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## **Internet Self-Efficacy, Self-Regulation, and Student Performance: African-American Adult Students in Online Learning**

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# Internet Self-Efficacy, Self-Regulation, and Student Performance: African-American Adult Students in Online Learning

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**Internet Self-Efficacy, Self-Regulation, and Student Performance: African-American  
Adult Students in Online Learning**

**Abstract**

The paper intended to investigate adult students' Internet self-efficacy, self-regulation, and performance in online learning environments. The relationships between these variables and the effect of student characteristics on Internet self-efficacy and self-regulation were explored. The participants of this study were African American students from a university in the United States. They participated in two web-based research courses offered in summer. Data were collected through an online survey and were analyzed by a quantitative approach. The results showed Internet self-efficacy was positively related to self-regulation at a significant level. Internet self-efficacy and self-regulation differed in terms of student performance. The differences of gender and age did not have a significant impact on Internet self-efficacy and self-regulation. Discussions and implications were addressed according to the major findings of this study.

**Keywords:** Online learning, Internet self-efficacy, self-regulation, student performance, minority students

## Introduction

Online learning has become the main alternative to traditional face-to-face learning (Allen, Seaman, Poulin & Straut, 2016). Online enrollments continue to grow in higher education, with an increased rate of 3.9% per year (Allen et al., 2016). There are approximately one-third of the students (28%) who have taken at least one distance education course (Allen et al., 2016). Studies have found that there were no significant differences in learning outcomes between online learning and face-to-face learning (Allen et al., 2016; Allen & Seaman, 2008; Allen, Bourhis, Burrell & Mabry, 2002; Johnson, 2000). Student performance is an important measure of student success in program evaluation (Moore & Kearsley, 1996). Students with better performance are more likely to be persistent in their learning, and research evidence suggests that having successful learning experiences helps to maintain and improve retention (Debourgh, 1999; Koseke, & Koseke, 1991; Friedman & Mandel, 2009). Students with a higher level of academic performance are often more satisfied with their experiences with an online course (Chang & Smith, 2008; Kuo & Belland, 2016).

The features of online learning, such as flexibility and convenience, align with learning needs of adult learners (Dabbagh, 2007). Adult learners need flexible and diverse educational delivery systems facilitated by a variety of information and communication technologies (Paul, Baker & Cochran, 2012). Online learning has shifted from the focus of instructor-centered learning to learner-centered one, and it requires students to take greater responsibilities for managing and controlling their own learning progress (Artino, 2007; Inan, Yukselturk, Kurucay & Flores, 2017; Lin, Szu, & Lai, 2017). Previous studies have found the factors that affect student performance over years (Pintrich & De Groot, 1990). Pintrich and De Groot (1990) indicated that motivational and self-regulation learning components are critical to academic

performance. Self-regulation was assumed to be a prerequisite for successful online learning (Bothma & Monteith, 2004; Inan et al., 2017). Students who possess better skills of managing their learning progress are more likely to achieve academic success in online learning environments (Barnard, Lan, To, Paton, & Lai, 2009).

In addition, given that the nature of online learning requires students to perform Internet-related tasks to complete assigned tasks or activities, students' self-confidence in utilizing the Internet may also influence their academic performance (Chang et al., 2014; Compeau & Higgins, 1995). Self-efficacy has been identified as a critical factor for student learning in traditional classroom instruction (Zimmerman & Schunk, 2003). The relationship of self-efficacy to student performance has been investigated and proved to be important (Hodges & Kim, 2010; Usher, 2009)

Although many studies of online learning have been conducted in higher and continuing education, few of them have focused on minority students (Kuo & Belland, 2016; Kuo, Walker, Belland, Schroder, & Kuo, 2014). There is a dearth of research with a focus on African-American adult students' self-efficacy and self-regulation in relation to student performance in online settings. Given the increasing interest of taking online courses among college students and the increasing rate of minority students enrolled into online programs, it is necessary to understand minority students' online learning experiences, especially their Internet self-efficacy, self-regulation, and performance.

### **Literature Review**

The concepts of self-regulation and self-efficacy are the theoretical bases for this study. The theories of self-regulation and Internet self-efficacy as well as their important roles in

learning were described first. Then, the relationships between self-regulation, Internet self-efficacy, and student performance, and their applications in online learning were indicated.

### **Self-regulation**

Self-regulation, originally from psychology, was defined by Bandura (1988) in terms of three forms of cognitive motivators including causal attributions, outcome expectancies, and cognized goals, each of which is based on its corresponding theory. Based on Zimmerman (1989), self-regulated learning is defined as the degree to which students are metacognitively, motivationally, and behaviorally active participants in their own learning. A combination of cognitive, metacognitive, motivational and behavioral processes is needed in the pursuit of learning goals. Cognitive processes refer to the strategies that learners use to attain or comprehend knowledge or information. Metacognitive processes involve learners' ability to set up plans, schedules, or goals to monitor or evaluate their learning progress. Motivational processes indicate that learners are self-motivated and willing to take responsibilities for their successes or failures. Behavioral processes consist of seeking help from others to optimize learning (Zimmerman & Martinez-Pons, 1988). Zimmerman (1989) assumes self-regulation as a reciprocal causation among personal, behavioral, and environmental influence processes (Zimmerman, 1989).

Self-regulation has been considered important in online learning. Researchers premised that self-regulation has an impact on individuals' learning behaviors and effectiveness (Lin, Huang, & Chuang, 2015; Barnard et al., 2009). For example, Delen and Liew (2016) indicated the necessity for online learners to develop self-regulation skills because online learning provides limited interactions among students and between students and the teacher, and instructors are more likely to encounter pedagogical and technological problems than face-to-face learning. The

design of online learning, such as support for learning content, peer collaboration, and instructional scaffolding, may influence students' self-regulation levels (Delen, Liew & Willson, 2014; Wang, 2011). Students with better self-regulation skills are more active in learning, which in turn help them maintain their learning motivation towards a subject or a topic (Lin, Szu, & Lai, 2017).

Although many researchers have assumed the important role of self-regulation in an individual's online performance, it is inconsistent about the prediction of self-regulation on student performance in online learning (Delen & Liew, 2016; Delen, Liew & Willson, 2014; Hodges & Kim, 2010; Inan et al., 2017; Matuga, 2009). Hodges and Kim (2010) applied self-regulation enhancing email messages to an online algebra course and found that self-regulation did not significantly predict student achievement. Similarly, Matuga (2009) found no significant relationships between self-regulation and academic achievement among secondary school students taking online college courses in science. Inan et al. (2017) investigated online undergraduate students taking an online introductory programming course and found that self-regulation, especially the factor of planning in self-regulation, significantly predicts student success. Metacognitive self-regulation, often referred as planning, is a critical constituent of self-regulation, and it is considered important for online learners (Azevedo, Guthrie & Seibert, 2004; Inan et al., 2017; Whipp & Chiarelli, 2004). Therefore, this study focused on meta-cognitive self-regulation.

### **Internet self-efficacy**

Self-efficacy theory stems from psychology with a theoretical framework that accounts for human behavior changes from diverse modes of treatment (Bandura, 1977). The concept of self-efficacy refers to efficacy expectations that present one's convictions toward behaviors

required to obtain certain outcomes and determine the effort people will make and how long they will persist when encountering obstacles or aversive experiences. The concept of self-efficacy has a long tradition and has been widely applied to social science areas, such as learning, program evaluation, human resource management, innovation, and training (Torkzadeh & Van Dyke, 2002). Self-efficacy is context-specific and its important role in predicting student learning has been proved (Alrushiedat & Olfman, 2014; Hodges, 2008; Zimmerman & Schunk, 2003). Hodges (2018) indicated the necessity to study self-efficacy in online learning environments. With the advent development of the Internet and computer technology, one's confidence in using the Internet may play an important role in online learning environments. Online learning may provide students with access to more resources, and the self-efficacy to use the Internet was assumed to be related to the effectiveness of web-based instruction (Bandura, 2002; Hodges, 2018; Thompson, Meriac, & Cope, 2002).

Internet self-efficacy refers to “the belief in one’s capability to organize and execute Internet actions required to produce given attainments” (Eastin & LaRose, 2000, p. 1). Previous Internet experience was found to be positively related to Internet self-efficacy (Eastin & LaRose, 2000). Males were generally found to have better Internet skills than females. User attitude and computer anxiety are found to be influential to Internet self-efficacy. People with positive attitudes toward computers have higher levels of Internet self-efficacy, compared to those with negative attitudes toward computers. Training is helpful to improve learners’ Internet self-efficacy, especially for those with positive attitudes toward computers and those with low computer anxiety (Torkzadeh et al., 2006; Torkzadeh & Van Dyke, 2002). Both Joo et al. (2000) and Thompson, Meriac, and Cope (2002) indicated that Internet self-efficacy significantly predicts student performance. Students with a higher level of Internet self-efficacy have better



information searching skills and learn better than those with a lower level of Internet self-efficacy (Tsai & Tsai, 2003). On the other hand, DeTure (2004) found Internet self-efficacy to be a poor predictor for student success in an online learning environment (DeTure, 2004). The effect of Internet self-efficacy on student learning seems to be inconsistent.

### **Relationships between Internet self-efficacy, self-regulated learning, and performance**

Self-efficacy is positively related to student performance (Alrushiedat & Olfman, 2014). Students with a higher level of self-efficacy perform better than those with a lower level of self-efficacy (Bandura, 1988; Tsai & Tsai, 2003; Wang & Wu, 2008; Zimmerman, 1997). Although self-efficacy is important to one's online learning experience, the impact of self-efficacy on learning outcomes is not always significant (Bell, 2007). Online learning environments are different from traditional classroom instruction because they require students to perform Internet-related tasks to complete online assignments. Students' confidence in utilizing the Internet has assumed to be critical to their academic performance (Chang et al., 2014; Liaw, 2002; Salanova, Grau, Cifre, & Llorens, 2000). Limited research has explored the relationship between Internet self-efficacy and performance (Chang et al., 2014; DeTure, 2004; Moos & Azevedo, 2009). It is imperative to further validate such a relationship.

Self-regulation is influential to academic or learning performance (Delen & Liew, 2016; Pintrich, 2000; Yusuf, 2011b). Students who are more self-regulated are more likely to be successful in their learning when compared to their counterparts (Daniela, 2014; Inan et al., 2017; Richardson, Abraham, & Bond, 2012). Given the nature of online learning environments, students may need to employ more of the self-regulated skills to plan their learning and maintain their progress in online settings.

Some research has explored the connection between self-efficacy and self-regulation, and a positive relationship was found between these two variables (Ghonsooly & Ghanizadeh, 2013; Onoda, 2014; Wong, 2005; Yusuf, 2011a). However, limited research has examined the relationship of Internet self-efficacy and self-regulated learning. A few online studies indicated a positive correlation between Internet self-efficacy and self-regulated learning (Kuo, Walker, Belland, & Schroder, 2013; Kuo, Walker, Belland, Schroder, & Kuo, 2014). Students with higher Internet self-efficacy are more likely to be self-regulated in online learning.

### **Gender and Age Differences in Internet Self-efficacy and Self-regulation**

Previous research has investigated the effect of gender and age on students' use of technology (Joyce & Kirakowski, 2015; Kuo & Belland, 2016; Wu & Tsai, 2006). The findings were inconclusive although most of the research found that male students tended to show higher levels of confidence, knowledge, and competencies in using computers, the Internet, and other types of technologies (Chang et al., 2014; Wu & Tsai, 2006). Chang et al. (2014) investigated online college students' Internet self-efficacy and found that male students showed higher Internet self-efficacy and confidence than female students. In terms of self-regulated learning, female students appeared to have better ability to employ self-regulated learning strategies to achieve success than male students (Lee, 2002). However, Yukselturk and Bulut (2009) found that gender was not significantly related to self-regulated learning variables among undergraduate and graduate students who took online courses in Turkey. Limited research has focused on age and gender differences in relation to Internet self-efficacy and self-regulated learning among minority students. Therefore, this study explored the relationships among these variables.

## **Purpose**

The purpose of this study was to examine the relationship between Internet self-efficacy, self-regulation, and performance in online learning. In addition, we examined the effect of student characteristics on Internet self-efficacy and self-regulation.

1. Do student characteristics (i.e., age, gender) have an effect on Internet self-efficacy and self-regulation?
2. Is there a significant difference in Internet self-efficacy and self-regulated learning by student performance?
3. Is Internet self-efficacy related to self-regulation?

## **Methods**

### **Sample and Learning Environments**

The sample in this study were the African-American students enrolled in two undergraduate-level online research courses offered by the continuing education department from a university in the southeast. The online courses were offered in the summer semester and taught by the same instructor. Each of the summer-session courses lasted for 4 weeks. Blackboard was the learning management system utilized to deliver online courses and relevant activities. Major tasks included individual assignments, such as discussions, reflections, and research papers. There were limited interactions between students in these two online courses because no collaborative work was assigned.

Of the 64 enrolled students, 54 completed the online survey for the study. The return rate was 84%. Table 1 shows student background information. There were much more female respondents (85.2 %) than male respondents (14.8 %). The majority of the respondents were single (74.1%).

Many of them were between the ages of 18-25 (31.5%) and 26-35 (35.2%). About 98% of the students were African-Americans, and only about 2% of the students were Caucasians. As for the hours spent online per week, most respondents reported that they spent less than 5 hours or 6-10 hours online. Very few respondents reported spending more than 16 hours online for the class.

Table 1

<i>Student Information</i>	
Gender	Percentage
Male	14.8%
Female	85.2%
Marital Status	
Married	25.9%
Single	74.1%
Age	
18-25	31.5%
26-35	35.2%
36-45	14.8%
46-55	18.5%
Ethnicity	
African-American	98.1%
Caucasian	1.9%
Hours spent online for the class	
Less than 5 hours	29.6%
6-10 hours	33.3%
11-15 hours	24.1%
16-20 hours	7.4%
above 20 hours	5.6%

## Measurement

The survey of this study included three sections: student background information, Internet self-efficacy, and self-regulated learning. Student background information consisted of questions regarding gender, age, marital status, ethnicity, and the number of hours spent online per week for the class.

Table 2

*Number of items and Cronbach's alpha information for interaction and satisfaction scales*

Sub-scales	Final number of items	Cronbach's alpha from this study
Internet self-efficacy	8	0.97
Self-regulation	12	0.73

The Internet self-efficacy scale with 8 items, developed by Eastin & LaRose (2000) to measure one's belief in performing Internet-based technology, was used in this study. This measurement was a seven-point scale that ranges from 1 (very unlikely) to 7 (very likely). This scale was found to be reliable and internally consistent with a Cronbach's coefficient alpha value at .93, based on a population of 171 undergraduate students at a university. Construct validity of this scale was examined and established during prior instrument design efforts. The Cronbach's coefficient alpha of Internet self-efficacy based on the sample of this study is .97 (see Table 2).

The self-regulated learning scale used in this study was adopted from the Metacognitive self-regulation subscale in the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. (1993). The MSLQ was administered to a sample of 380 college students from 37 classrooms in 5 disciplines. MSLQ, including 15 sub-scales, has both validity as well as good reliability in terms of internal consistency. The metacognitive self-regulation subscale, which assesses the extent to which the planning, monitoring, and regulating strategies learners utilized during learning, is a 7-point Likert scale with 12 items ranging from 1 (not at all true of me) to 7 (very true of me). The coefficient alpha of Metacognitive for the self-regulation subscale was .79. The Cronbach's coefficient alpha of Internet self-efficacy based on the sample of this study is .73 (see Table 2). Student performance was measured through students' final grades in the online course. There were five levels of grades, including A, B, C, D and F.

## Data Collection

Online survey was used to collect student responses. The survey link was distributed through email and the announcements feature in Blackboard during the first week of the class. Follow-up emails or reminders were sent to students to increase student participation in the survey.

## Data Analysis

All data analyses were conducted using SPSS 24 for Windows software package. Descriptive analyses were conducted to present the student characteristics information and the average scores of Internet self-efficacy, self-regulation, and student performance. ANOVA analysis was used to examine the effect of student characteristics on Internet self-efficacy and self-regulation, and whether students' Internet self-efficacy and self-regulation differed in terms of performance. Correlation analyses were performed to examine the correlation between Internet self-efficacy and self-regulation.

## Results

### Descriptive Information

Table 3 shows the average scores for the respondents who rated for Internet self-efficacy and self-regulated learning. The average scores for both Internet self-efficacy and self-regulated learning were higher than the median score 4. Overall the respondents were quite confident in utilizing the Internet and had a moderate level of self-regulation in online learning environments.

Table 3

*Average score of each scale*

	<i>Mean</i>	<i>S.D.</i>
Internet self-efficacy (8 items)	5.64	1.10
Self-regulated learning (12 items)	4.22	0.88

Table 4 shows the distribution of student performance for the course. Most students received A or B from online courses. Only a few of them failed the class.

Table 4

*Student performance*

Performance	Percentage
A	35.2%
B	37.0%
C	9.3%
D	11.1%
F	7.4%

**ANOVA Analyses**

The assumptions of ANOVA were tested before the analysis was performed. There were no significant effects of student characteristics (i.e., age, gender) on Internet self-efficacy (see Table 5) and self-regulation (see Table 6) among online learners, although that female students appeared to have higher average scores of Internet self-efficacy and self-regulation than male students, and that minority students with their ages of 26-45 showed higher average scores of Internet self-efficacy than those with their ages at 18-25 and 46-55.

Table 5

*The effect of gender on Internet self-efficacy and self-regulation*

Variables		<i>N</i>	<i>Mean</i>	<i>F</i>	<i>p</i>
Internet self-efficacy	Male	5	6.05	.302	.585
	Female	43	5.84		
Self-regulation	Male	5	5.35	.053	.819
	Female	43	5.42		

Table 6

*The effect of age on Internet self-efficacy and self-regulation*

Variables		<i>N</i>	<i>Mean</i>	<i>F</i>	<i>p</i>
Internet self-efficacy	18-25	13	5.79	1.661	.189
	26-35	19	5.95		
	36-45	8	6.23		
	46-55	8	5.39		

Self-regulation	18-25	13	5.23	.659	.582
	26-35	19	5.53		
	36-45	8	5.58		
	46-55	8	5.30		

According to table 7, there was a significant effect of student performance on Internet self-efficacy,  $F(1, 49) = 3.58, p < .05, \eta^2 = 0.51$ . Similarly, self-regulation significantly differed in terms of student performance,  $F(1, 48) = 2.96, p < .05, \eta^2 = 0.26$ . Post hoc tests showed that there was significant difference on Internet self-efficacy between students who received D or F in their final grades. Students who received D as their final grade had higher Internet self-efficacy than those receiving F. The adjusted p-value through the Bonferroni procedure was not applied as the use of Bonferroni procedures could further reduce power, increasing a Type II error to unacceptable levels (Nakagawa, 2004). More emphasis should be placed on practical or biological significance (i.e., effect size) (Cohen, 1990). The current sample size provided adequate power to detect large effect sizes ( $\eta^2 = 0.51; \eta^2 = 0.26$ ) at the  $p < .05$  level.

Table 7

*The effect of student performance on Internet self-efficacy and self-regulation*

Variable	SS	MS	$F(1, 48)$	$p$	$\eta^2$
<b>Internet Self-Efficacy</b>					
Between	7.56	1.89	3.58	0.013*	0.51
Within	22.69	0.53			
<b>Self-Regulation</b>					
Between	5.14	1.29	2.96	0.030*	0.26
Within	18.65	0.43			



## **Correlation Analysis**

The correlation between Internet self-efficacy and self-regulation was positive and significant ( $r = .598, p < .01$ ), indicating that the higher the students' Internet self-efficacy, the more self-regulated they were.

## **Discussions**

More and more innovative technologies have been developed for educational purposes and been integrated into instructional design processes in order to engage students in an interactive learning environment. This paradigm shift in instructional technology has provided various techniques for teachers to deliver their learning materials and activities, such as flipping classroom, blended learning, or computer-supported collaborative learning (CSCL). Due to this reason, students are required to interact with the content and learning tasks via the learning management platform, to learn how to use third-party multimedia software, or to communicate with peers using cloud communication technologies. Hence, computer skills and Internet self-efficacy have strong influences on students' academic performance when technologies are involved in learning.

Firstly, research question one intended to investigate whether there are associations between online student's characteristics, Internet self-efficacy, and self-regulation. The results revealed that student characteristics, including gender and age, did not significantly impact Internet self-efficacy and self-regulation. Although compared to males students, female students appeared to be more confident in utilizing the Internet to perform required tasks and possess higher levels of self-regulation in online courses, the differences were not significant. This result is aligned with the findings of some previous research in which males and females were found to

have similar levels of Internet self-efficacy (Joyce & Kirakowski, 2015; Kuo & Belland, 2016), although some research indicated that males tended to have more positive attitudes toward the Internet than females (Wu & Tsai, 2006). It may be due to that students in this study might have taken online courses before with the same institution and were capable of using or adopting the learning management system used by the institution, or they were already familiar with online learning technologies and had experience in utilizing tools that require Internet connection for online courses.

The non-significant influence of age on Internet self-efficacy is aligned with the findings of previous research that minority students' Internet self-efficacy did not differ in terms of their age (Kuo & Belland, 2016). In this study, students with ages between 18 to 45 years old appeared to have higher Internet self-efficacy than those above 45 years old, although the difference was not significant. It may be due to that these students may have been frequently required to execute Internet-related tasks through their job or study. In terms of self-regulation among different age and gender groups, although there was a tendency for older or female students to be more self-regulated than younger or male students, such differences were not significant. Although this result is aligned with some of previous research for different ethnic groups, more research on minority students would help validate such relationships of self-regulated learning with age and gender.

Self-efficacy in online learning is still in need of more in-depth investigations. For example, multi-dimensions of self-efficacy are necessary to be taken into account when investigating students' learning characteristics in the context of online learning. Additional online learning self-efficacies may include Learning Management System (LMS) self-efficacy

(Martin, Tutty, & Su, 2010), information-seeking self-efficacy (Bronstein & Tzivian, 2013; Tang & Tseng, 2013), and self-efficacy in critical thinking skills (Scigliano, 2011).

Secondly, this study found that Internet self-efficacy and self-regulation were positively related to student performance at a significant level. Minority students' confidence in the use of the Internet did impact their performance in online learning, which implies that students who had a stronger belief in their ability in executing Internet related actions to complete certain tasks were more likely to succeed in the online course. This result is consistent with the findings of some previous research where Internet self-efficacy was found to be an important predictor for student performance in online learning (Chang et al., 2014; DeTure, 2004). The significant relationship between self-regulation and student performance is aligned with the findings of some previous studies in which self-regulation was found to have a significantly positive impact on student performance (Bothma & Monteith, 2004; Pintrich & De Groot, 1990).

Finally, Internet self-efficacy was found to be positively and significantly related to self-regulation ( $r = .65, p < .01$ ), indicating that students with a higher level of Internet self-efficacy had better meta-cognitive self-regulatory skills. This result supports the findings of previous research in which Internet self-efficacy was found to have a positive relationship with self-regulation in online learning contexts (Kuo, Walker, Belland, & Schroder, 2013; Kuo, Walker, Belland, Schroder, & Kuo, 2014).

### **Conclusion and Implication**

This study investigated African-American adult students in online learning and found that Internet self-efficacy and self-regulation were related to student performance. The finding that minority students with higher Internet self-efficacy outperformed those with lower Internet self-efficacy supports the important role of Internet self-efficacy in enhancing online learning

performance. It is important for instructors to ensure their students possess a required level of technological ability or skills to be able to succeed in an online course. Instructors should pay attention to students with low Internet self-efficacy and self-regulation at the beginning of the class and provide them with necessary assistance or support to enhance students' learning performance. In addition, Institutions should provide technology workshops or orientations for all online students before an online course starts to help students get familiar with the learning management system and Internet-related issues and troubleshooting.

There was a positive relationship between Internet self-efficacy and self-regulation. Minority students with high Internet self-efficacy were more likely to be self-regulated learners in online learning. Student characteristics, including age and gender, did not significantly impact Internet self-efficacy and self-regulation among minority adult students. More studies are needed in the future to examine the effect of age and gender on Internet self-efficacy and self-regulation in relation to performance in online learning, to further validate the findings of this research for minority groups of students, and to provide more insights about the influence of age and gender on minority adult students' online behavior.

In terms of the future study, experimental or mix-method (Qualitative and Quantitative) research design may be needed to explore additional factors that can influence Internet self-efficacy and self-regulation in the context of online learning, and to examine whether these new discovered factors mediate the effect of academic performance. It is also suggested that future research include a larger sample size or different course design to investigate the relationships between proposed variables so that the research result could be better generalized to a similar group of students.

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