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MEDIATION OF STUDENT INTRINSIC MOTIVATION BETWEEN ONLINE LEARNING ENVIRONMENT AND STUDENT ENGAGEMENT

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A B S T R A C T

The shift to a full online learning environment (OLE) introduces new challenges which affect the motivation and engagement of students. This study investigates the relationship between the online learning environment and online student engagement as mediated by intrinsic motivation. The self-system model of motivational development (SSMMD) was used as the framework of the study. The researchers hypothesized that intrinsic motivation will partially mediate the relationship between the online learning environment (OLE) and online student engagement (OSE). 255 college students completed the survey. GLM mediation analysis was conducted using JAMOVI. Our analysis shows that the online learning environment significantly predicts online student engagement ($\beta = 0.553$, p<001). A decrease in regression weight with the direct effect was observed with the inclusion of intrinsic motivation as a mediator ($\beta = .430$, p<.001). Even with the inclusion of intrinsic motivation, the direct effect of OLE on OSE remained significant. The indirect effect was also significant using the Corrected bias bootstrap percentile with 1000 repetitions ($\beta = 0.127$, p = 0.002, 95% CI [0.0245, 0.103]). Findings support the hypothesized partial mediation of intrinsic motivation between OLE and OSE.

A R T I C L E   I N F O

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1. INTRODUCTION

Lockdown caused by the COVID-19 Pandemic forced institutions in many countries to move from face-to-face to fully online classes (Al-Ahdal, 2020; Embalsado et al., 2022; Khater et al., 2020; Mousavi et al., 2020; Shenoy et al., 2020). The shift to a full online learning environment (OLE) introduces new challenges which affect the motivation and engagement of students (Assunção et al., 2020; Genn, 2001; Saeed & Zyngier, 2012; Vasalampi et al., 2009). We intend to fill the gap in the literature by exploring the influence of the online learning environment on student motivation and engagement.

Extant literature suggests that OLE provides accessible learning materials and online modules in learning management systems (LMS) and promote student interaction cultivate motivation and engagement (Kim & Frick, 2011; Kreijns et al., 2003; Martin & Bolliger, 2018; Williams & Whiting, 2016). Students also encounter issues in their OLE observed from a poor internet connection, poor interaction with peers, and delayed communication and feedback from their teachers (Aragon & Johnson, 2008; Chen et al., 2010; Faisal et al., 2022). However, there is a lack of research on the role of online learning environment during the COVID-19 pandemic (Baber, 2020; Nieuwoudt, 2020; Ramshe et al., 2019; Shenoy et al., 2020).

The self-system model of motivational development (SSMMD) Skinner and Belmont (1993) is used as a framework for the study. The model posits that the learning environment determines student engagement through student motivation (Chiu, 2022; Deci & Ryan, 2008; Deci et al., 1999; Skinner & Belmont, 1993; Skinner et al., 2008). In our study, we propose that an online learning environment would cultivate online student engagement (OSE) through students' intrinsic motivation. We hypothesize that the online learning environment predicts intrinsic motivation and online student engagement (Skinner et al., 2009), and intrinsic motivation partially mediates the relationship between the online learning environment and online student engagement. This research will benefit college students, educators, and administrators considering that the online learning environment plays an essential role in education during the pandemic. Also, this will assess students' engagement in the context of OLE since most of the students are still adjusting to this kind of setup (Baber, 2020).

1.1 Online Learning Environment (OLE)

The online learning environment is composed of the program effectiveness, teaching quality, professionalism, learner support, awareness of school regulations, and safety and convenience (Dixson, 2015; Maatuk et al., 2022; Tsai et al., 2021). Furthermore, OLE is a systematic system used to distribute and acquire learning materials from the internet and LMS (Baber, 2020; Mousavi et al., 2020). OLE that are student-centered, self-directed, interactive, flexible, and self-paced present advantages in learning (Cole et al., 2009; Hampel & Dancsházy, 2014). OLE requires the use of devices (e.g., laptops, phones, and tablets) and the internet to participate in class, interact with peers, and access learning modules (Al-Ahdal, 2020; Gikas & Grant, 2013; Khater et al., 2020; Mousavi et al., 2020; Sumuer, 2018). Educators mainly use LMS (e.g., Canvas and Google classroom), video conferencing (e.g., Zoom and Google meet), and social media (e.g., Youtube) to facilitate online classes (Shenoy et al., 2020).

The learning environment affects the behavior of the students because all the learning happens in their learning environments itself (Genn, 2001). Thus, their learning environments affect their academic development, satisfaction, and achievement (Genn, 2001; Razak, 2010). Moore et al. (2011) stated that online learning improves easy access to educational opportunities for learners described as both nontraditional and online. Other studies pertain to the accessibility of online education and its connectivity, flexibility, and ability to promote varied interactions and communication among students (Hiltz & Turoff, 2005). The accessibility and convenience of OLE aid students to continue their education during the pandemic.

1.2 Online Student Engagement

Online Student Engagement is a set of constructs that includes students' actions and in their thought processes as well as how they feel about their learning and the connections they are making with the content, the instructor, and other students in terms of skills, participation, performance, and emotion (Dixson, 2015; Dyment et al., 2020; Tsai et al., 2021). Students who have high engagement in the learning process tend to be more active in classroom interaction. They involve more of their feelings and sense in their exchange to achieve the learning objectives (Susanti, 2020). As explained by Schlechty in the book entitled Working on the work: an action plan for teachers, principals, and superintendents. The jossey-bass education series in 2002 that engagement is active; students work with enthusiasm and diligence. They tend to make ways to engage longer and push themselves through their learning processes (Klem & Connell, 2004; Raykov, 2001) to have better outcomes and achievements (Klem & Connell, 2004; Wonglorsaichon et al., 2014). However, engagement in the online setting during the pandemic has not been thoroughly explored (Baber, 2020).

1.3 Online Learning Environment and Online Student Engagement

OLE affects student engagement in online classes. The flexibility and convenience of accessing the class modules through LMS, social media, and other platforms make students more engaged in their classes (Baber, 2020; Shenoy, et al., 2020). Especially during the pandemic when the government implements community quarantines to minimize COVID-19 infection. Online learning allowed students to continue their studies even with strict health regulations (Shenoy, et al., 2020). Extant research also indicates that support, guidance, and feedback from teachers are essential aspects of an online learning environment that promotes student engagement (Chen et al., 2010; Tait, 2000).

Conducive OLE promotes students' participation in individual and group class activities (Fredricks et al., 2004; Nieuwoudt, 2020; Williams & Whiting, 2016). Interaction with peers and teachers makes students feel belongingness, and enjoyment in their classes which engages them with studies (Ramshe et al., 2019; Williams &

Whiting, 2016; Reeve, 2013). Organized and thorough OLE engages students to exert effort, think of learning strategies, and challenge themselves to maximize learning (Brunzell et al., 2016; Chu, 2022; Hew et al., 2010). Engaged students exert cognitive resources to evaluate, reason, and create ideas to solve problems (Akyol et al., 2009; Darabi & Jin, 2013).

1.4 Intrinsic Motivation

Intrinsic motivation is defined as doing something for inherent satisfaction and not for external benefits (Ryan & Deci, 2000). Intrinsically motivated individuals are more resilient when they are experiencing problems, and for that reason, they become more interested in learning relevant strategies to cope with those challenges (Deci & Ryan, 2008). In education, intrinsic motivation refers to the student's volition to learn and effort in their studies according to their interest (Kim & Frick, 2011; Sumuer, 2018). As explained by Misra and Mazelfi in the research entitled Long-distance online learning during pandemic: The role of communication, working in group, and self-directed learning in developing student's confidence in 2021, intrinsically motivated students push themselves to learn even without the influence of rewards and other people. Keywords that also describe intrinsic motivation are interest, enjoyment, and inherent satisfaction, and as a result, students engage if they have encountered these experiences. Deci and Ryan (2008) also expound that if an individual is intrinsically motivated, he or she is driven to work for the desire and pleasure that is actively engaged rather than gaining from external inquiries, pressure, or social rewards. As far as engagement is concerned, there would be a significant effect of intrinsic motivation on student engagement and is positively associated with behavioral, cognitive, and emotional engagement in school tasks (e.g., Benware & Deci, 1984; Furrer et al., 2014; Goodenow, 1993; Hausmann et al., 2007; Phan, 2009; Skinner et al., 1990). However, the influence of intrinsic motivation of students to student engagement in online classes during the pandemic has not been thoroughly explored.

We propose that the intrinsic motivation of students serves as a partial mediator between OLE and online student engagement. Previous literature supports our hypothesized mediation, for instance, the quality of OLE influence the student's volition, interest, and effort in their education which in turn affect their participation; attachment to their teachers, peers, and institutions; and effort to formulate learning strategies, and develop skills to be successful in their education (Skinner et al., 2008). We draw a line by seeing the context fosters the development of motivation, particularly intrinsic motivation (Skinner et al., 2014; Ryan & Deci, 2000), and having this motivation of the students at hand, will help them to engage more in their activities (Deci & Ryan, 2008; Deci et al., 1999; Skinner & Belmont, 1993; Skinner et al., 2008). Academic motivation (i.e., intrinsic motivation) may explain the relationship between the online learning environment and student engagement.

1.5 Present Study

The current study has two main objectives: 1) understand the association between OLE and OSE, and 2) understand the mediation of intrinsic mediation between the association between OLE and online student engagement. We used SSMMD as a framework, the model posits that the learning environment or context of students determines student engagement through student motivation (Skinner et al., 1993). In our study, we propose that OLE would cultivate online student engagement through intrinsic motivation (Fig. 1).

According to Skinner and Pitzer's book chapter entitled Developmental dynamics of student engagement, coping, and everyday resilience in 2012, the context is where the student is in (e.g. online learning environment, traditional setting). The self which includes students' self-perceptions which refer to an assessment of multiple features of the self, such as motivation or a sense of belongingness in school, is considered a facilitator of engagement that is the active component of this conceptualization (Deci & Ryan, 2008). As explained by Connell and Wellborn's book chapter entitled Competence, autonomy, and relatedness: A motivational analysis of self-system processes in 1991 furthermore, according to SSMMD, student engagement is optimized when the learning environment fulfills student motivation. The context variable in the SSMMD can pertain to different contexts like the online learning environment. This model specifies conditions wherein these needs are fulfilled to promote engagement (e.g., flexibility and convenience) (Skinner & Belmont, 1993). These conditions would help students achieve motivation and engagement (Skinner & Belmont, 1993). But when the context does not nurture motivation, engagement is undermined. Likewise, it is explained that if one's context does not nurture (e.g., controlling, over-challenging, rejecting) motivation, the student will be disengaged with their studies (Eccles & Wigfield, 2002).

Fig. 1 Conceptual Diagram

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2. METHOD
2.1 Participants and Procedures
Convenience sampling was utilized where all available students were invited to participate. 256 college students participated in the study with a mean age of 20.8 ranging from 18 to 25. 179 (70.2) are Female and 76 are males (29.8). Most are 4th year students (119, 46.7%). Data gathering is conducted from December to February 2021 or Academic year 2020-2021. This time period reflects the implementation of fully online classes to manage COVID-19 infection. The abrupt shift to online classes results in the importance of the online learning environment. The theoretical framework explains that the environment or learning context influences student engagement through academic motivation.

Upon requesting the students to volunteer, the researchers gave each participant a link to a survey on google forms. The link was sent through their emails. The form includes an informed consent form to participate in the study. The approximate time will take no longer than 5-10 minutes to complete the form and questionnaires. The participants are asked if they had any questions and are thanked sincerely for their time and cooperation.

2.2 Measures
E-learning educational atmosphere measure (EEAM) Mousavi et al. (2020) was used to measure the student OLE. As explained by Reeve's book chapter entitled Self-determination theory applied to educational settings in 2002, it surveys students' self-perceptions about their experiences in their educational background, that is, the academic atmosphere. The scale obtained good interim internal consistency, α=0.943. It is a 40-item instrument that consists of six factors, namely, Program effectiveness (e.g., "It's easy for me to study and do my assignments and activities"), Teaching quality (e.g., "Teachers of this programme cover teaching process within LMS"), Ethics and professionalism (e.g., "Copyright and intellectual property of scientific resources and contents are respected"). Learner support (e.g., "Course plans are clear and available"), Safety and convenience (e.g., "I can easily work with LMS."), Awareness of the rules (e.g., "I have become aware of educational regulations and administrative processes"). It is to be answered on a five-point Likert scale, ranging from 1 ("absolutely disagree") to 5 ("totally agree"). We used the total scores in the study.

Online Student Engagement Scale (OSE) was used to measure online student engagement (Dixson, 2015; Tsai et al., 2021; Dyment et al., 2020). It measured the psycho-educational perspective of participants' student engagement. It has good psychometric properties and a Cronbach's alpha of 0.86. It is a 19-item instrument that consists of four factors, namely, Skills engagement (e.g., "study regularly"); Emotional engagement ("put forth effort"); Participation/Interaction engagement ("have fun in online chats"); and Performance engagement ("do well on tests"). It is to be answered on a five-point Likert scale, ranging from 1 ("never") to 5 ("always"). We used the total scores in the study.

To assess college academic motivation, particularly their intrinsic motivation (IM), we used the Academic Motivation Scale (AMS) (Vallerand et al., 1992). The scales correspond with a good and reasonable psychometric property, with alphas ranging from alphas that range from .80. The 12-item scale consists of 4 item per subscale, namely, Intrinsic Motivation to know (e.g., "Because I experience pleasure and satisfaction while learning new things"), Intrinsic Motivation towards accomplishments (e.g. "For the pleasure, I experience while surpassing myself in my studies"), Intrinsic Motivation to experience stimulation (e.g. "For the intense feelings I experience when I am communicating my ideas to others"). It is to be answered through a 7-point Likert scale, 1 being "does not correspond at all" to 7 being "corresponds exactly," and 4 as midpoint being "corresponds moderately." We used the total scores in the study.

2.3 Ethical Considerations
Our paper was reviewed by the university ethics committee. We presented the informed consent which explains the nature, procedures, risk, and benefits of the study. Participants were told that then can withdraw at any point in the study. The gathered information gathered, will be kept confidential and anonymous. The data was stored in a secured drive using the University account to protect the identity of the research participants.

3. RESULTS AND DISCUSSION
In the initial analysis we analyzed for the descriptive statistics of the participant demographic profile and research variables. Then we obtained the internal consistency of the measures for the reliability, and pearson r product moment correlation for the association between the research variables. GLM mediation analysis of JAMOVI version 2.2.5 was used for the mediation analysis. Bootstrap percentile with 1000 repetitions was conducted for the indirect effect. Table 1 shows the participants' profile.

Table 1.
Participant Profile

	M	*SD*	Range
Age	20.8	2.26	18-25
	Frequency	Percentage	Cumulative Percentage
Male	76	29.8%	29.8%
Female	179	70.2%	100%
	Frequency	Percentage	Cumulative Percentage
1st Year	42	16.5%	6.5%

2nd year	37	14.5%	31%
3rd year	57	22.4%	53.3%
4th Year	119	46.7%	100%

Note: N-255

The Pearson correlation coefficients indicated significant value throughout the three variables (Table 2).

Table 2.
Descriptive Statistics and Correlation Matrix of Research Variables

	1	2	3	*M*	*SD*	α
1.OSE	-	-	-	72.5	12.8	.940
2.OLE	O.557***	-	-	14.1	26.1	.969
3,IM	0.468***	0.553***	-	46.5	8.98	.940

Nore: OSE – Online Student Engagement, OLE – Online Learning Engagement, IM – Intrinsic Motivation

The coefficient indicated a strong, positive correlation between OLE and OSE (r= .557 p<.001). The relationship between Intrinsic motivation and OSE indicated a moderate positive correlation (r= .468 p<.001). Finally, the correlation between Intrinsic Motivation and OLE indicated a high positive correlation (r= .553 p<.001).

Using Jamovi GLM Mediation analysis we tested the hypothesized positive association between OLE and online student engagement; and intrinsic motivation as mediator between their association (Table 3).

Table 3.
Meditation

Type	Effect	β	SE	95% CI		p
				Lower	Upper	
Indirect	OLE ⇒ IM ⇒ OSE	0.127	0.021	0.024	0.103	0.002
Compo-nent	OLE ⇒ IM	0.553	0.019	0.148	0.227	<.001
	IM ⇒ OSE	0.230	0.103	0.132	0.532	0.002
Direct	OLE ⇒OSE	0.430	0.037	0.135	0.282	<.001
Total	OLE ⇒OSE	0.557	0.025	0.223	0.324	<.001

Results indicate that OLE positive predict intrinsic motivation ($\beta = 0.553$, p<.001) and online student engagement ($\beta = 0.430$, p<.001). Similarly, intrinsic motivation also positively predicts online student engagement ($\beta = 0.230$, p = 0.002). Accounting for the total effect ($\beta = 0.553$, p<.001) of intrinsic motivation as mediator resulted to a decrease in regression weight on the direct effect ($\beta = 0.430$, p<.001). Even with the inclusion of the intrinsic motivation as mediator the direct effect remained to be significant, suggesting a partial mediation.

Corrected bias bootstrap percentile with 1000 repetitions revealed that the indirect effect of the online learning environment on student engagement is significant ($\beta = 0.127$, p = 0.002, 95% CI [0.0245, 0.103]). Fig. 2 below exhibits the conceptual diagram with the description of the regression weights.
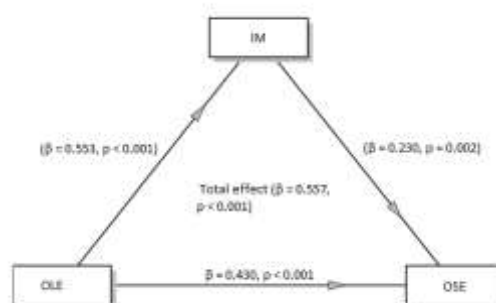

Fig. 2 Conceptual Diagram with Regression Weights

3.1   *Discussion*
We intend to prove intrinsic motivation as a partial mediator in the relationship between Online Learning Environment (OLE) and Online Student Engagement (OSE). Results suggest, Intrinsic motivation partially mediates OLE and OSE. The relationships of OLE to intrinsic motivation and intrinsic motivation to OSE are positively significant. Findings support the model of Skinner and Belmont (1993) that posits intrinsic motivation is accounted for the association between the learning environment and student engagement.

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3.2   Online Learning Environment and Online Student Engagement

Our findings support existing literature on the predictive role of the learning environment on student engagement. According to the SSMMD Skinner and Belmont (1993), an online learning environment predicts student engagement through academic motivation. Findings showed that an online learning environment positively predicts student engagement. Results support previous studies that students equipped with the necessary learning equipment are more engaged in their studies. According to Dixson (2015), students feel more connected to the materials they use and to the lessons it applies to their lives which creates ties with their school. In return, emotions like belongingness, valuing, and enjoyment will encourage students to get involved with their online learning (Fredricks et al., 2004; Ramshe et al., 2019; Schult et al., 2022; Williams & Whiting, 2016). This demonstrates that the effectiveness of the academic program, teaching quality, professionalism in classes, support to learners, and awareness of class and institutional rules can engage students in their online classes. Thus, if the learning environment of the students is conducive then the students will actively participate in-class activities, exert effort in their outputs, and develop effective learning strategies in their classes.

Moreover, it shows the positive effect of accessibility, connectivity, flexibility, and connectedness of students in online education to their engagement (Debowska et al., 2022; Hiltz & Turoff, 2005; Williams & Whiting, 2016). The strength of the relationship will depend on how the context or the online learning environment hones students' engagement. For example, a student enrolled in a good online learning program (e.g., proper use of LMS and modules) will have a higher engagement with their studies. A proper online learning environment could also initiate critical thinking and interaction with peers (Darabi & Jin, 2013; Dennen & Wieland, 2007). Overall, the conducive and structured program as an online learning environment could engage students to efficiently learn their lessons, and enhance their cognitive abilities (e.g., critical thinking, and decision making (Akyol et al., 2009; Darabi & Jin, 2013).

3.3   Intrinsic Motivation as a Mediator

The findings suggest that OLE cultivates OSE through intrinsic motivation. This indicates that an online learning environment that fosters personal interest and drives students to develop the volition to work on their tasks could foster student participation, class interaction, exert effort in class, and do well in-class activities. Evidence is aligned with SSMMD on the role of intrinsic motivation between the learning environment and student engagement. Suggests that if the online learning environment is conducive to learning then students will put effort, experience satisfaction, and express interest in their classes developing online student engagement. Results are consistent with the studies of Kim and Frick (2011) and Sumuer (2018); OLE facilitates learning where learners can only rely on themselves in pushing themselves to learn online, like engaging with online schoolwork. Intrinsic motivation expresses willingness and satisfaction which drive a student to focus their energy on their class (Chiu, 2022). Thus, this makes learners fuel their intrinsic motivation. Results also show a positive relationship between intrinsic motivation and OSE. In this study, intrinsically motivated students engage more to retain their motivation.

A nurturing online learning environment is the root of a student's motivation which is an important factor to accomplish one's academic task in the online setting. When students' online environment is nurtured, they get the urge to study intrinsically. And so this urge makes them do and finish their schoolwork in time. It makes sense that surveyed students get motivated when their overall online environment is conducive despite the challenges online. Thus, intrinsic motivation can explain why students with nurturing OLEs accomplish and do more school tasks. The findings are consistent with the model of Skinner and Belmont (1993). The model specifies conditions (e.g., flexibility and convenience) to promote engagement. These conditions would help students achieve motivation and engagement (Skinner & Belmont, 1993). Furthermore, if one's context does not nurture (e.g., controlling, over challenging, rejecting), motivation -then students could withdraw themselves in class engaging with their class. This suggests that a student's motivation promotes and directs behavior in to perform a task (Eccles & Wigfield, 2002; Schult et al., 2022).

3.4   Scope of the Study

The researchers have identified several limitations. First, our study employed a cross-sectional design which focused the data gathering on a point in time. Longitudinal research consisting of data gathering in different timeframes is necessary to provide strong support to the present study. Second, the samples are limited to one area, a bigger sample can be obtained for a better generalization of results. Third, the data we're using self-report questionnaires which limits the responses of the participants and potential biases from the participants. Fourth, the research focused on identifying the information about the online class and excluded other forms of education (e.g., blended learning).

3.5   Implications

Our study indicates that the learning environment in terms of the effectiveness of the academic program, teaching quality, professionalism in classes, support to learners, and awareness of class and institutional rules can engage students in their online classes. Educational institutions can properly plan their online modules to motivate and engage their students. Educators could develop enticing online modules to capture the interest of the students which could engage them to participate in their classes. Educational institutions could also train teachers with online teaching pedagogy, LMS, and ICT use properly support the academic concerns of the students. Thus, proper implementation of online classes as observed by the online learning environment could lead to better academic outcomes (Reeve et al., 2004), student persistence (Appleton et al., 2006), and better mental health of students,

prevent students from dropping out (Archambault et al., 2009), and timely completion of requirements. Our research indicates that the learning environment in online classes has a different need and effect on students.

3.6   Theoretical Insight

Given our results, some of the assumptions of SSMMD were confirmed: the self-variable namely, Intrinsic motivation as presented in the model has a significant impact on student engagement. It is also found that intrinsic motivation is a significant partial mediator in the relationship between the online learning environment and online student engagement. It is also to be noted that the OLE has impacts on both intrinsic motivation and OSE. Intrinsic motivation is found as a partial mediator in the model. These findings will be a starting point and reference in researching student engagement. Moreover, the online context and conditions where this study is conducted can help in succeeding research of engagement and motivation because it is uncertain how the online context will progress. Hence, this study will add up to the new variety of knowledge that will help researchers view engagement and motivation in the online context. To conclude, new studies using similar approaches and SSMMD are needed to clarify the theoretical assumptions of this model.

4.   CONCLUSION

This research aimed to prove whether intrinsic motivation is a partial mediator in the relationship between the online learning environment and online student engagement. The hypotheses are answered based on the theoretical model of SSMMD. Based on quantitative analyses of the data gathered, it was found that intrinsic motivation is a significant partial mediator. It was also found that OLE significantly predicts OSE and intrinsic motivation. Findings align with the evidence on the role of learning environment to student motivation and student engagement. Our findings contribute to the literature by providing contextualized findings of online learning environment to online student engagement through instrinsic motivation.

Conclusions can be drawn based on these results: (1) Students' respective online learning environments are a significant predictor of their high or low intrinsic motivation and online engagement. (2) Intrinsic motivation may explain the relationship or is the reason why OLE and OSE are related. With IM explaining this relationship, removing this mediator from the equation will not affect the relationship between OLE and OSE. Meaning, that they will still be significantly related or predict each other. (3) Finally, the model of SSMMD and its claims supported the aims of this research. In return, this research also supported the SSMMD to be used as a potential reference for future research.

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