

# Formulation of Self-Regulated Learning Strategies Framework for Digital Learning for Lifelong Learning

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**Abstract:** *Digital technology have changed the way university students approach learning because it has become a necessity and an integral part of their lives. University students are accustomed to using their digital devices for almost anything such as communication, collaboration, accessing information for solutions, etc. While digital technologies bring about incredible transformation in the education sector, they also present their own challenges such as media multitasking, digital distraction and mind wandering. Current studies show that students have difficulties with online learning because they lack in self-regulated skills. Self-regulated learning strategies help students regulate their learning in the aspect of personal functioning and academic behavioral performance. A lack in self-regulation weakens student engagement, leads to low performance and increases dropout rates. Research also shows that students are not taught how to self-regulate. Hence, there is a need provide university students with necessary self-regulated learning strategies (SRLS) to engage and effectively navigate their learning process in an online learning environment. Little is known about the use of SRLS that are essential to assist university students' online learning. This paper presents a formulation of self-regulated learning strategies framework that can be used for online learning in higher education. This framework can be a guideline for educators and students to master their learning process independently in an online learning environment.*

**Keywords:** Self-regulated learning strategies, online learning

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## 1. Introduction

Digital technology is the catalyst for transformation in education in this 21<sup>st</sup> century. Due to the rapid and continuing innovation in educational technology in this digital era, online learning is confidently emerging. Hence, to keep pace in this dynamic digital environment, the current generation of students are in need of quality education where learning strategies are being developed and mastered. One of the challenges faced by learners in this 21<sup>st</sup> century is not only about what they learn but how they learn. Based on the Future of Jobs Survey Report (2018) published by World Economic Forum, active learning and learning strategies are among the trending skills of 2022 (Future of Jobs Survey Report, 2018). While the scenario of digitalisation brings incredible transformation, they present their own challenges such as media multitasking, digital distraction and mind wandering. These digital challenges that are making its way to the young generation and may be the defining problem of underperformance in learning.

As such, students who goes through online learning need to self-regulate their learning because they are expected to engage actively in the learning process (Phillips, Turnbull and He, 2015;

Lilian, Koo & Hew, 2021; Anthonysamy, Koo, & Hew, 2020). Self-regulated learning is the active process in which students play a major role in mastering their own learning process. However, literature reveals that university students exhibit limited use of self-regulated learning strategies (SRLS) with technologies (Yot-Domínguez and Marcelo, 2017; Hj Ramli, Alavi, Mehrinezhad and Ahmadi, 2018; Balapumi, 2015). Findings revealed that the poor employment of SRLS includes setting academic goals, lack of planning, monitoring, and control in their learning process (Balapumi, 2015), time management issues (Hafizah, Norhana, Badariah and Noorfazila, 2016), lack inquiry skills and critical thinking to correctly analyse and efficiently use online resources among others (Hafizah et al., 2016).

Students with poor use of SRLS often have difficulty with online learning as opposed to those who have self-regulative abilities (Zhu, Au, and Yates, 2016). This has led to ineffective online learning as students experience frustration (Yang, Kim, and Korea, 2014; Lilian, 2021), become less engaged online and achieve less (Hu and Li, 2017; Yang et al., 2014). Scholars reported that one of the reasons for increased student dropout rates in an online learning environment is because of low self-regulation (Deschacht and Goeman, 2015; Wandler and Imbriale, 2017).

Goradia and Bugarcic (2017) reported that the major challenge in online learning is that students are not taught how to self-regulate. How SRLS can assist students become better online learners are lagging behind (Wandler and Imbriale, 2017). Likewise, Zhu and associates stressed the need to examine how SRLS can enhance students' learning performance in the area of online learning environment (Zhu, Au, and Yates, 2016). Similarly, Boelens and researchers had pointed out that more attention should be paid to increasing learner control as facilitating students' learning processes has been noted as one of the challenges in an online learning environment (Boelens, De Wever and Voet, 2017). Online learning brings more challenges to university students because it demands for a higher student engagement and self-regulated learning (Zhu, Au and Yates, 2016, Lilian, 2021).

Seeing this research gap and the different challenges digital technology brings to the lives of university students, there is a pressing need to formulate a self-regulated learning strategies framework for online learning for university students.

This paper begins with the initial discussion of online learning, digital distraction, self-regulated learning, self-regulated learning strategies and the underlying theory. Then followed by providing research methodological steps towards the formulation of research framework to examine self-regulated learning strategies in online learning for university students to address the research gap. Lastly, this paper includes the concluding remarks and direction of this research.

## **2. Literature Review**

### **Online Learning**

Online learning can be defined as “as educational instruction that occurs using web-based technology, which may be engaged in completely asynchronously or with components of synchronous learning, and with no located face-to-face class time.” (Broadbent, 2017, p.25). Online learning is a form of education in which instructions and content are delivered through the Internet.

### Self-Regulated Learning

Self-regulation is evidently one of the most vital competencies for the 21st century (OECD, 2013a, 2013b). Self-regulation is not a person's behavior or characteristic. It is a skill that can be developed and mastered through positive learning habits and behaviour. Self-regulatory skill is needed to achieve successful learning. A self-regulated learner will continuously make flexible adjustments to goals and strategies. One of the most obvious signs a student has self-regulatory skills is the student's ability and effectiveness in the use of personal, behavioral and environmental strategies (Zimmerman and Martinez-Pons, 1986).

### Self-Regulated Learning Strategies

Self-regulated learning strategies (SRLS) are used to assist students to learn efficiently. Example of SRLS are rehearsal, elaboration, organisation, time management, peer learning, effort regulation, monitoring, and so forth which involves the use of cognition, metacognition, motivation, environmental, and behavioural components derived from social cognitive theory (Bandura, 1986). Literature has also emphasised repeatedly in a clear manner that in order for students to shine in an online learning environment, they need to equip themselves with SRLS (Greene, Copeland, Deekens, and Yu, 2018; Broadbent and Poon, 2015; Kizilcec, Pérez-Sanagustín, and Maldonado, 2017; Phillips, Turnbull and He, 2015; Lai and Hwang, 2016). Learners who self-regulate tend to report more positive learning performance (Greene, 2015). Furthermore, many previous research have empirical evidence proving that SRLS have the ability to overcome learning difficulties (Nota, Soresi and Zimmerman, 2004).

## 3. Method

The aim of this study is to present a research roadmap to formulate self-regulated learning strategies framework in online learning. It encompasses of three phases which are Phase 1: Identification of self-regulated learning strategies through a systematic literature review, Phase 2: Classification of self-regulated learning strategies to domains and Phase 2: Formulation of research framework. Each phase carries a number of activities. A total of five activities have been identified in this formulation. Figure 1 shows the step by step activities towards the formulation. Each phase and activities are explained in detail below.

### Phase 1: Identification of self-regulated learning strategies through a systematic literature review

This phase starts with **Activity 1** which is conducting a systematic literature review. Systematic literature review (SLR) is an intentional and purposeful method to extract data from literature. SLR is refined into three steps: review plan, conducting review and reporting review [24]. Below are the explanations of each step.

#### a) Review Plan

A review plan includes the purpose of the review and the criteria used to extract information from the literature. It further consists of two sub steps which are identifying the need for a review and review protocol development.

The purpose of this review is to identify the use of self-regulated learning strategies in online learning in higher education institutions. Current literature does not provide the mapping of self-regulated learning strategies used in online learning in higher education. Hence, in order identify the list of self-regulated learning strategies used in online learning in higher education, a systematic literature review method is employed. The next sub step involves the development of a review protocol. This step consists of six stages and is explained below.

i) Background of study

The research study reviews self-regulated learning strategies in the perspective of online learning particularly in the higher education setting. Through the background study, the related information regarding the study will be known.

ii) Identification of research goal and research questions

The goal of this research is to formulate SRLS framework in online learning in higher education institutions. The research question is:

- What are the self-regulated learning strategies that need to be considered in developing a SRLS framework for online learning?

iii) Determining the keywords

The determination of keywords is based on the research goal and objective. Keywords enable a study to narrow down the search criteria in order to achieve the objective. The identified keywords are shown below:

- ‘Self-regulated learning strategies’, ‘online learning’, ‘higher education’, ‘blended learning’, and ‘online blended learning’, ‘e-learning’, ‘tertiary education’.

iv) Identifying the resources

Identification of materials are needed in order to know what is needed to be analysed. Table 1 shows the list of databases that are used in this study.

**Table 1: Identified resources for performing SLR**

No.	Resource
1.	Science Direct
2.	Sage
3.	Google Scholar
4.	Springer-Link
5.	Emerald
6.	Wiley Online
7.	ACM Digital Library

There are two ways in which the search of papers are performed. First level of search is an automatic search with selected keywords. Second level of search is a manual search of the reference of papers to ensure a complete and thorough search.

v) Determining the inclusion and exclusion criteria

Inclusion criteria includes all related work for the study. On the other hand, exclusion criteria lists that not included in the scope of study. Inclusion and exclusion criteria for this study are as follows:

- Papers are restricted to only Scopus-indexed Q1 and Q2 journals that are related to SRLS in online learning in higher education published from year 1999 to 2019. Conference papers, book reviews, book chapters and synopsis are excluded.
- Papers which explored the use of SRLS in online/ blended e-learning environment in higher education settings were reviewed. Studies can involve the use of one or more self-regulated learning strategies. Studies involving

traditional classroom learning, MOOC/wholly online, distance learning/education are excluded.

- Only respondents from universities, were included in this review. Other types of students were excluded in this study.

vi) Identifying the data extraction strategy

Table 2 shows the table used to record related information from selected papers.

**Table 2: Extracted Data template**

Inclusion Criteria	Item Information	Tick (√)	Remarks
Publication year	1999 to 2019		
Publication type	Scopus – indexed (Q1 and Q2)		
Learning environment	Online learning/e-learning / blended learning/ online blended learning		
Respondents	Undergraduates / university students		
Education	Higher Education		
Selection Status	Include		Exclude

b) Conducting Review

The five important steps for conducting review are explained below.

i) Search Identification

The search strings that are used in this study are:

- (“Self-regulated learning strategies” AND (“online learning”) AND (“higher education”))
- (“Self-regulated learning strategies” AND (“blended learning”) AND (“higher education”))
- (“Self-regulated learning strategies” AND (“blended online learning”) AND (“higher education”))
- (“Self-regulation learning strategies” AND (“e-learning”) AND (“higher education”))
- (“Self-regulated learning strategies” AND (“online learning”) AND (“tertiary education”))
- (“Self-regulation learning strategies” AND (“blended learning”) AND (“tertiary education”))

Synonyms are included in this study to achieve search completeness. For example, the use of ‘higher education’ and ‘tertiary education’ as the search criteria because they are synonym with each other.

ii) Primary Studies Selection

Papers that are selected based on the inclusion criteria will be considered as primary studies. In this study, Scopus-indexed papers of Q1 and Q2 only are selected.

iii) Quality Assessment of study

Quality assessment tool for quantitative studies involves a simple checklist of the following:

- Was the research questions or objectives clearly stated in the paper?
- Was the population clearly defined?
- Was the sample size justified?

- Was the method clear?
- Were the independent variables clearly defined?
- Were the dependent variables clearly defined?

iv) Data Extraction and Monitoring

The Extracted Data form shown in Table 2 will be used to record extracted data.

v) Data Synthesis

After extracted data is recorded, it will be synthesized to achieve the objective of the SLR in this study.

c) Reporting Review

The result of the reporting step involves the output of the systematic literature review which reveals the list of self-regulated learning strategies used in higher education in the online learning environment within a span of 20 years.

### **Phase 2: Classification of self-regulated learning strategies to domains**

This phase involves two activities. It starts with **Activity 2** which is operationalising self-regulated learning strategies into measurable concepts in order to derive the independent variables for this research. Operationalisation is a technique to measure abstract concepts in a quantifiable manner. Operationalising is done by looking at behavioral aspects and properties of the concept. This is then translated into measurable items to measure the concept. Operationalisation is performed based on literature. The activity is **Activity 3**, which is classifying SRLS into domains based on literature. This activity enables the derivation of independent variables.

### **Phase 3: Formulation of self-regulated learning strategies framework for online learning**

This phase starts with **Activity 4** which is determining the type of outcome measure in order to derive the dependent variable for the research. Generally, in an online learning setting, learning performance is measured by both objective and subjective measures (Yang, Quadir, Chen, & Miao, 2016; Vo, Zhu, & Diep, 2017). For this study, subjective outcomes are used because it is a good measure to quantify students' overall attitude and behaviour towards learning. Using objective measures alone such as grades, marks and attendance may not give the full picture of student's performance (Bowyer, 2017). In other words, objective measures may not reflect the learning quality of a student. The final activity is **Activity 5** which is integrating SRLS domains as independent variables and outcome measure as dependent variable to develop the research framework.

**Phase 1: Identification of self-regulated learning strategies through a systematic literature review**

**Activity 1: Performing systematic literature review**  
 Investigate from literature a list of self-regulated learning strategies used for online learning in higher education through a structured process.



**List of self-regulated learning strategies in online learning used in higher education**

**Phase 2: Classification of self-regulated learning strategies to domains**

**Activity 2: Operationalize self-regulated learning strategies concepts**  
 Initial steps to formulate independent variables through literature. mapping



**Activity 3: Classification of self-regulated learning strategies concepts**  
 To classify self-regulated learning strategies into domains.



**List of self-regulated learning strategies domains**

**Phase 3: Formulation of self-regulated learning strategies framework for online learning**

**Activity 4: Identifying outcome measure**  
 Identifying type of outcome measure to formulate dependent variable through .....



**Activity 5: Integration of self-regulated learning strategies domains and outcome measure**  
 Integrating self-regulated learning strategies domains as independent variables and outcome measure as dependent variable



**Self-regulated learning strategies framework for online learning**

**Figure 1: Formulation process of self-regulated learning strategies framework for university students in online learning**

#### 4. Conclusion

This study reveals the research framework formulation process for self-regulated learning strategies in online learning for higher education. This framework will be further tested to ensure its suitability for self-regulated learning strategies in online learning for university students. The proposed framework is intended to be a tool for higher education institutions to use in order to engage university students to learn more effectively in an online learning environment.

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