4-2020

Exploring First-time Online Undergraduate and Graduate Students' Growth Mindsets and Flexible Thinking and Their Relations to Online Learning Engagement

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Abstract

The present study was an attempt to help us reveal the characteristics and complexity of today's first-time online students in a higher education setting. Data were collected from undergraduate and graduate students enrolled in fully online courses for the first time during spring semester in the 2016-2017 academic year at a Southern university in the United States. Primarily, path analysis was conducted to investigate the impacts of flexible thinking, mindsets, and self-efficacy on the 254 first-time online students' online learning engagement. The results of the path analysis supported six out of the eight hypotheses and all standardized path coefficients have values between 0.14 to 0.31. In conclusion, growth mindset and learning self-efficacy appear to be important variables for first-time online students and have a positive relation to online engagement. The practical implications and future research are discussed.

Keywords: Growth Mindsets; Flexible Thinking; Online Learning Engagement; Learning Self-Efficacy; First-time Online Undergraduate and Graduate Students

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1. Introduction

Online learning can be stressful for students, especially for those with low learner autonomy (Heo & Han, 2018; Yang, 2016). Many struggle to learn and to interact with others in a fully online course for the first time and have been found to have a high level of anxiety at the beginning of the online courses (Abdous, 2019; Bolliger & Halupa, 2012; Kuo, Walker, Schroder, & Belland, 2014). They also often lack the necessary independence and time-management skills needed for persistence (Ghiasvand, Naderi, Tafreshi, Ahmadi, & Hosseini, 2017; Tseng, Yeh, & Tang, 2019) and often experience cognitive overload in the early stages of an online course (Bawa, 2016), which likely contributes to high dropout rates (within the first few weeks of the course start). And ironically, bad practices of online course designs could be making it worse and can further amplify students' negative feelings regarding online learning experiences (Allen, & Seaman, 2014; Cooper, & Scriven, 2017; Miller, 2014). From the cognitive load perspective, when requiring students to mentally integrate different sources of information (split-attention effect) or combine redundant information creates unnecessary processing in the working memory (Schmeck, Opfermann, van Gog, Paas, & Leutner, 2015; Sweller, van Merriënboer, & Paas, 2019). As Miller (2014) emphasized in her book, poor instructions or requiring new features without practice are bad examples of online course design that can negatively increase the cognitive load. Simunich, Robins, and Kelly (2015) also noted that poorly organized course content or illogical sequence of instruction can waste students' time in searching for information, leading to demotivation and attrition. According to one of the

instructional design principles, to maximize student benefit from the learning content and activities, appropriate, logical, and hierarchical sequence needs to be determined by the instructor when constructing the course (Morrison, Ross, Kemp, & Kalman, 2010). Furthermore, for course or assignment objectives, clear expectations and assessment criteria should be provided and be consistent (Duncan, Range, & Hvidson, 2013). Otherwise, confused feelings could demotivate students' learning and lead them to dropout from this online course. In contrast, instructors should follow quality course design principles or concepts when designing their courses for students to have better learning experiences. The Quality Matters (QM) Rubric (Quality Matters Program, 2013) consists of a set of eight general standards (e.g. course overview and introduction, learning objectives, assessment and measurement, and instructional materials, etc.) to evaluate the design quality of online and hybrid courses. The QM standards have been examined by educators and evidences found in educational literature have shown that those factors can facilitate learning engagement and achievement (Adair, & Shattuck, 2015), as well as improve retention rates (Ni, Diomede, & Rutland, 2013; Outlaw, Rice, & Wright, 2018).

Along with the rapid development of online learning technologies and environments in the early 2000's, there is a rich body of literature pertaining to characteristics and skills that are critical and that online students should possess or develop to be successful in online learning environments. Researchers summarized that online students should have a strong academic self-concept, possess interpersonal and communication skills, and social learning skills (Dabbagh, 2007). These characteristics and skills can ensure that a learning community is established and students are learning socially, collaboratively, and interactively as a whole. In addition, fluency in the use of online technologies (Dabbagh, 2007), self-efficacy for technology skills (Jan, 2015), and Internet self-efficacy (Alqurashi, 2019; Chang et al., 2014; Kuo, Walker, Schroder, &

Belland, 2014) are essential factors for online students to retain high confidence level in completing learning tasks and to focus more on learning.

However, online students who have low levels of technology competencies and flexible thinking in learning are more emotional and anxious when encountering technical issues (Celik & Yesilyurt, 2012; Mac Callum & Jeffrey, 2014). Such emotional responses (i.e., discomfort and frustration) can prompt students to stop being proactive and motivated in learning. Nevertheless, not all students act this way when they encounter difficulties and problems. Students with strong self-beliefs or resiliency in life seek out challenges and do not perceive a one time mistake as an indication of failure. In contrast, those with fixed beliefs seek performance goals by choosing tasks that are not overly difficult (Murphy & Thomas, 2008). While eLearning tools are impacting the ways in which teaching and learning are taking place in this digital era, Ashok (2014) pointed out that it is imperative that we reassess the mindsets of teachers and learners in order to enhance students' learning outcomes.

In Dweck and Leggett's original work (1988), they proposed a social-cognitive approach to the study of implicit theories of intelligence that distinguished an individual's self-belief into either an incremental theory of intelligence (growth mindset) or an entity theory of intelligence (fixed mindset). People who endorse an incremental theory of intelligence believe that intelligence is increasable and controllable, and they see challenges as opportunities to increase their competency. Research found that growth mindset can promote resilience (Dweck, 2006; Brooks, Brooks, & Goldstein, 2012), student engagement (Kern, Waters, Adler, & White, 2015; Zenh, Hou, & Peng, 2016), and motivation (Brooks, Brooks, & Goldstein, 2012). Conversely, those with an entity view of intelligence believe challenges, effort, and setbacks are measures of ability within a world of threats and defenses. Students with an entity view of intelligence often

reduce effort when they face difficult decisions and challenges and accordingly use ineffective strategies. In regard to self-efficacy, Bandura (2001) delineated it from the perspective of social cognitive theory and stated that people choose what challenges and the level of personal engagement to undertake based on their efficacy beliefs. Originally, Bandura (1995) defined self-efficacy as "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (p. 2). Because the self-efficacy in this study focused on the aspect of student learning and performance, we decided to use the definition of self-efficacy from the Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991), where the definition is "a self-appraisal of one's ability to master a task.... includes judgments about one's ability to accomplish a task as well as one's confidence in one's skills to perform that task." (p. 13). According to Bandura (1986), self-efficacy is closely related to academic confidence and generally refers to the degree of a student's capability of performing academic tasks. Self-efficacy can also influence how people think (pessimistically or optimistically) in ways that are self-enhancing or self-hindering. Like the implicit theories of intelligence, self-efficacy also ties to the overall framework of social cognitive theory and is about the mindset that individuals put themselves in. People are more inclined to change in order to reach their goals if they are open-minded in changing approaches of thinking and are capable of adopting a combination of problem-solving strategies. Komarraju and Nadler (2013) studied adult undergraduate students and found that students who have high self-efficacy in their academic performance were more likely to believe that their intelligence is malleable (incremental/growth mindset) based on their efforts. Similarly, Beckmann, Wood, Minbashian, and Tabernero (2012) examined the impact of members' implicit theories of intelligence on group learning and results revealed that high incremental theory groups set more

challenging group goals, attained higher GPA, and developed stronger self- and group- efficacy than low incremental theory groups.

In addition to growth mindsets and self-efficacy, "flexible thinking" has been mentioned as another key competency for success in the 21st Century and technology-enhanced learning environments (Barak & Levenberg, 2016b; Griffin, McGaw, & Care, 2012; OECD, 2013). Barak and Levenberg (2016a) stressed that "A higher order thinking skill that constitutes open-mindedness to other's ideas as fundamental to the ability to adapt to changes in learning situations and to accept new or changing technologies" (p. 82). Those competencies are definitely essential for first-time online students to successfully transfer their learning experience from a traditional face-to-face learning environment to a flexible, self-paced, learner-centered, online learning environment.

Although such research on students' social behaviors and learning achievement is promising, they were conducted in a primary and secondary context. There is a gap in the literature when it comes to connecting growth mindsets and social cognitive learning in higher education settings. In addition, none of the current studies examine growth mindsets in online students or as a way to facilitate online learning engagement. In order to develop successful learning experiences, it is imperative that we understand these learners and their needs, especially those taking online classes for the first time. Thus, the purpose of this study is to create and test a model (see Figure 1) that can help us reveal the characteristics and complexity of today's first-time online students in a higher education setting from the perspectives of social and cognitive learning and the twenty-first century thinking skills by investigating the impacts of flexible thinking, mindsets, and self-efficacy in learning on first-time online students' online learning engagement. In this study, the researchers refer first-time online students in a higher

education setting as “the students who were enrolled in full-time degree programs or certifications at undergraduate and graduate levels, and they could earn credits by successfully passing the courses.”

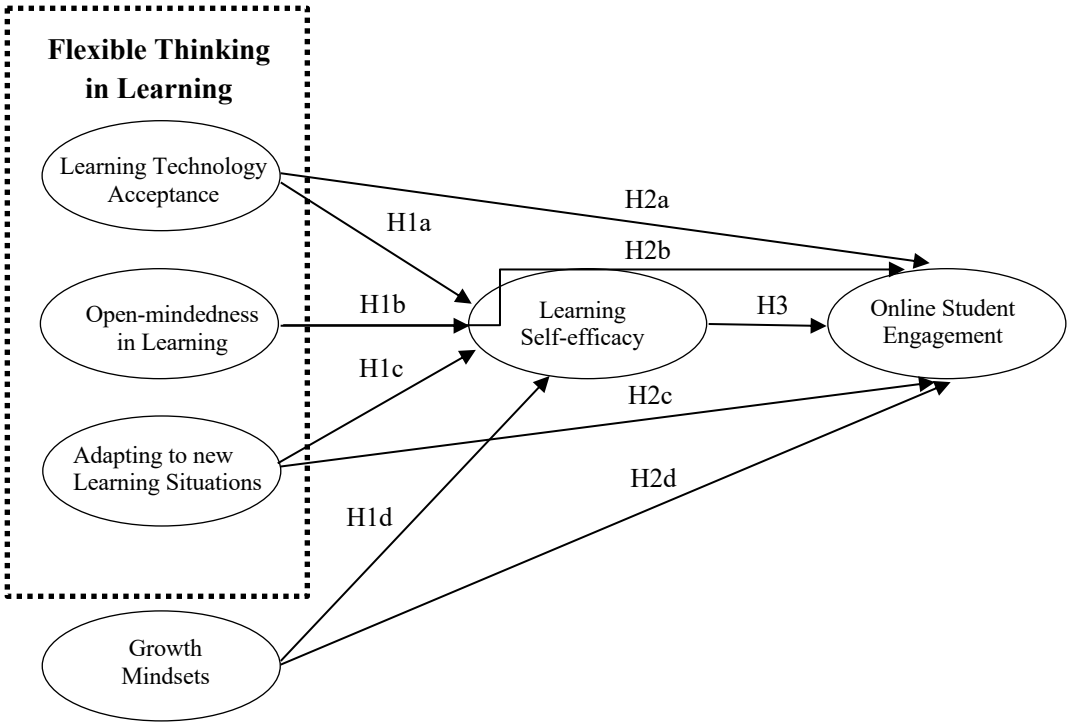

Fig. 1. Hypothetical relationships between flexible thinking, growth mindsets, learning self-efficacy, and online student engagement

2. Theoretical Framework

2.1. Flexible thinking, growth mindsets, and learning self-efficacy

From a cognitive perspective, flexibility is reflected in diverse human behaviors and it occurs when a person is open-minded to new ideas and able to transfer knowledge to different circumstances; moreover, he/she would consider multiple viewpoints and perspectives, and always try to seek multiple solutions and answers (Mincemoyer, Perkins, & Munyua, 2001).

Spiro and Jehng (1990) defined cognitive flexibility as "the ability to adaptively re-assemble diverse elements of knowledge to fit the particular needs of a given understanding or problem-solving situation" (p. 169). Especially in an online learning environment where the learning process is more autonomous and learnings usually take place during constructive interactions, flexible thinking is needed for students to construct knowledge from different conceptual and case perspectives. We define flexible thinking in diverse learning environments as a person's awareness of interaction and solution alternatives, ability to adapt to new situations, willingness to consider different opinions, and self-efficacy in being flexible. In the twenty-first century learning environment, students must have an open mindset to receive information from various resources and have flexibility to make alternative decision and process knowledge between changing learning situations and tasks. Moreover, flexible thinking in learning is significant for learners to adjust ways to restructure knowledge, to adapt various roles, and to accept changes in new learning situations (Bentley, 2014). In general, flexible thinkers are more capable of weighting arguments carefully, seeking alternative solutions to any given problem (Vernon & Hocking, 2016), and adjusting approaches as new challenge emerge.

In regard to concepts and definitions of "cognitive flexibility" and "flexible thinking", they are used interchangeably in studies of psychology, cognition, and social sciences. Since this study focused on flexibility in aspect of education contexts and its impacts on student learning, thus we use the term "flexible thinking" throughout the study. Barak and Levenberg (2016a) conducted a grounded theory method and collected data through three phases via an online survey and semi-structured interviews to identify the conceptualization of flexible thinking in the context of contemporary technology-enhanced education. Their findings indicated three main themes that underlie flexible thinking: Open-mindedness to others' ideas; adapting to changes in

learning situation; and accepting new or changing learning technologies. Barak and Levenberg (2016b) further extended the model of flexible thinking and generated a valid and reliable instrument, the Flexible Thinking in Learning (FTL) scale, for measuring an individual's inclination to think flexibly. According to them, the scale can be used as a reflective tool for learners to assess their own strengths and weaknesses and educators can use it to examine the degree of effects of pedagogical interventions on learners' flexible thinking. Thus, we argued that assessing student's flexible thinking is essential especially when online learning technologies and tools are involved and students might have different levels of proficiency in navigating the interfaces of those technologies.

Dweck (2006) introduced the power of "implicit theories of intelligence" that has been shown to make a difference for success in academics (DeBacker et al., 2018; Good, Rattan, & Dweck, 2012). Implicit theories of intelligence refer to individuals' beliefs in the stability versus malleability of intelligence. Students' belief on the degree to which their abilities are, either fixed or can be improved, will influence how they set their learning goals and how willing they are to put efforts into learning new skills. Dweck (2006) stated that mindsets change is about "seeing things in a new way. When [people] change to a growth mindsets, they change from a judge-and-be-judge framework to a learn-and-help-learn framework. Their commitment is to growth, and growth takes plenty of time, effort, and mutual support" (p. 238). It is a world of opportunities to improve for students with an incremental theory of intelligence and they perceive challenges, effort, and setbacks as positive energies for them to learn and grow (Yeager & Dweck, 2012). Especially when students are in the most challenging of times, for example, once the first-time online students are anxious about the isolated online learning environment and do not know how

to seek helps from other resources, having a growth mindset creates a passion and positive energy for learning (Degol, Wang, Zhang, & Allerton, 2018).

In regard to the relationship between the implicit theories of intelligence and self-efficacy, Komarraju and Nadler's study (2013) revealed that strong self-efficacy leads students to make efforts and be persistent in pursuing their goals. Those students believe that intelligence is changeable and they have the desire to overcome challenges and are less worried about failure. In contrast, students with low self-efficacy usually deal with uncertainty and insecurity in their success in learning and they are less likely to be motivated by mastery goals. However, research has not addressed this connection on students who are facing a more challenging online learning environment and those taking online courses for the first time.

According to Bandura (1977), cognitively flexible people have strong self-belief and are able to behave effectively. Martin and Anderson (2003) stressed that self-efficacy is needed for people in bringing out the desired behavior when they are spontaneously aware that there are alternative choices of behaviors in a given situation. Hence, they claimed that self-efficacy is a part of cognitive flexibility. Findings in prior research reveal that cognitive flexibility is positively related to self-efficacy, self-monitoring, and self-regulation (Çelikkaleli, 2014; Martin & Anderson, 2003). Çelikkaleli (2014) took multi-dimensions of self-efficacy (academic, social and emotional) into account when examining the relation between cognitive flexibility and self-efficacy of adolescents. Çelikkaleli collected data from 270 adolescents (163 female, 107 male) and the Pearson product-moment correlation coefficient indicated significant ($p < .01$) and positive relations between cognitive flexibility and academic ($r = .26$), social ($r = .24$) and emotional self-efficacy ($r = .27$). However, the relations between cognitive flexibility and self-efficacy in those prior studies mentioned above were all examined with a correlation coefficient.

We argued that these results were limited in terms of the direction of the relation, and that path analysis was needed to further investigate the magnitude and significance of hypothesized causal connections between these two variables.

Based on prior research and the implicit theories of intelligence, we hypothesized that flexible thinking and growth mindsets have a positive relation to learning self-efficacy. The research framework is provided in Fig. 1.

H1a. First-time online students' learning technology acceptance is positively associated their learning self-efficacy.

H1b. First-time online students' open-mindedness in learning technology is positively associated with their learning self-efficacy.

H1c. First-time online students' adaption to new learning situations is positively associated with their learning self-efficacy.

H1d. First-time online students' growth mindsets is positively associated with their learning self-efficacy.

2.2. Flexible thinking, growth mindsets, and online student engagement

Engagement has been recognized as a vital contributor for students learning accomplishment and success. In addition, it is associated with academic achievement and persistence in school (Handelsman, Briggs, Sullivan, & Towler, 2005; Jung, & Lee, 2018; Wang, 2017). Researchers consider and view student engagement as a multidimensional construct that links different components of students positively and proactively involving and committing in the learning process. Fredricks, Blumenfeld, and Paris (2004) described and defined engagement in three ways: behavioral engagement refers to the observable behaviors necessary to meet academic standards, such as attendance, and to be successful on academic tasks, such as autonomy participation and concentration in academically related activities. Emotional engagement concerns student's feelings in the classroom and regarding their learning

experiences, including interest, boredom, anxiety, and social belonging. Finally, when learning and interacting in an online learning environment, cognitive engagement is important for students to be self-regulated and strategic, so they can focus more on deeper learning process. Similarly, Handelsman et al. (2005) proposed a four sub-constructs of measuring student learning engagement, including skills engagement (putting efforts in reading, studying, and completing homework); emotional engagement (making the learning interesting and relating to their life), participation/interaction engagement (having fun and participating in class discussion); and performance engagement (getting a good grade and doing well in the class). As online learning becomes a common course delivery method that is truthful for all disciplines in higher education around the world, a description of online student engagement should emerge. Dixson (2015) combined social constructivist notions of learning and the Community of Inquiry model, he stated that "Engagement involves students using time and energy to learning materials and skills, demonstrating that learning, interacting in a meaningful way with others in the class, and becoming at least somewhat emotionally involved with their learning" (p. 4).

The Partnership for 21st Century Skills (P21, 2009) determined that flexibility and adaptability skills are essential for students in the Information Age in order to develop life and career skills. From course design and teaching strategy standpoints, educational technologies seem to be most effective when they are situated in a flexible framework of knowledge of content, pedagogy, and technology (Maeng, Mulvey, Smetana, & Bell, 2013). Nevertheless, students are required to be flexible in their ability to use technologies efficiently and be flexible in learning new technical skills when facing new situations (Calvani, Cartelli, Fini, & Ranieri, 2008) for them to be active and engaged learners in technology-enhanced learning environments. Hence, technology acceptance and adaption is an important skill for 21st century learners,

especially when learning online, to effectively use technology for meaningful learning (Barak & Levenberg, 2016a) and engage in technology integration tasks.

Dweck's implicit theories of intelligence postulates that mindset is an important personality variable and students' mindsets can have an important influence upon their motivational beliefs on achievement behavior when engaging in academic tasks (Aditomo, 2015; Dweck, 2006; Dweck, Mangels, & Good, 2006). Zenh, Hou, and Peng (2016) recruited 1260 Chinese students (602 female, 658 male) from five primary and middle schools and conducted a structural equation model (SEM) analysis. The results supported their hypothesis that the development of high levels of growth mindsets correlated with higher school engagement ($r = .20$, $p < .001$). Similarly, Kern, Waters, Adler, and White's (2015) findings also indicated a positive and significant relation between growth mindset and school engagement ($r = .30$, $p < .01$). Hence our hypotheses:

H2a. First-time online students' learning technology acceptance is positively associated with their online learning engagement.

H2b. First-time online students' open-mindedness in learning is positively associated with their online learning engagement.

H2c. First-time online students' adaption to new learning situations is positively associated with their online learning engagement.

H2d. First-time online students' growth mindsets is positively associated with their online learning engagement.

2.3. Learning self-efficacy and online student engagement

According to Bandura (1997), people with high levels of self-efficacy tend to interpret uncontrollable situations and problems more as challenges than as obstacles or hindrances. In this regard, self-efficacy is postulated as having a positively link to engagement level (Schunk &

Mullen, 2012; Ventura, Salanova, & Llorens, 2015). Levpuscek and Zupancic (2009) stated that students' beliefs about their academic capabilities become an essential factor that can affect academic engagement and performance. It is because students who feel efficacious about learning are able to make adequate modifications (e.g., learning strategies, seeking help) to improve their learning and simultaneously to foster their learning engagement (Schunk & Mullen, 2012). Walker, Greene, and Mansell (2006) studied 191 undergraduate students, they hypothesized that self-efficacy, and intrinsic motivation would have a positive correlation with meaningful cognitive engagement. Their findings indicated that self-efficacy contributed to the prediction of meaningful cognitive engagement with a path coefficient of $r = .32$, $p < .01$. Hence our hypothesis,

H3. First-time online students' learning self-efficacy is positively associate with their online learning engagement.

However, when the literature was reviewed in terms of the effects of flexible thinking, mindsets and self-efficacy on student engagement, only a few studies have examined those important learning factors in contemporary and technology-enhanced online contexts. We believe that this topic is one to be studied further and results from empirical research are also needed to close the gap in understanding the effects of first-time online learners' perceived personal behaviors in learning.

3. Methods

3.1. Participants and Settings

Participants were undergraduate and graduate students enrolled in the fully online course(s) for the first time during spring semester in the 2016-2017 academic year at a Southern

university in the United States. Since 2010-2011 academic year, instructors were encouraged to develop online curriculum and offer more effective online courses with instructional designers' guidance and assistance. Currently, approximately 50 fully online degrees have been offered across disciplines. Furthermore, since summer term in the 2015-2016 academic year, the university has increased the availability and schedule flexibility of online courses during summer terms. This, in conjunction with lowering the online tuition rate, has resulted in a steady enrollment growth of more than 6% in each summer term. Student enrollment data of the present semester in the university's student information system were retrieved and compared with enrollment data during five years prior to determine the list of students who were taking online courses in that semester for the first time at this university. In addition, to facilitate validation of participants' online learning experience, all participants were asked the following question: "Are you taking your first online course?" Only participants who indicated themselves as the first-time online students would receive further survey questions for them to complete. As a result, 1116 students were recognized as first-time online learners at this university and were invited to participate in this study. A total of 254 surveys were returned with a response rate of 23 percent. Of the participating students, 68.9% (n = 176) were female; and 30.7% (n = 78) were male (see Table 1). There were more female students than male students in this study of online learning. Seventy-four participants (29.1%) were in their junior year and the majority of respondents (n = 74, 29.1%) reported being in the 20–24 age range. There were more undergraduate students (85%) than graduate students (15%) in our sample.

Table 1

Demographic Information of Participants (N = 254)

Gender	
Female	176 (68.9%)
Male	78 (30.7%)
Age	
Under 20	54 (21.3%)
20-24	74 (29.1%)
25-29	40 (15.7%)
30-39	45 (17.7%)
40-49	29 (11.4%)
Over 50	12 (4.7%)
Class Level	
Freshman	59 (23.2%)
Sophomore	54 (21.3%)
Junior	74 (29.1%)
Senior	29 (11.4%)
Graduate Students	38 (15.0%)

3.2. Instrumentation

3.2.1. Flexible Thinking in Learning (FTL) Scale

In this study, students' flexible thinking was measured by Barak and Levenberg's (2016b) Flexible Thinking in Learning (FTL) scale that consists of three subscales: Acceptance of new or changing technologies (5 items), Open-mindedness to others' ideas (7 items), and Adapting to changes in learning situations (5 items). The questions included, for example, "I adjust quickly to new learning technologies," and "I do not have trouble getting used to new learning situations." The reliability of the survey in this study was .957, using Cronbach's Alpha, which indicates a strong degree of internal consistency.

3.2.2. Implicit Theories of Intelligence Scale

An 8-item (5 point) Likert-type questionnaire developed by Dweck and her colleagues (2006) was given to the participants to determine their mindset. The questions include, for

example, “You can learn new things, but you can’t really change how intelligent you are,” “No matter how much intelligence you have, you can always change it quite a bit,” and “You can always substantially change how intelligent you are.” The scale displayed acceptable internal consistency (α = .767) in this study.

3.2.3. Online Student Engagement (OSE) Scale

The 19 items OSE Scale was purposely developed to examine the effectiveness of student engagements in online courses and was validated by Dixson (2015). It consists of four subscales: Skills (6 items), Emotion (5 items), Participation (6 items), and Performance (2 items). All items were measured on a 5-point Likert-type scale, ranging from 1 = “*not at all characteristic of me*” to 5 = “*characteristic of me.*” The questions include, for example, “Making sure to study on a regular basis,” and “Finding ways to make the course interesting to me.” The Cronbach's alpha of the scale in this study was 0.948, indicating strong internal consistency.

3.2.4. Self-Efficacy for Learning and Performance Scale

One of the subscales, self-efficacy for learning and performance, in Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & Mckeachie, 1991) was adapted and utilized to measure students’ self-efficacy for learning. MSLQ has been widely adapted and studied, either in its full version that consists of 15 subscales or the form of selected subscales (Duncan & McKeachie, 2005; Holland et al., 2018; Muis, Winne, & Jamieson-Noel, 2007). Holland et al. (2018) conducted a meta-analytic review of reliability estimates (the years from 1991 to 2015) from 295 peer-reviewed journal articles studying MSLQ subscales. Results from 199 alpha coefficients particularly associated with the self-efficacy produced mean reliability scores ranged from .48 to .96. In this study, all eight items were measured by a 7 point Likert-type scale and strong internal consistency was reported (α = .965).

3.3. Data Collection and Analysis Procedures

During the last three weeks of the semester, the *Flexible Thinking in Learning (FTL) Scale*, *Implicit Theories of Intelligence Scale*, and *Online Student Engagement (OSE) Scale* were distributed in an online survey format and a survey invitation letter was sent to students. All scales were expected to take about 20 minutes to complete. IBM SPSS AMOS 24.0 was utilized to conduct the path analysis. The test statistics of good model fit (Hu & Bentler, 1999) included Chi-square (p >.05), Comparative Fit Index (CFI >.95), Root Mean Squared Error of Approximation (RMSEA < .06), and Standardized Root Mean Square Residual (SRMR < .08).

4. Results

First, a confirmation factor analysis (CFA) was conducted to verify the factor structure of a set of observed variables. Item standardized regression weight estimates for the three-factor FTL model revealed ranges of the regression weight from .787 to .861 on the *Open-mindedness in learning* items; from .802 to .876 on the *Learning technology acceptance* items; and from .810 to .937 on the *Adapting to new learning situations* items. All loadings were significant at p < .001 level. Goodness of fit indices of CFA indicated a good fit of the collected data and the model χ^2 (101, N = 254) = 259.34, p = .000, TLI = .947, RMSEA = .079, GFI = .90, CFI = .956 (Hu & Bentler, 1999).

Path model fit tests were done in AMOS and the results of the path analysis indicated good model fit χ^2 (1, N = 254) = 1.13, p > .05, TLI = .997, RMSEA = .023, SRMR = .003, GFI = .999, AGFI = .969 (Hu & Bentler, 1999) as shown in Figure 2.

Table 2 shows the path coefficient for each path along with its significance. An alpha of 0.05 was used as the cutoff for significance and the results from the path analysis supported six

out of the eight hypotheses. Except for H1a: Learning Technology Acceptance → Self-efficacy and H1d: Growth Mindsets → Self-efficacy, all standardized path coefficients have values between 0.14 to 0.31, which are considered medium effect. In addition, this model accounted for 28% of variance for flexible thinking and growth mindsets in explaining self-efficacy and 36% of variance for flexible thinking, growth mindsets and self-efficacy in explaining online student engagement.

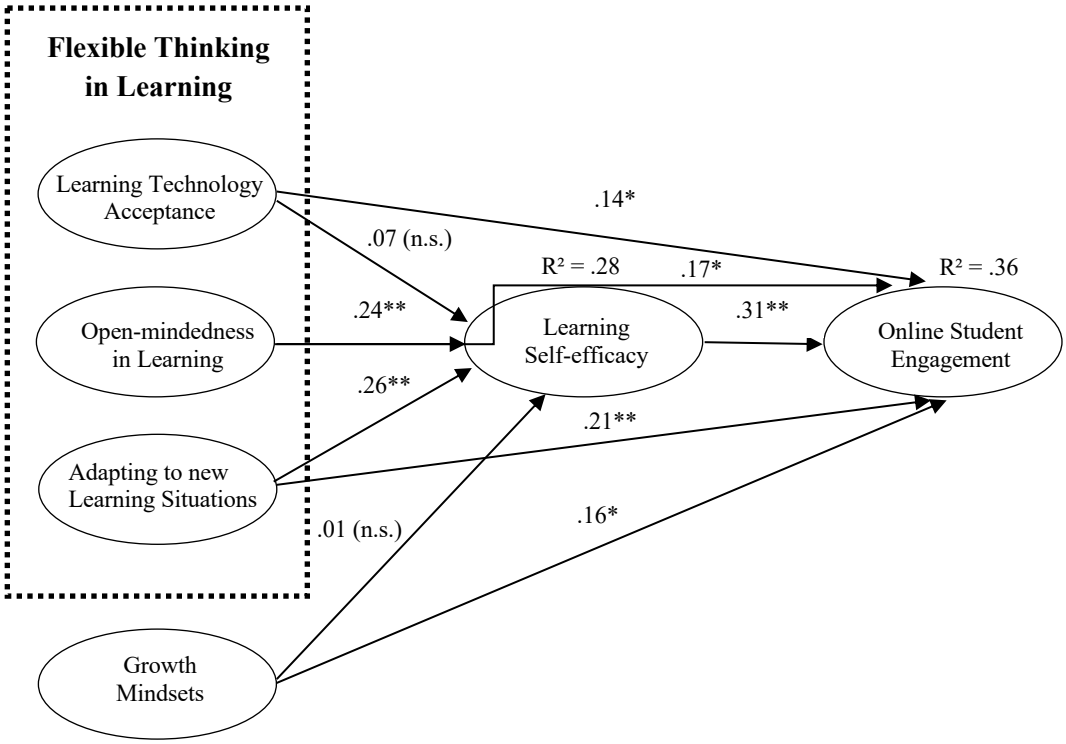

Fig 2. Final path model, * $p < .05$, ** $p < .01$

Table 2

Hypothesis testing results

Hypothesis	Path	Path Coefficient	Results
H1a	Learning Technology Acceptance → Self-efficacy	.07	not support
H1b	Open-mindedness in Learning → Self-efficacy	.24**	support
H1c	Adapting to New Learning Situation → Self-efficacy	.26**	support
H1d	Growth Mindsets → Self-efficacy	.01	not support
H2a	Learning Technology Acceptance → Student Engagement	.14*	support
H2b	Open-mindedness in Learning → Student Engagement	.17*	support
H2c	Adapting to New Learning Situation → Student Engagement	.21**	support
H2d	Growth Mindsets → Student Engagement	.16*	support
H3	Self-efficacy → Student Engagement	.31**	support

Note. * $p < .05$, ** $p < .01$

5. Discussion

This study examined the influence of flexible thinking, mindsets, and self-efficacy for learning on the first-time online students' online learning engagement through path analysis. The findings of this study supported most of our hypotheses. It appears that first-time online learners with high flexible thinking, growth mindsets, and learning self-efficacy are more likely to be engaged in online courses. The hypothesis of a positive relationship between flexible thinking and learning self-efficacy was supported, which is consistent with the findings of previous research (Çelikkaleli, 2014; Martin & Anderson, 2003) where Çelikkaleli's (2014) study investigated the relationship of flexible thinking and learning self-efficacy among high school students and a positive correlation of these two variables was confirmed.

Among three dimensions of flexible learning, "adapting to new learning situations" and "open-mindedness" strongly influence learning self-efficacy; however, "learning technology acceptance" does not have an impact on self-efficacy. It may be due to that the first-time online

students showed similar levels of accepting new or changing learning technologies, which leads to no significant differences in self-efficacy. Contrary to previous studies that postulate growth mindset is positively related to self-efficacy (Dweck, 1999; Komarraju & Nadler, 2013), growth mindset did not significantly influence self-efficacy among first-time online students. This result implies that whether first-time online students believe intelligence is malleable or not did not have an impact on their feeling of self-efficacy towards success for the online course.

We found that flexible thinking and growth mindsets have a significant effect on online students' engagement. These results indicate that first-time online learners with higher levels of technology acceptance and willingness to adapt themselves to new learning circumstances and embrace new challenges or setbacks, show higher engagement in learning. This finding is in accordance with previous studies that state the necessity of possessing flexibility and adaptability skills for students to be more engaged in learning (Howard, Ma, & Yang, 2016; Rashid & Asghar, 2016), and the positive relationship between growth mindsets and engagement (Aditomo, 2015; Hou & Peng, 2016).

As indicated in the literature review, self-efficacy is positively related to learning engagement, and is an important predictor of student academic engagement and success (Levpuscek & Zupancic, 2009; Schunk & Mullen, 2012; Ventura, Salanova, & Llorens, 2015). This result is strongly supported by our study that the more self-efficacious the students are, the more they will possess self-regulated learning habits and mega-cognitive strategies (Sungur & Kahraman, 2011), which, in turn, promote student's engagement and learning. First, goal setting is a powerful process for students to have clear visions on their learning and motivate them for committing efforts in order to accomplish each achievement. Instructors could assist students in

setting specific, attainable, and relevant goals and advise them to review and adjust their learning goals. In addition, role-play simulations involving real-world scenarios can be used to provide students with a great self-assessment opportunity to build and grow their confidence or self-efficacy in learning. In addition, self-efficacy was a mediating variable for the impact of flexible learning on student engagement. First-time online students who had higher confidence in dealing with challenges and problems were more likely to be more engaged in online learning to achieve academic success.

5.1. Limitations

There are several limitations in this study that should be considered. First, we included both undergraduate and graduate students who were first-time learners for online courses at the proposed institution by looking back to the previous record of students' enrollment in last five years prior to their attending to the online course in the semester where the survey was distributed. In addition, a question in the survey was designed to ask whether this is students' first time taking the online course. However, there is a possibility that our study did not rule out the students who had attended a MOOC course or other informal online training, or the students who considered themselves as the first-time online student only at the current institution. Secondly, self-report data were used to measure students' perceived engagement based on one of the instruments or methods for the evaluation of student engagement. The self-report data may not fully capture students' actual engagement in an online course, depending on the instrument that was chosen, which would possibly lead to the bias of the report of student engagement. Thirdly, the sample of this study included the majority of adult learners. We did not distinguish traditional teenage undergraduates or graduates from those who were adult learners at their age

of over 25 years old. Although we targeted the students who took the online course for the first time, these two groups of students may be different in certain ways. In addition, the low response rate of this study (23%) may be due to that some of the students whom we delivered the survey to might not be the true first-time online learners so that they did not choose to participate in the survey. Therefore, our study may not fully capture the students who did not respond but were first-time online students in the university setting. Low response rates may result in a bias of research findings when the other first-time online students within the 75% of the non-respondents were counted. Strategies (providing rewards or gift cards, etc.) to increase the response rate could be applied to increase the response rate of first-time online students to minimize the bias issue from the low response rate. Furthermore, most of the first-time online students who responded were course completers. As the survey was given at the end of the semester, our study did not capture the first-time online students who did not stay until the end of the course. For example, those who withdrew from the class in the middle of a class, or before the survey was distributed to students. Lastly, the proposed model of engagement of first-time online students in this study focused on addressing the effect of flexible thinking, growth mindsets, and self-efficacy on engagement. It may not include other variables that may potentially influence first-time online students' engagement, such as students' prior experience with online courses as well as other factors including students' literacy skills (e.g., computer, Internet, information, etc.). In addition, the self-efficacy that we measured in this study did not take into account different disciplines or subjects of the courses where students were enrolled into, and future studies may consider examining self-efficacy of online students from different disciplines.

6. Conclusion and Implications

6.1. Practical implications

As Clark and Sousa (2018) noted that little focus or studies on the mindsets in higher education, including the preparation of students in online learning readiness and strategy adaption. The study has increased our understanding of first-time online students' flexible thinking, growth mindsets, learning self-efficacy, and online engagement in a four-year university. In addition, we found strong connections between these learner factors. The positive influences of flexible thinking and growth mindsets on online student engagement revealed in this study could provide online instructors with alternative ideas of designing their online courses. As educators, it is our responsibility to know first-time online students' ability to adapt to new learning situations, as it provides information about students' desire to pursue academic success and engagement level. When involved in learning activities, students with growth mindsets emphasize learning goals (becoming smart, improving capabilities) instead of performance goals (looking smart, proving their capabilities) (Dweck, Mangels, & Good, 2006; Rissanen, Kuusisto, Tuominen, & Tirri, 2019), and they tend to see interactive experiences with peers, and engaging in a diverse knowledge sharing situation, as learning opportunities that may benefit their development. The results of this study also indicated that students with growth mindsets are more likely to be engaged in online learning tasks. This might be because they feel more appreciated when instructors provide them with strategic feedback, for example, "The point isn't to get it all right away." "The point is to grow your understanding step by step." "What can you try next?" (Dweck, 2015). Also, instructors guide them with multiple approaches of problem solving (Suh, Graham, Ferranone, Kopeinig, & Bertholet, 2011). This strategy encourages students to focus on the learning process and improvement; thus, they would be persistently

engaged and motivated in their learning. In addition, to engage students with fixed mindset more in the learning process, instructors should consider presenting the course content and ordering assessments in a hierarchical sequence. Thus, they can concentrate on current topics and press past failures to true learning.

No study has investigated first-time online students' flexible thinking and growth mindsets, and very limited research has addressed both variables in online contexts. This study suggests that instructors or course planners should (a) pay attention to first-time online students' skills of adaptability and their perceptions of challenges in online learning, as online learning requires students to be more self-directed and due to the nature of online learning, students may experience uncertainty and insecurity when they first start with online courses; (b) provide information about online learning strategies for first-time online students to increase their confidence in online learning; (c) pay attention to first-time online students' participation in various learning activities and provide feedback and further guidance in a positive way when necessary, especially for those with low self-efficacy; (d) consider providing a growth-mind training workshop for first-time online students to help them understand the characteristics of a growth mindset as well as the actions that they can take to overcome challenges they may encounter in online learning; and (e) assign students who have fixed mindset or growth mindset together into team activities, encourage consensus goals setting at the beginning, and provide opportunities for reflection on their learning processes.

6.2. Future research directions

For future research, we suggest that researchers further examine the relationships between flexible thinking, growth mindsets, self-efficacy, and engagement in online learning

with first-time online students to validate the findings of this study. Specifically, the finding of the non-significant effect of growth mindset on learning self-efficacy should be further investigated through the replication of similar studies in online contexts. Variables such as mindsets and flexible thinking could be collected at the beginning and at the end of the semester to establish a baseline dataset and track the trend of changes as well. Moreover, researchers may consider learning analytics (LA) techniques by using existing data stored in learning management systems (such as time spent on learning tasks, frequency of discussion posts, and frequency of access, etc.) to meaningfully measure online students' engagement. Other variables such as persistence, prior experience with online courses, familiarity with or attitudes toward the course content, as well as technology or literacy skills may be included in the model of online engagement for first-time online students. In addition, researchers may consider compare first-time online students and non first-time online students in terms of engagement and relevant variables. Course design (i.e., problem-based learning, collaborative learning, and gamification, etc.) may be an important factor that contributes to online students' engagement and should be brought into account for future investigations. Due to the low response rate which may cause a bias in the finding of this study, future studies should find ways to increase the response rate to receive a more reliable result that could accurately represent first-time online students.

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