

The Relationship between Synchronous and Asynchronous Learning and Self-Directed Learning in the Remote Teaching Environment

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Abstract

With the advent of the COVID pandemic, teaching and learning moved online and synchronous and asynchronous modes of education became more commonplace. Yet, in such a scenario, the role played by learners becomes even more vital, since they need to become more dependent on themselves as they adapt to the online learning. In the light of this, the study aimed to explore the relationships between synchronous and asynchronous learning and SDL that became more prevalent during and after the pandemic. The study used a quantitative research methodology that included de-scriptive quantitative statistics, comprising a 39-item survey. The statistical assumptions for all variables were examined by means of applying four competing structural equation models (SEM) to explain associations between remote teaching and learning ("RTL") and SDL ("SDL") and also to find one model that best explained these relationships. A parametric correlation (Pearson's correlation coefficient) was used to examine statistical relationships between variables. The study's findings reveal a significant relationship between the independent variables of synchronous and asynchronous learning methods and the dependent variables related to students SDL skills, i.e., self-management, self-monitoring and motivation. etc. In the light of this, the researchers recommend that students continue studying online for some of their key

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courses, even after returning to normal, to improve their SDL skills.

Keywords: Remote teaching and learning, Synchronous and Asynchronous learning, Self-directed learning.

الملخص:

مع ظهور جائحة الكورونا، انتقل التدريس والتعلم عبر الإنترنت وأصبحت أنماط التعليم المتزامنة وغير المتزامنة أكثر شيوعًا. ومع ذلك، في مثل هذا السيناريو، يصبح الدور الذي يلعبه المتعلمون أكثر أهمية، لأنهم يحتاجون إلى أن يصبحوا أكثر اعتمادًا على أنفسهم لأنهم يتكيفون مع التعلم عبر الإنترنت. في ضوء ذلك، هدفت الدراسة إلى استكشاف العلاقات بين التعلم المتزامن وغير المتزامن والتعليم الذاتي التي أصبحت أكثر انتشارًا أثناء الجائحة وبعدها. استخدمت الدراسة المنهجية البحث الكمي وتضمنت إحصاءات كمية ووصفية، كما تضمنت أيضًا استبيانًا مكونًا من 39 سؤال. تم فحص الافتراضات الإحصائية لجميع المتغيرات عن طريق تطبيق أربعة نماذج معادلة هيكلية متنافسة (SEM) لشرح الارتباطات بين التدريس والتعلم عن بعد ("RTL") و("SDL") كما هدفت هذه الدراسة أيضًا للعثور على نموذج واحد يشرح هذه النماذج بشكل أفضل من خلال العلاقات. تم استخدام الارتباط البارامترى (معامل ارتباط بيرسون) لفحص العلاقات الإحصائية بين المتغيرات. تكشف نتائج الدراسة عن علاقة ذات دلالة إحصائية واضحة بين المتغيرات المستقلة لطرق التعلم المتزامن وغير المتزامن والمتغيرات التابعة المتعلقة بمهارات SDL للطلاب، أي الإدارة الذاتية والمراقبة الذاتية والتحفيز. في ضوء ذلك، يوصي الباحثون بأن يواصل الطلاب الدراسة عبر الإنترنت لبعض دوراتهم الرئيسية، حتى بعد العودة إلى الوضع الطبيعي، لتحسين مهاراتهم في لغة البرمجة SDL.

الكلمات الدلالية: التدريس والتعلم عن بعد ، التعلم المتزامن وغير المتزامن ، التعلم الذاتي.

Introduction: Due to advancements in technology, there have been many significant developments in education in recent years (Szymkowiak et al., 2021). Changes in educational technology have affected the relationship between teachers and students, improving them and transforming almost beyond recognition. Remote teaching and learning ("RTL") provide numerous opportunities for individualized learning and collaboration between learners and the teacher on a scale hitherto unknown. It goes without saying that RTL employing

synchronous and asynchronous learning allows students to access knowledge at any time or place (Libasin et al., 2021). Moreover, learners can access an unlimited amount of information and educational resources, including e-books, videos and websites; online tools and learning management systems. To facilitate all this, numerous online learning environments have been developed, particularly during the COVID-19 pandemic. These assisted teachers in curating, interacting and assessing their students. In such a scenario, synchronous and asynchronous learning provides opportunities for students to share, cooperate and discuss (Riwayatiningsih & Sulistyani, 2020). Online-distance Learning "ODL" is therefore emerging as an effective alternative to traditional face to face classes. Naturally in ODL, learners play a critical role in achieving the learning objectives. In addition, teachers and learners requires a higher level of technical skill e.g. computer literacy, independent learning, interaction and content adaptability. All these impacts the effectiveness and successfulness of RTL (Klašnja-Milićević et al., 2017). Another important factor is that students need to be more self-directed to become more independent learners. Effective online learning requires perseverance, dedication, self-discipline, and self-regulation. Without these, it will be difficult for them to succeed when studying online.

Self-Directed Learning ("SDL") has been defined as, "a process in which an individual, with or without the assistance of others, diagnoses their learning requirements, formulates a learning objective, identifies learning resources, selects and implements a learning strategy, and evaluates the learning outcome" (Knowles, 1975) (p.18). In other words, instructors and students must possess not only academic excellence but also SDL abilities (Zhu et al., 2020). Online learners are expected to study without the assistance of an instructor, hence, competence in SDL increases their motivation and self-monitoring (Hain, 2021). SDL in adult education refers to the learner's capacity to take charge of their own learning, catering for their own educational needs. Students must set their own objectives, identify useful resources and employ effective learning techniques, as well as conducting self-evaluation about their efforts and results. According to (Yip & Wong, 2019), research into adult students' readiness to engage in SDL is an important success factor. Students' attitudes and positive action and competence all contribute to successful online learning (Zhai et al., 2020). (Kim, 2020) confirms that learners who are unable to structure

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their learning are highly likely to experience failure. For all these reasons, SDL has become an area of increasing importance in twenty-first century teaching and learning.

(Lasfeto & Ulfa, 2022) state that RTL requires learners to use additional tools that facilitate the sharing process such as negotiation and discussion and that students having a high degree of SDL will participate more actively in learning activities. However, McLoughlin, Cathereine, Northcote, and Mari (2017) suggest that teachers using IT in their classes should do so, not just to appear knowledgeable in these online tools, but rather to ensure the tools are integrated using sound of pedagogical strategies that facilitate realistic exchange and dialogue with and among students. The authors hold the opinion that when implementing SDL and RTL, both asynchronous and synchronous learning should be combined in order to promote active learning and understanding on the part of students.

The focus of the study was to examine the relationships between SDL and synchronous and asynchronous learning in an RTL environment for students at higher education institution (“HEI”). In this context, students' actions in synchronous and asynchronous learning were considered a subset of the RTL environment, and the RTL environment was seen as a subset of the online learning process. SDL was taken as a measure of student characteristics when applying RTL (synchronous and asynchronous learning methods). In short, the study sought to ascertain the influences of synchronous and asynchronous learning on learners' SDL skills during RTL sessions.

As a background to the variables of the study, Olivier (2020) reported a significant correlation between synchronous and asynchronous learning and SDL among tertiary level students. Moreover, Poloie and Leila (2021) looked at the relationship between online learning and SDL in relation to synchronous and asynchronous online learning. Their findings indicate that synchronous and asynchronous learning can enhance learners' SDL skills. However, the research did not consider the characteristics of students influencing their engagement with the RTL environment. Consequently, the authors identified the following research questions to be examined.

RQ1: Is there a significant relationship between RTL (synchronous and asynchronous learning) and SDL in terms of self-management.

RQ2: Is there a significant relationship between RTL (synchronous and asynchronous learning) and SDL in terms of self-monitoring.

RQ3: Is there a significant relationship between RTL (synchronous and asynchronous learning) and SDL in terms of motivation.

While the Hypotheses are:

H₁: There is a significant relationship between RTL (synchronous and asynchronous learning) and SDL in terms of self-management.

H₂: There is a significant relationship between RTL (synchronous and asynchronous learning) and SDL in terms of self-monitoring.

H₃: There is a significant relationship between RTL (synchronous and asynchronous learning) and SDL in terms of motivation.

CONCEPTUAL FRAMEWORK

The conceptual framework used in the study comprised theoretical and empirical guidelines for understanding the connection between learners' experiences of synchronous and asynchronous learning and their relevance to SDL in an RTL environment.

Generally, it is believed that synchronous and asynchronous learning in an RTL context encourage students to be in control of their learning more than in face-to-face learning (Dewi et al., 2019; Garrison et al., 2015). SDL is therefore essential element to student success in online learning, especially when students are socially and physically separated from their teacher and classmates. That is, students need to be highly capable in SDL skills in order to benefit from synchronous and asynchronous modes (Burns et al., 2020; Cavusoglu, 2019).

The hypothesised correlations of the dependent variables i.e.(self-management, self-monitoring, and motivation) and independent variables i.e.(synchronous and asynchronous learning) and the manner in which the independent variables ("IV's") influence the dependent variables ("DV") are explained using a conceptual model that combines Garrison's theory of SDL and heutagogical principles. The proposed model is supported by empirical data including Kim, Olfman, Ryan, and Eryilmaz (2014), who looked at the learning environment i.e. online learning and its impact on SDL skills. One finding was

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that students are more likely to see their RTL experience positively if they engage with the learning material actively and meaningfully and are able to build beneficial relationships with their peers and teachers. In other words, student views of RTL are likely to be positively impacted by personal interaction with the material, their classmates, and the teacher.

SDL AND SYNCHRONOUS AND ASYNCHRONOUS LEARNING

In a research conducted by Kim, Olfman, Ryan, and Eryilmaz (2014) the researchers reported a significant relationship between SDL and online learning. This supports the objective of the current study. Similarly, Mubashra Khalid, Sadia Bashir, and Hina Amin (2020), identified a relationship between SDL and online learning via the internet. Chou (2012) investigated students' ability to study on their own initiative in a remote teaching environment, looking at students' ability to self-direct their learning and results. The outcomes of the study demonstrated a strong and favourable association between students' ability to self-direct their learning as well as their online learning productivity. Thus, we can see that online learning can improve students' SDL skills in an RTL environment when they are able to depend on themselves in terms of self-management, self-monitoring, and motivation.

SDL SCALE

The SDL scale created by Garrison and Randy (1997) was used to assess students' SDL skills during RTL sessions. For them, SDL comprises three dependent variables: self-management, self-monitoring, and motivation. For the current study, this SDL instrument was adapted and consisted of 27 items; 9 items for each of the following three factors of: self-management, self-monitoring, and motivation.

The questionnaire items came from previous studies by Comrey & Lee, 2013; Field, 2013; Lee et al. (2012) and the validity and reliability of the SDL instrument was derived from previous research conducted by Garrison and Randy (1997); Finestone and Peter Michael (1986) and Wiley (1983). The reliability scores were 0.82 (Finestone, 1986) and 0.79 for (Wiley, 1983).

METHODOLOGY

Research Design

The data collection method used a cross-sectional one-shot survey method utilizing a 39 items questionnaire with a 5-point Likert scale (strongly agree, neutral as mid-point, and strongly disagree). The article is classified as correlational ex post facto research in terms of its research design since the cross-sectional data produced from the 39 items were evaluated for potential correlations between the constructs of RTL and SDL (Patten & Newhart, 2017).

Population

The population of the study consisted of 955 students, while the participants were 318 (138 male and 180 female) in the Kulliyah of Education (“KoED”) of the International Islamic University Malaysia (IIUM). The undergraduate students from different years of study attended RTL classes in four areas of specialization, namely: Guidance and Counselling (GUIDE), Islamic Education (ISED), Teaching Arabic as Second Language (TAASL), and Teaching English as Second Language (TEASL).

Sample Size Determination

The study utilized inferential statistics for analysis of the data, including exploratory factor analysis (“EFA”), confirmatory factor analysis (“CFA”) and Structural Equation Modelling (“SEM”). The sample size was chosen according to the requirements of SEM. An acceptable margin of error for the population size ranges normally between (1% and 5%), with an acceptable confidence level of between 95% and 99%, while the complexity of the hypothesised model refers to the number of latent variables, indicators, and path relationships in the model. All these factors determine the minimum sample size for SEM (Zhang et al., 2021).

Instrumentation

A survey questionnaire with 41 items (39 items measuring RTL and SDL) were used as the main instrument in this study to assess KOED students' relationship between the DV and IV based on a Likert scale of 1 (Strongly Disagree) to 5 (Strongly Agree). The Table (1) shows the number of items that related to each of the variables.

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Table 1. Reliability of the Five Constructs (N = 318)

Section	Variables	No of Items	Cronbach's Alpha
Self-Directed Learning	Self-Management	9	.856
	Self-Monitoring	9	.882
	Motivation	9	.915
Remote Teaching and Learning	Synchronous Learning	5	.850
	Asynchronous Learning	7	.897

Procedure

To reiterate, the objectives of the study used a two-stage selection procedure to choose a minimum sample of 280 individuals from 955 students enrolled in four undergraduate degree programmes at KOED i.e., GUIDE, ISED, TAASL and TEASL. To perform justifiable comparisons of the sample's RTL-SDL data by gender and speciality, the sample size had to be adequately gender-balanced and evenly distributed among the four specialities (Boddy, 2016). As a result, a two-stage sampling approach incorporating stratified sampling and simple random sampling (Gómez-Guzmán & González-Ruiz, 2020) was developed by means of the factor loading shown in Table 2. The researcher statistically measured the two variables of RTL and SDL and evaluated the statistical relationships (correlations) between them.

Table 2 Extracted Factors, Items and Factor Loadings

Items Load-ing	Self-Man-agement	Self-Moni-toring	Motivation	Synchronous	Asynchronous
SM1	.633				
SM2	.668				
SM3	.686				
SM4	.770				
SM5	.785				
SM6	.741				
SM7	.804				
SM8	.838				
SM9	.770				
SMO1		.803			
SMO2		.620			
SMO3		.658			
SMO4		.668			

SMO5	.864	
SMO6	.803	
SMO7	.658	
SMO8	.668	
SMO9	.864	
MOV1	.781	
MOV2	.657	
MOV3	.652	
MOV4	.632	
MOV5	.781	
MOV6	.657	
MOV7	.712	
MOV8	.685	
MOV9	.828	
SYN1		.712
SYN2		.685
SYN3		.828
SYN4		.851
SYN5		.636
ASYN1		.803
ASYN2		.636
ASYN3		.785
ASYN4		.741
ASYN5		.804
ASYN6		.838
ASYN7		.632

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

The strength and direction of the relationships between the RTL measures of synchronous and asynchronous learning, and the SDL factors of self-management, self-monitoring, and motivation were correlated providing an understanding of how RTL impacts SDL. The results suggest that student SDL skills may be enhanced by synchronous and asynchronous learning. In other words, RTL has the potential to impact SDL factors such as self-management, self-monitoring, and motivation.

Research Variables

By the end of the second semester, the scores of students' online discussion was accumulated allowing the measurement of the two elements of RTL (synchronous and asynchronous learning) and students' SDL skills.

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Statistical Analysis

The Cronbach's Alpha coefficient was used to examine the internal consistency and dependability of a group of items from one variable (Bonett & Wright, 2015). A parametric correlation (Pearson's correlation coefficient) was used to examine the statistical relationships between variables (Ananda et al., 2022). The Statistical Package for the Social Sciences (SPSS) version 23.0 software was used for all the analyses.

Results and Discussion

The majority of KOED students indicated that their RTL sessions (synchronous and asynchronous learning) were interesting, with synchronous sessions scoring (M = 4.09) which was higher than asynchronous sessions at (M = 3.92). During RTL, students reported high levels of self-management (M = 4.14) and self-monitoring (M = 4.42), while motivation (although positive) was significantly lower at M = 4.02. Table 3 summarizes these values.

Table 3 Descriptive statistics

Variable	Overall Mean	Overall SD
Independent		
1) Synchronous	4.09	0.973
2) Asynchronous	3.92	0.974
Dependent		
1) Self-Management	4.09	0.937
2) Self-Monitoring	4.42	0.747
3) Motivation	4.02	0.937

The findings related to SEM are presented to illustrate the causal correlational links between KOED students' remote learning experiences RTL and SDL. The independent variables, or external factors, were measured by the questionnaire items that evaluated students' RTL experiences;

divided into two dimensions: synchronous learning (SL) and asynchronous learning (ASL). The three dependent variables, or endogenous variables, were the three sub-constructs of students' SDL, namely: self-monitoring (SMO), motivation (MOV) and self-management (SM). Each construct is represented by four (4) items, which were chosen based on the EFA results and the items' contributions to the construct's dependability.

Table 4 Descriptive Statistics and Reliability Indexes of the RTL and SDL Indicators

Construct	Code	Mean	SD	α
Synchronous Learning	SL1	4.03	1.00	0.89
	SL2	4.10	0.96	
	SL3	4.17	0.87	
	SL5	3.84	1.12	
Asynchronous Learning	ASL4	4.24	0.83	0.89
	ASL5	3.85	1.09	
	ASL6	4.32	0.81	
	ASL7	4.36	0.87	
Self-Monitoring	SMO2	4.34	0.84	0.88
	SMO3	4.33	0.80	
	SMO7	3.84	1.11	
	SMO8	4.17	0.90	
Motivation	MOV2	4.11	0.82	0.82
	MOV6	3.94	0.84	
	MOV8	4.16	0.84	
	MOV9	4.17	0.86	
Self-Management	SM3	3.81	1.16	0.88
	SM5	4.18	0.89	
	SM6	3.22	0.87	
	SM7	3.04	0.95	

The analysis used Kline's two-step modelling approach to answer identify the best-fitting RTL model that properly and reliably describes students' SDL skills, as well as the RTL factors influencing SDL indicators.

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The suitability of the measurement model was ascertained by running a CFA analysis on all of the structural equation model's latent variables or factors. Secondly, based on the plausibility of the CFA results, four competing models were considered, each included two RTL components and three SDL indicators. The following ‘good-fit’ statistics were used to verify the suitability of each structural model: (i) acceptability of parameter estimations, and (ii) fit indices, that included comparative fit index (CFI) and Root Mean Square Error of Approximation (RMSEA) (Kline, 2015; Smith & Karaman, 2019). To test the appropriateness of each model, the investigation employed the following widely used cutscore; in general, a CFI of .90 is regarded a good-fit for SEM, but an RMSEA of .10 is deemed an unsatisfactory model. The measurement model met all of the criteria for an acceptable fit for SEM, as shown in the Figure 1 below.

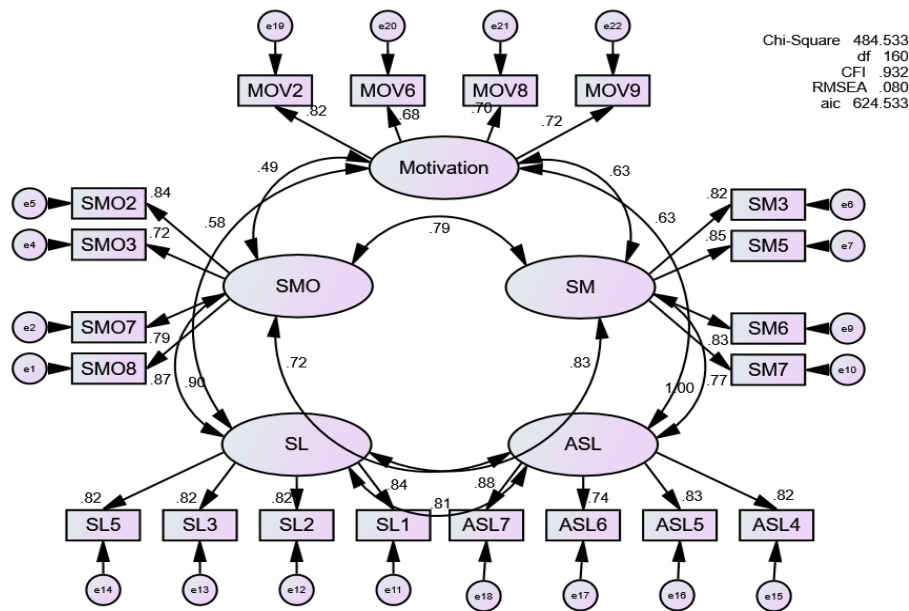


Figure 1 Measurement Model of RTL-SDL Relationships

All of the loadings were statistically significant ($p = .001$) and practical ($\lambda \geq .5$). The components (synchronous and asynchronous, self-monitoring, motivation, and self-management) were all positively associated as predicted. In addition, the composite reliability indices (CR) varied

from .82 (Motivation) to .89 (Synchronous Learning), showing that the subscales were generally consistent internally.

In the light of the results, the study supports the notion that students' RTL performance can increase their SDL skills; however, there are implications for the role of online instructors during synchronous learning, as well as the design of effective online courses and materials for asynchronous learning (Abeygunasekera et al., 2021; Rosuli & Ahsan, 2021).

Conclusion

The research set out to study the relationships between undergraduate students' SDL skills and synchronous and asynchronous learning in an RTL environment. It was discovered that there is indeed a significant relationship between SDL and synchronous and asynchronous learning in an RTL environment, as well as a significant impact on student engagement during online learning. This engagement was proportional to learners' SDL abilities. The main elements of RTL that improved SDL skills were found to be synchronous and asynchronous learning. As such, the authors recommend improving learners' SDL skills if they are to be more successful in an RTL environment. Another suggestion is the inclusion of factors such as CGPA and student prior knowledge for future studies at universities seeking to explore the impact of SDL skills on learners' achievement. Lastly, the results of the study point towards the need for HEI's to adapt and improve instructional design for RTL environments to enhance students' SDL skills and vice versa.

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