences in preservice teachers' online self-regulated learning capacity: A multilevel analysis. *Computers and Education*, 207, Article 104926. <https://doi.org/10.1016/j.compedu.2023.104926>
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, 81(3), 329. <https://doi.org/10.1037/0022-0663.81.3.329>
- Zimmerman, B. J., & Schunk, D. H. (2001). Reflections on theories of self-regulated learning and academic achievement. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 289–307). Lawrence Erlbaum Associates.
- Zulfikar, N., Shafi, M. T., & Ajmal, R. (2023). Academic Achievement of first-generation university students in spotlight: Role of parental involvement, autonomy support, and academic motivation. *Journal of College Student Retention: Research, Theory and Practice*, 27(1). <https://doi.org/10.1177/15210251231160774>

The *Higher Learning Research Communications (HLRC)*, is a peer-reviewed, online, interdisciplinary journal indexed in Scopus, ERIC, JGATE and Directory of Open Access Journals (DOAJ). It is an open access journal with an international focus published by Walden University, USA. Its aim is to disseminate both high quality research and teaching best practices in tertiary education across cultures and disciplines. *HLRC* connects the ways research and best practice contribute to the public good and impact the communities that educators serve. *HLRC* articles include peer-reviewed research reports, research briefs, comprehensive literature reviews, and book reviews.