Effects of Course Design on Online Self-Regulated Learning among University Students

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Abstract: Online self-regulated learning (OSRL) has been seen as a personal characteristic that could transcend across different courses. This proposed study aims to investigate whether OSRL and the relationship between OSRL and learning outcomes can be influenced by course design and how university students regulate their online learning by interacting with course design within an online course. Mixed methods with a combination of questionnaire-based surveys, semi-structured interviews, and data-track analyses will be employed. The findings may provide online course designers, instructors, and university administrators with implications for advancing students' OSRL through improving course design.

Keywords: Online self-regulated learning, course design, university students

1. Introduction

Online course learning has become increasingly popular in higher education, especially after the COVID-19 outbreak (Hodges et al., 2020; Jiang et al., 2021). Without immediate supervision and support from instructors and peer students, self-regulation becomes critical for online course learning (Jong et al., 2008). Online self-regulated learning (OSRL) contributes to academic achievements (Broadbent & Poon, 2015; Chai et al., 2021; Song & Kim, 2020; Zhou et al., 2021) and student satisfaction (e.g., Jong et al., 2006; Kara et al., 2020).

University students, however, may find OSRL a challenge (Jong, 2019). Prior studies showed that a majority of university students had a low level of SRL skills (Schwam et al., 2020); university students are largely not aware of several empirically supported learning strategies (McCabe, 2011); and they tend to use learning strategies based on familiarity instead of strategy efficiency (Wiedbusch et al., 2021). A recent study found that even postgraduates lack the competence to manage online course learning by themselves during COVID19 (Wang & Cai, 2021). Therefore, it is necessary to understand and improve university students' OSRL.

When investigating OSRL, many studies (e.g., Kuo et al., 2014; Ozawa, 2019) take it as one of the students' characteristics that affect learning outcomes. Relatively less attention is paid to the course context in which OSRL happens. Since "SRL is inherently contextual" (Winne, 2010, p. 268), the present study aims to investigate course design's role in shaping OSRL and thus influencing learning outcomes among university students.

Specifically, we try to answer the following research questions:
RQ 1: Does university students' OSRL differ in courses with different designs?
RQ 2: Is there a moderating effect of course design on the relationship between OSRL and learning outcomes?
RQ 3: How do university students develop their OSRL within one online course?

2. Literature Review

2.1 Framing online self-regulated learning as a stable characteristic of students

As a key construct in educational psychology, self-regulated learning (SRL) has been researched since first introduced by Zimmerman (1986) and Pintrich et al. (1993). Moreover, "one of the key issues in SRL is the students' ability to select, combine, and coordinate cognitive strategies in an effective way" (Boekaerts, 1999, p. 447). From this perspective, whether students could regulate their learning for online courses shows their personal cognitive, metacognitive, emotional, and social ability to actively process their learning, e.g., taking notes, monitoring learning progress. This ability perspective continues its popularity when SRL is studied in online learning environments. OSRL has been considered a stable personal characteristic that can transcend different courses (e.g., Broadbent et al., 2021; Kuo et al., 2014; Ozawa, 2019).

2.2 Framing online self-regulated learning as an adaptation process

The conceptualization of SRL shifted from a component-oriented to a process-oriented definition (Panadero et al., 2016). For example, Zimmerman & Moylan (2009) proposed a cyclical three-phase model of SRL (i.e., forethought phase, performance phase, and self-reflection phase), and Winne (1997) proposed a four-phase model (i.e., surveying task conditions, setting goals and planning, engaging the task, and composing major adaptations for future tasks). When OSRL is considered a process, it could be a changing state instead of a stable characteristic. University students may perform OSRL in different extents and ways when learning different online courses.

2.3 Online self-regulated learning and course design

As mentioned earlier, we believe OSRL is contextual as SRL. Course design may be a contextual factor that affects OSRL. A literature review (Alonso-Mencia et al., 2020) found that course duration and the content delivery mode affect the way students deploy strategies to self-regulate their learning process in MOOCs. Kizilcec et al. (2020)'s study also reported that one effective OSRL intervention in a certain MOOC could not fits across different MOOCs. Therefore, it is necessary to investigate the influence of course design on OSRL. Through the investigation, we could know to what extent OSRL is a stable characteristic of students and to what extent it is a changing state shaped by the course design.

3. Proposed Methods

This study aims to examine the effect of course design on university students' OSRL. Mixed methods with an explanatory sequential design will be adopted (see Table 1). Data will be gathered from questionnaire surveys, semi-structured interviews, and students' trace data from online course platforms.

A convenient sampling method will be adopted. Two online courses in one university in southern China will be selected based on the researchers' access. The two courses are fully online, offered as general education courses to all university students, carry one credit, and last for 11 weeks. All students who enrolled in the two courses will be invited to participate in the study.

A questionnaire about OSRL will be conducted three times, i.e., before, in the middle, and after the courses. The questionnaire will be a revised five-point scale based on Online Self-Regulated Learning Questionnaire (Barnard et al., 2009). Students' perceived learning outcomes will be surveyed after the courses. The study will use multiple analysis of variance (MANOVA) to see whether the structure of OSRL is different in the two courses and use multigroup structuring equation modelling to examine whether the relationships between OSRL and learning outcomes are different in the two courses. The study will also use latent growth modelling to examine the growth trajectories of OSRL in each course.

Meanwhile, students of the two groups will be invited to semi-structured interviews regarding their OSRL development. They will be selected purposefully according to their OSRL trajectories, which their questionnaire responses and trace data will demonstrate.

Trace data (e.g., log events) will be gathered from the course platform to triangulate the findings from questionnaire surveys and interviews to present a fuller picture of how participants' OSRL developed within each course.

Table 1. *Data Sources and Analyses for Corresponding Research Questions*

Research questions	Data sources	Data analyses
RQ 1: Does university students' OSRL differ in courses with different designs?	• Questionnaire-based survey	• MANOVA
RQ 2: Is there a moderating effect of course design on the relationship between OSRL and learning outcome?	• Questionnaire-based survey	• Multigroup structuring equation modelling
RQ 3: How do university students develop their OSRL within one online course?	• Questionnaire-based survey (three-time points: before, in the middle of, and after the course) • Trace data • Interview (stimulated recall)	• Latent growth modelling • Process mining • Content analysis

4. Expected Implication

The present study examines the effect of online course design on OSRL and the relationship between OSRL and learning outcomes among university students, and the development trajectory of OSRL within one online course. Practically, it is expected to provide online course designers, instructors, and university administrators with implications for advancing students' OSRL through improving course design. Theoretically, the study may provide empirical evidence for "SRL is inherently contextual" (Winne, 2010, p. 268) in an online learning environment from a course design perspective. Furthermore, it may promote the understanding of OSRL not only as a personal characteristic but also as a changing state in different course contexts.

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