EasyChair Preprint

№ 10566

Dynamic Interaction Model of E-Learning Readiness, Self-Regulated Learning, and Student-Student Dialogue to Assess E-Learning Efetive-Ness

Sean Eom

July 15, 2023

DYNAMIC INTERACTION MODEL OF E-LEARNING READINESS, SELF-REGULATED LEARNING, AND STUDENT-STUDENT DIALOGUE TO ASSESS E-LEARNING EFETIVENESS

Research full-length paper

Sean Eom, Southeast Missouri State University, Cape Girardeau, USA, sbeom@semo.edu

Abstract

Since the late 1990s, a significant learning management systems (LMS) research stream has included reviewing and analyzing existing online readiness surveys. A substantial portion of the current research examined (1) the number of factors in e-learning readiness, (2) the number of items/indicators in each factor, and (3) empirically tested the relationships among predefined factors and indicators. This paper attempts to answer two following research questions. How has the online learning readiness (OLR) research stream changed over the past decades? Does our contemporary OLR research address relevant topics that can affect the current online learner's success?

This paper expanded the domain of e-learning readiness research to replace SDL with SRL and to add dialogues (student-student and student-instructor) variables into a new research domain. We present a dynamic interaction model of e-learning readiness, SRL, and student-student dialogue to assess e-learning effectiveness. By integrating SRL and student-student dialogue, this study empirically tested a model of the effectiveness of LMS. The research model is tested using WarpPLS (version 8), which is the structural equation modeling (SEM)-based Partial Least Squares (PLS) methodology. It provided statistically significant evidence to suggest that students' readiness for e-learning significantly affected three areas: self-regulated learning (H1), learning effectiveness (H2), and student-student dialogue (H3).

Keywords: Distance Learning, Learning Management Systems (LMS), User-Satisfaction, Effectiveness, Online Learning Readiness.

1 Introduction

Since 2019, the world has been devasted by the COVID-19 pandemic. It forced all educational institutions in the USA and elsewhere to shift to distance education without time to prepare administrators, instructors, and students. Further, it has changed how educational institutions deliver education, including HyFlex, a new delivery model in which the instructor and students are simultaneously in a physical classroom and synchronously online through videoconferencing software (Kohnke & Moorhouse, 2021). The growing presence of new delivery modes highlighted distance learning as a critical strategic tool that guarantees the continuity of the institution's stability and students' education processes. With the growing importance of e-learning and the sudden shift to forced distance learning, a critical question is: what are crucial student attributes that help e-learners succeed in the e-learning process?

Online learner readiness (OLR) is one of many critical success factors that predicts e-learning outcomes and effectiveness. OLR has long been used to refer to e-learners' ability to complete online learning activities successfully. The origin of OLR can be traced back to the late 1990s when researchers began to investigate success factors that can influence online learning outcomes. There is a wide range of divergent opinions about what elements constitute online learning readiness.

Over the past four decades since the late 1990s, a significant research stream has included reviewing and analyzing existing online readiness surveys. A substantial portion of the current research has examined (1) the number of factors in e-learning readiness, (2) the number of items/indicators in each factor, and (3) empirically tested the relationships among predefined factors and indicators.

This paper attempts to answer two following research questions.

How has the OLR research stream changed over the past decades? Does our contemporary OLR research address relevant topics that can affect the current online learner's success?

2 How has OLR research changed over the past decades?

Review of OLR published research in the early 2000s (Aydin & Tasci, 2005; Hoban, Lawson, Mazmanian, Best, & Seibel, 2005; Hung, Chou, Chen, & Own, 2010; Mercado, 2008; O'SHEA, 2003; Parnell & Carraher, 2003; van der Rhee, Verma, Plaschka, & Kickul, 2007; Watkins, Leigh, & Triner, 2004) led us to conclude that three sub-elements define OLR concepts: (1) Technical dimensions including computer self-efficacy, Internet self-efficacy, and online self-efficacy; (2) self-directed learning (DDL); and (3) motivation. Based on further review of OLR studies published in the late 2000s (Chung, Noor, & Mathew, 2020; Horzum, Demir-Kaymak, & Gungoren, 2015; Kırmızı, 2015; Yilmaz, 2017), we have not seen any fundamental changes in the intellectual structure of OLR research.

Table 1 contrasts the significant differences between OLR research and the E-learning success model (Sean B. Eom & Ashill, 2016, 2018; Sean B. Eom, Ashill, & Arbaugh, 2016) regarding critical factors. Some crucial differences between the two are as follows. First, OLR research utilizes self-directed learning (SDL) (Doo, Zhu, & Bonk, 2023; Knowles, 1975; O'SHEA, 2003) as the critical construct, while the e-learning success model uses self-regulated learning (SRL) (Broadbent, 2017; Panadero, 2017; Wan, Compeau, & Haggerty, 2012).

The heart of the system's view of the e-learning success model (Fig. 2) includes SRL, which comprises three main processes: motivational, metacognitive, and behavioral. Self-regulated learners are more motivated to complete the learning process: goal setting, monitoring progress, selecting appropriate cognitive and metacognitive, and resource management strategies. As shown in Fig, the dialogical

process is the most significant difference between SDL and SRL. 2. Self-directed learning was developed based on the principles of adult education (Knowles, 1975; O'SHEA, 2003), with much less collaboration among adult learners.

Second, the OLR model emphasizes the technical dimension of learning readiness. In contrast, the e-learning success model considers the role of the instructor as a crucial element of e-learning success.

Systems	**Entities**	**Online Learning Readiness Model**	**System's View of the E-learning Success Model**
Inputs	Students	Motivation	Motivation (Intrinsic and Extrinsic)
Inputs	Students	Self-directed Learning (SDL)	Self-Regulated Learning (SRL)
Inputs	Instructor		Course Design
Inputs	Instructor		Instructor (Feedback, Facilitation)
Inputs	LMS/CIT	Computer Self-efficacy Internet Self-efficacy	
Processes	E-learning systems	Online Self-Efficacy	Dialogues (Student-Student and Instructor-Student)
Outputs	E-learning systems	Learning Outcomes/ Effectiveness	Learning Outcomes/ Effectiveness

Table 1. Online learning readiness model vs. E-learning Critical Success Factors Model

3 Does our contemporary OLR research address relevant topics that can affect the current online learner's success?

The concept of e-learning readiness and the e-learning critical success factors model are two different research streams developed in the distance learning community. However, they are two sides of an identical coin. Nevertheless, the existing online learning readiness empirical research model has ignored the recent developments in empirical e-learning research in the critical success factors model (S. Eom, 2021; Sean B. Eom & Ashill, 2018). The contemporary OLR research failed to address the pressing and crucial issues in e-learning systems: SRL and dialogues (Student-Student and Student-Instructor dialogues). OLR research has continuously used SDL as a critical construct. Theoretically, SRL is a better construct. In e-learning literature, few studies use SDL anymore.

This paper presents a dynamic interaction model of e-learning readiness, SRL, and student-student dialogue to assess e-learning effectiveness. This model is derived from a system's view of the e-learning success model. The contribution of this article lies in its exploration of the relationship between several e-learning critical success factors and LMS effectiveness, offering a theory-based foundation for future OLR and LMS empirical studies.

4 System's View of the E-learning Success Model

To tackle our research question on the effect of self-efficacy and SRL on OLR and LMS effectiveness, we must base our research on a new theoretical foundation. The systems view of the e-learning success model, Fig. 1, emerged as a new e-learning research framework for advancing our empirical e-learning research toward solid theory building. A system's view of e-learning systems sees distance learning systems as a dynamic set of interdependent sub-entities interacting together, and e-learning systems are not explainable from characteristics of isolated sub-entities. The components of a systemic model consist of inputs, processes, and outputs. The inputs of the distance learning systems consist of the human (students and the instructor) and design dimensions, including LMS and communication and information technology (CIT). See Eom (2018) for a detailed description of this view.

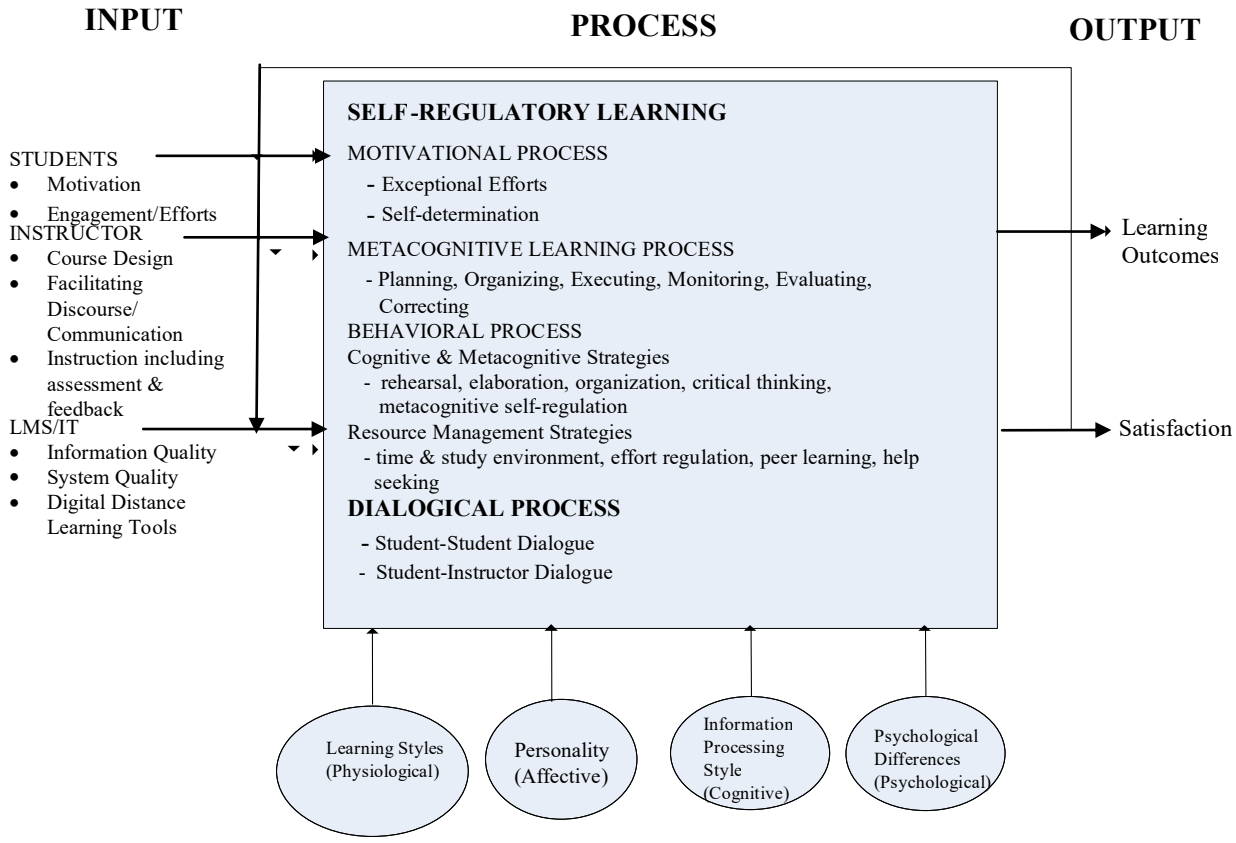

Figure 1. System's View of E-learning Success (Source: Eom and Ashill 2016)

The process is the bridge that connects input and two outputs: learning outcomes and student satisfaction. Learning outcomes in e-learning success models are often called LMS effectiveness in OMR em-

pirical studies. The other crucial element of the e-learning success model is self-regulated learning (SRL). The SRL process includes motivational, metacognitive, and behavioral processes.

LMS/IT is a sub-element of e-learning systems. The output of e-learning systems is learning outcomes and student satisfaction.

5 Research Model

The research model (Fig 2) is derived from the system's view of the e-learning success model. Therefore, the two dependent constructs (SRL and student-student dialogue) are the critical difference between the current and previous online learning readiness research models in the literature. No other previous research attempted to investigate the effects of e-learning readiness on SRL and SS dialogue. The systems view emphasizes dynamics among inputs, processes, and outputs of e-learning systems. Unlike most empirical readiness studies (Martin et al., 2020; Torun, 2020) that typically use e-learning readiness as a single construct to predict e-learning outcomes, our model (Figure 3) includes two process variables. The research model examines readiness as a predictor of learning effectiveness (H_2) and readiness as a predictor of self-regulation learning behavior (H_1) and student-student dialogue (H_3).

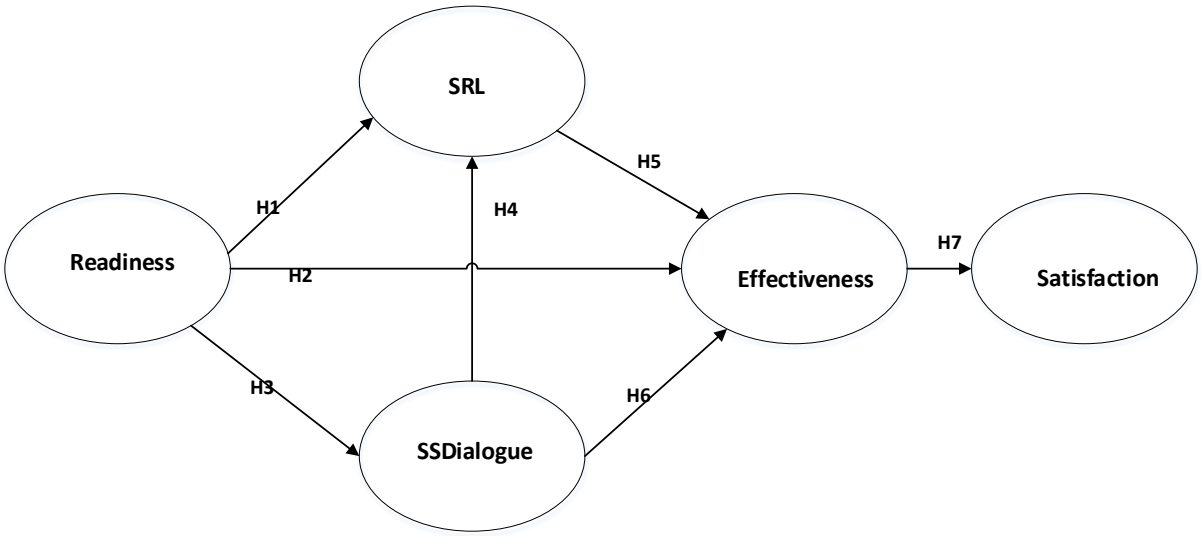

Figure 2. Research Model

5.1 E-learning readiness

The online learning readiness (OLR) concept is a multidimensional construct comprising the following sub-dimensions: self-directed learning; motivation for learning; learner control; computer and Internet self-efficacy; and online communication self-efficacy. Few studies explore the relationship between OLR and SRL. SRL is a dynamic process in which the learner actively manages the learning process. The learning process consists of setting learning goals, planning strategies to accomplish the goals, including time management, monitoring the differences between goals and performances, and positively interacting with the instructor and fellow students. Consequently, online learning readiness facilitates and bolsters this process.

Therefore, we hypothesize:

H1: Online Learning Readiness will be positively related to self-regulated learning.

A large number of empirical studies on online learning readiness investigated the associations between OLR and e-learning effectiveness. Each subdimension of OLR (self-directed learning, motivation, computer self-efficacy, and online communication self-efficacy) has shown that each variable by itself and taken together positively associated with learning effectiveness (Fang & Choi, 2022; Martin, Stamper, & Flowers, 2020; Torun, 2020).

Therefore, we hypothesize:
H2: Online Learning Readiness will be positively related to LMS effectiveness.

In e-learning empirical studies, comprehensive studies explored the effect of student-student interaction and student-instruct interaction on positive student learning outcomes (Borokhovski, Bernard, Tamim, Schmid, & Sokolovskaya, 2015; S. B. Eom, 2018; Sean B. Eom & Ashill, 2018; Luo, Zhang, & Qi, 2017; Sher, 2009; Yu, Huang, Han, He, & Li, 2020). However, few research papers investigated the relationships between OLR and student-student dialogues. Self-directed learning is a learning strategy and learner-managed process in which learners are actively involved in planning, monitoring, and controlling the whole process with high motivation. Therefore, expecting a positive relationship between OLR and student-student dialogue is highly plausible.
Therefore, we hypothesize:
H3: Online Learning Readiness will be positively related to Student-Student Dialogue.

5.2 Student-student dialogue

The study is the first one where the two independent constructs (SRL and student-student dialogue) are introduced. No other previous studies in OLR research attempted to investigate the effects of e-learning readiness on SRL and SS dialogue.

Self-directed learning (SDL) constructs have been considered a subdimension of OLR, as shown in Fig. 1. In contrast, self-regulated learning has been identified as a critical success factor of e-learning success factor (Sean B. Eom & Ashill, 2018). According to Knowles (1975, p. 18) (1975), self-directed learning is defined as follows:

> A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes.

The above definition does not differentiate the concept of SDL and SRL. A key feature of definitions of SDL is understanding the historical background tied to adult education in the literature. SDL research historically related to adults who engaged in self-directed learning processes (O'SHEA, 2003). On the other hand, SRL can be better understood with e-learning. SRL refers to students' ability to set learning goals and manage the learning process with high intrinsic motivation. SRL is perhaps the most important predictor of students' success in e-learning. We must understand the constructivist learning paradigm to see the association between student-student dialogue and self-regulated learning. Eom and Ashill (2016) reviewed the constructivist learning paradigm as a base for studying e-learning environments. They described the roles of student-student dialogue in the success of e-learning as follows (Sean B. Eom & Ashill, 2016, p.188):

> "Another school of thought, collaborativism, assumes that knowledge is socially and collaboratively constructed through sharing. Accordingly, involvement, interaction, and dialogue

between students and between the instructor and students are viewed as being critical ingredients to the success of e-learning."

Student-student dialogue is an indispensable ingredient to building knowledge socially and collaboratively. Therefore, we hypothesize:

H4: Student-student dialogue will be positively related to Self-regulated learning.

H6: Student-student dialogue will be positively related to LMS effectiveness.

5.3 Self-regulated learning

The root of e-learning is the constructivist model of learning. The fundamental premise of the constructivist model is that students construct knowledge instead of being transferred from the instructor to them(Piaget, 1977). Because of this fundamental premise, students' roles should change from passive learners to active knowledge constructors. Therefore, students must become independent learners as well as collaborative learners. The heart of the system's view of the e-learning success model includes SRL, which comprises three main processes: motivational, metacognitive, and behavioral. Self-regulated learners are more motivated to complete the learning process: goal setting, monitoring progress, and selecting appropriate cognitive and metacognitive, and resource management strategies (Sean B. Eom, 2015; Sean B. Eom & Ashill, 2018; Song & Kim, 2020).

Therefore, we hypothesize:

H5: Self-regulated Learning will be positively related to learning effectiveness.

5.4 LMS effectiveness

E-learners' learning outcomes and satisfaction have been two primary dependent constructs in empirical e-learning studies (Sean B. Eom & Ashill, 2016, 2018). In most cases, learning outcomes are measured by the perceived level of students' quality of learning experience in online classes. Students' satisfaction is measured by their willingness to take online classes again or to recommend the instructor of online classes taken to other students. Therefore, viewing the learning outcomes as the antecedent of satisfaction is logical. Thus, consistent with existing research, we hypothesize the following:

H7: LMS effectiveness will be positively related to learner satisfaction.

6 Survey Instrument and Sample

The survey questionnaire is selected from a multidimensional model for assessing e-learning systems success (ELSS) from the perspective of the e-learner (Wang, Wang, & Shee, 2007). The ELSS model is developed based on DeLone and McLean's (2003) updated IS success model. We slightly modified the language of some of the items of the ELSS better to fit the perspective of the online university student. The survey instrument consisted of 35 items using a seven-point Likert scale ranging from "strongly disagree" to "strongly agree." In this study, all constructs are reflective constructs. The population was undergraduate and graduate students enrolled in an online course at a large university in the Midwest United States. The survey URL and instructions were

sent to 2156 valid e-mail addresses. Of those students invited, 809 volunteered responses, with 674 surveys being complete and usable for a response rate of 31.3%.

DATA AVAILABILITY STATEMENT The data supporting this research's findings are available on request from the corresponding author.

7 Research Method and Results

The research model is tested using WarpPLS (version 8), which is the structural equation modeling (SEM)-based Partial Least Squares (PLS) methodology (Kock, 2022).

7.1 Model fit and quality index

All 10 model fit and quality indices suggest a good model fit. The first three indices (average path coefficients (APC), average R-squared (ARS), and average adjusted R-squared (AARS)) are all significant at P<0001 level, which is much better than the recommended value at the 0.05 level (Kock, 2022). The model's predictive and explanatory power are well demonstrated, rated by the Average block variance inflation factor (AVIF) and average full collinearity variance inflation factor (AFVIF). AVIF is 2.790, which is less than the acceptable value <=5. Further, AFVIF is 4.247, which is less than the acceptable value. All other five remaining indices illustrate high levels of predictive power.

7.2 Measurement (outer) model evaluation

The measurement (outer) model defines the relationships between the latent variables (constructs) and their indicators. Evaluation of the reflective measurement model includes (1) estimating internal consistency reliability with several criteria such as Cronbach's α and composite reliability; (2) convergent validity with the average variance extracted (AVE); and discriminant validity (Hair, Hult, Ringle, & Sarstedt, 2017). All reliability measures were above the recommended level of 0.70., thus indicating adequate internal consistency (Claes R. Fornell & Bookstein, 1982; Nunnally & Bernstein, 1994). The average variance extracted scores (AVE) were also above the minimum threshold of 0.5 (Chin, 1998; Claes R. Fornell & Larcker, 1981) and ranged from 0.508 to 0.873. When AVE exceeds .50, the variance shared with a construct and its measures is greater than the error. This level was achieved for all of the model constructs.

Construct validity is assessed by establishing both convergent and discriminant validities. Convergent validity refers to the extent to which indicator variables load together and load highly (loading >0.50) on their associated factors. Individual reflective measures are considered reliable if they correlate more than 0.7 with the construct they intend to measure. Table 2 shows that most loadings, except outcom1 and outcome2, were higher than the threshold value .7.

Discriminant validity is "the extent to which a construct is truly distinct from other constructs by empirical standards" (Hair et al., 2017, p.115). It is established when each observed variable loads highly on its theoretically assigned construct and not high on other constructs. Discriminant validity in PLS is assessed by comparing the square root of the extracted AVE for each construct with the correlation between the construct and other constructs in the model. Adequate discriminant validity is manifested

when the square root of the AVE for each construct is larger than the correlation between the construct and any other construct in the model (Claes R. Fornell & Larcker, 1981). Table 3 shows that the square root of each AVE is more significant than any correlation among any pair of latent variables, thus demonstrating discriminant validity.

Constructs and Items	Factor Loadings (Combined loadings)
Readiness for Online learning (Cronbach's alpha = .830 AVE = 0.668)	
Q21. I am able to easily use the Internet as needed for my studies.	0.776
Q22. I am comfortable communicating electronically.	0.901
Q23. I am willing to actively communicate with my classmates and instructors electronically.	0.878
Q24. I feel that online learning is equal to the quality of traditional classroom learning.	0.696
Self-regulated Learning (Cronbach's alpha = .920 AVE = 0.807)	
Q25. When it comes to learning and studying, I am a self-directed person.	0.861
Q26. In my studies, I am self-disciplined and find it easy to set aside reading and homework time.	0.923
Q27. I am able to manage my study time effectively and easily complete assignments on time.	0.913
Q28. In my studies, I set goals and have a high degree of initiative.	0.895
Student-Student Dialogue (Cronbach's alpha = .901 AVE =1.000)	0.906
Q32. I feel confident exchanging ideas with other students in online chats or discussion forums.	1.000
Effectiveness (Cronbach's alpha =0.950 AVE = 0.870)	
Q17. The system has a positive impact on my learning.	0.932
Q18. Overall, the performance of the system is good.	0.950
Q19. Overall, the system is successful.	0.952
Q20. The system is an important and valuable aid to me in the performance of my class work.	0.895
Satisfaction (Cronbach's alpha =0.917 AVE = 0.923)	
Q15. I think the system is very helpful.	0.961
Q16. Overall, I am satisfied with the system.	0.961

Table 2. Model validation results

	Readiness	SRL	Effectiveness	SS Dialogue	Satisfaction
Readiness	0.817				
SRL	0.601	0.898			
Effectiveness	0.660	0.419	0.933		
SS Dialogue	0.720	0.558	0.480	1.000	
Satisfaction	0.590	0.376	0.913	0.420	0.961

Table 3. The correlation among the construct scores (Square root of AVE in the diagonal)

7.3 Structural model results

The results of the structural model are summarized in Table 4. Specific hypotheses (H_1 through H_7) are tested. Hypothesis 1 examined the relationship between readiness and SRL. The association was positive and significant ($\beta = .413$, $p < .001$). Hypothesis 2 examined the relationship between readiness and LMS effectiveness. The association was positive and significant ($\beta = .668$, $p < .001$)

Hypothesis 3 examined the relationship between e-learning readiness and SS dialogue. The association was positive and significant ($\beta = .722$, $p < .001$). Hypothesis 4 examined the roles of SS dialogue on SRL behavior. The association was positive and moderate ($\beta = .268$, $p < .001$).

The remaining two hypotheses (H_5 and H_6) were not supported. The last hypothesis, H_7, examined the association between effectiveness and learner satisfaction. The association was positive and significant ($\beta = .924$, $p < .001$).

Hypothesized Relationships	Path Coefficient	Observed P-value	Significance Level	Hypothesis Support
H_1. Readiness -> SRL	0.413	< 0.001	****	Yes
H_2 Readiness -> Effectiveness	0.668	< 0.001	****	Yes
H_3 Readiness → SS Dialogue	0.722	<0.001	****	Yes
H_4 SS Dialogue → SRL	0.268	<0.001	****	Yes
H_5. SRL → Effectiveness	0.019	0.314	ns	no
H_6. SS Dialogue → Effectiveness	0.015	0.348	ns	no
H_7. Effectiveness → Satisfaction	0.924	<0.001	****	Yes

p-values: **** <0.001, *** <0.01, ** <0.05, * <0.1, ns = not significant

Table 4. Test of research model and hypotheses

8 Conclusion and Discussion

Our first research question was how OLR research constructs changed over the past decades. Our bibliometric analysis concludes that OLR research constructs have not changed at all. Initially, OLR researchers investigated the technical dimensions, motivation, and self-directed learning as potential

predictors of online learning effectiveness. Despite changing distance learning environments, this focus has remained until now without responding to changing technological and behavioral environments. Further, applying the concepts of self-direct learning is no longer effective. A core difference between SRL and SDL is that SRL uses collaborative learning with other students and with the instructor, while self-directed learners may prefer to learn independently. E-learning theoretically assumes that interactions with other students and the instructor are critical success factors in constructing knowledge socially and collaboratively (Sean B. Eom & Ashill, 2016).

This paper expanded the e-learning readiness research domain to replace SDL with SRL and added the dialogues (student-student and student-instructor) model into a new domain. The concept of e-learning readiness and the e-learning critical success factors model are two different research streams developed in the distance learning community. This paper presents a dynamic interaction model of e-learning readiness, self-regulated learning, and student-student dialogue to assess e-learning effectiveness. By integrating SRL and student-student dialogue, this study empirically tested a model of the effectiveness of LMS. It provided statistically significant evidence to suggest that students' readiness for e-learning significantly affected three areas: self-regulated learning (H_1), learning effectiveness (H_2), and student-student dialogue (H_3).

We suggest that future OLR empirical research expand the use of additional constructs from e-learning critical success factor literature based on the systems view (Eom & Ashill, 2016, 2018). This is a theoretically significant new attempt because the current research uses SRL instead of SDL. This will undoubtedly make OLR empirical research more meaningful and boundary-spanning in that OLR empirical research can deal with a richer set of variables (instructor's role and activities, communication and information technology tools, etc.) and their dynamic impacts on learning outcomes and learner satisfaction.

References

Aydin, C. H., & Tasci, D. (2005). Measuring Readiness for e-Learning: Reflections from an Emerging Country. *Educational Technology & Society, 8 (4)*, 244-257.

Borokhovski, E., Bernard, R. M., Tamim, R. M., Schmid, R. F., & Sokolovskaya, A. (2015). Technology-Supported Student Interaction in Post-Secondary Education: A Meta-Analysis of Designed Versus Contextual Treatments. *Computers & Education, 96*, 15-28. doi: 10.1016/j.compedu.2015.11.004

Broadbent, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. *Internet and Higher Education, 33*, 24-32.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern Methods for Business Research* (pp. 295-336). Mahwah, NJ: Lawrence Erlbaum Associates.

Chung, E., Noor, N. M., & Mathew, V. N. (2020). Are You Ready? An Assessment of Online Learning Readiness among University Students. *International Journal of Academic Research in Progressive Education and Development, 9*(1), 301–317.

Doo, M. Y., Zhu, M., & Bonk, C. J. (2023). Influence of self-directed learning on learning outcomes in MOOCs: A meta-analysis. *Distance Education, 44*(1), 86-105. doi: 10.1080/01587919.2022.2155618

Eom, S. (2021). *Online Learning Empirical Research on the Learning Process and Its Impact on Learning Outcomes: Review of Literature and a Future Research Direction*. Paper presented at the MENACIS2021, Agadir, Morocco. https://aisel.aisnet.org/menacis2021/11

Eom, S. B. (2015). The Effects of Student Motivation and Self-Regulated Learning Strategies on Student's Perceived E-learning Outcomes and Satisfaction. *Association for Information Systems Special Interest Group for Education (AIS SIGED: IAIM) Conference*, Paper No. 12. Retrieved from http://aisel.aisnet.org/siged2015/12

Eom, S. B. (2018). *The Effects of Students' Motivation and Student-Student Dialogue, Student-Instructor Dialogue on Students' Perceived E-Learning Outcomes.* Paper presented at the Twenty-fourth Americas Conference on Information Systems, New Orleans, LA.

Eom, S. B., & Ashill, N. (2016). The Determinants of Students' Perceived Learning Outcomes and Satisfaction in University Online Education: An Update. *Decision Sciences Journal of Innovative Education, 14*(2), 185-215.

Eom, S. B., & Ashill, N. (2018). A system's view of e-learning success model. *Decision Sciences Journal of Innovative Education, 16*(1), 42-76.

Eom, S. B., Ashill, N. J., & Arbaugh, J. B. (2016). Guest Editors' Introduction to the Special Issue. *Decision Sciences Journal of Innovative Education, 14*(2), 124-127.

Fang, M., & Choi, K. (2022). E-Learning Achievement of Higher Education Students: Role of Students' Learning Readiness, Grit and Characteristics. *International Journal of e-Education, e-Business, e-Management and e-Learning, 12*(2), 49-61.

Fornell, C. R., & Bookstein, F. L. (1982). A Comparative Analysis of Two Structural Equation Models: LISREL and PLS Applied to Market Data. In C. R. Fornell (Ed.), *A Second Generation of Multivariate Analysis* (Vol. 1, pp. 289-323). New York: NY: Praeger.

Fornell, C. R., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (Second ed.). Thousand Oaks, California: Sage.

Hoban, J. D., Lawson, S. R., Mazmanian, P. E., Best, A. M., & Seibel, H. R. (2005). The Self-Directed Learning Readiness Scale: a factor analysis study. *Medical Education 2005; , 39*, 370–379. doi: doi:10.1111/j.1365-2929.2005.02140.x

Horzum, M. B., Demir-Kaymak, Z., & Gungoren, O. C. (2015). Structural equation modeling towards online learning readiness, academic motivations, and perceived learning. *Educational Sciences: Theory & Practice, 15*(3), 759-770. doi: https://doi.org/10.12738/estp.2015.3.2410

Hung, M. L., Chou, C., Chen, C. H., & Own, Z. Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education, 55*(3), 1080-1090. doi: https://doi.org/10.1016/j.compedu.2010.05.004

Kırmızı, Ö. (2015). The influence of learner readiness on student satisfaction and academic achievement in an online program at higher education. *TOJET: The Turkish Online Journal of Educational Technology 14*(1), 133-142.

Knowles, M. S. (1975). *Self-Directed Learning: A Guide for Learners and Teachers*. Chicago, IL.: Follett Publishing.

Kock, N. (2022). WarpPLS© User Manual: Version 8.0. Laredo, Texas USA: ScriptWarp Systems.

Luo, N., Zhang, M., & Qi, D. (2017). Effects of different interactions on students' sense of community in e-learning environment. *Computers & Education, 115*, 153-160.

Martin, F., Stamper, B., & Flowers, C. (2020). Examining student perception of their readiness for online learning: Importance and confidence. *Online Learning, 24*(2), 38-58. doi: https://doi.org/10.24059/olj.v24i2.2053

Mercado, C. A. (2008, December 11-12, 2008). *Readiness Assessment Tool for An eLearning Environment Implementation.* Paper presented at the Fifth International Conference on eLearning for Knowledge-Based Society, , Bangkok, Thailand.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.

O'SHEA, E. (2003). Self-directed learning in nurse education: a review of the literature. *Journal of Advanced Nursing, 43*(1), 62–70.

Panadero, E. (2017). A Review of Self-regulated Learning: Six Models and Four Directions for Research. *Frontiers in Psychologies, 8*(422). doi: 10.3389/fpsyg.2017.00422

Parnell, J. A., & Carraher, S. (2003). The Management Education by Internet Readiness (MEBIR) scale: Developing a scale to assess personal readiness for internet-mediated management education. *Journal of Management Education, 27*(4), 431-446.

Piaget, J. (1977). *Equilibration of Cognitive Structures*. New York: Viking Press.

Sher, A. (2009). Assessing the relationship of student-instructor and student-student interaction to student learning and satisfaction in Web-based Online Learning Environment. *Journal of Interactive Online Learning, 8*(2).

Song, D., & Kim, D. (2020). Effects of self-regulation scaffolding on online participation and learning outcomes. *Journal of Research on Technology in Education*, 1-15. doi: 10.1080/15391523.2020.1767525

Torun, E. D. (2020). Online Distance Learning in Higher Education: E-Learning Readiness as a Predictor of Academic Achievement *Open Praxis, 12*(2), 191–208.

van der Rhee, B., Verma, R., Plaschka, G. R., & Kickul, J. R. (2007). Technology Readiness, Learning Goals, and eLearning: Searching for Synergy. *Decision Sciences Journal of Innovative Education, 5*(1), 127-149.

Wan, Z., Compeau, D., & Haggerty, N. (2012). The Effects of Self-Regulated Learning Processes on E-Learning Outcomes in Organizational Settings. *Journal of Management Information Systems, 29*(1), 307-340. doi: 10.2753/MIS0742-1222290109

Wang, Y.-S., Wang, H.-Y., & Shee, D. Y. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. *Computers in Human Behavior, 23*(4), 1792–1808.

Watkins, R., Leigh, D., & Triner, D. (2004). Assessing Readiness for E-Learning. *Performance Improvement Quarterly, 17*(4), 66-79.

Yilmaz, R. (2017). Exploring the role of e-learning readiness on student satisfaction and motivation in flipped classroom. *Computers in Human Behavior, 70*, 251-260.

Yu, J., Huang, C., Han, Z., He, T., & Li, M. (2020). Investigating the Influence of Interaction on Learning Persistence in Online Settings: Moderation or Mediation of Academic Emotions? *International Journal of Environmental Research and Public Health, 17*(2320). doi: 10.3390/ijerph17072320