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FACTORS CONTRIBUTING TO STUDENT RETENTION IN ONLINE LEARNING AND RECOMMENDED STRATEGIES FOR IMPROVEMENT: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Aim/Purpose	This systematic literature review investigates the underlying factors that influence the gap between the popularity of online learning and its completion rate. The review scope within this paper includes an observation of possible causal aspects within the non-ideal completion rates in online learning environments and an identification of recommended strategies to increase retention rates.
Background	While online learning is increasingly popular, and the number of online students is steadily growing, student retention rates are significantly lower than those in the traditional environment. Despite the multitude of studies, many institutions are still searching for solutions for this matter.
Methodology	A systematic literature review was conducted on 40 studies published between 2010 and 2018. We established a set of criteria to guide the selection of eligible articles including topic relevance (aligned with the research questions), empirical studies, and publication time frame. Further steps were performed through a major database searching, abstract screening, full-text analysis, and synthesis process.
Contribution	This study adds to expanding literature regarding student retention and strategies in online learning environments within the higher education setting.
Findings	Revealed factors include institutional support, the level difficulty of the programs, promotion of a sense of belonging, facilitation of learning, course design, student behavioral characteristics, and demographic variables along with

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	other personal variables. The recommended strategies identified for improving student retention are early interventions, at-all-times supports for students, effective communication, support for faculty teaching online classes, high-quality instructional feedback and strategies, guidance to foster positive behavioral characteristics, and collaboration among stakeholders to support online students.
Recommendations for Practitioners	Since factors within the open systems of online learning are interrelated, we recommend a collective effort from multiple stakeholders when addressing retention issues in online learning.
Recommendations for Researchers	We recommend that fellow scholars consider focusing on each influential factor and recommendation in regard to student retention in online learning environments as synthesized in this study. Findings will further enrich the literature on student retention in online learning environments.
Future Research	Future research may investigate various data-mining and analytics techniques pertaining to detection and prediction of at-risk students, the efficacy of student support and faculty support programs, and ways to encourage struggling students to adopt effective strategies that potentially engender positive learning behaviors.

Keywords	student retention, online learning, instructional strategies, higher education

INTRODUCTION

Earlier studies consistently reported the popular demands of online courses. In the last decade, there was a 100% increase rate of online course enrollments from 2003 to 2007 (Moore & Fetzner, 2009). Of all students enrolled in higher education in 2013, 32% took at least one online course (Allen & Seaman, 2013). Analysis conducted in 2011 shows that in the 2010-11 academic year, 89 % of four-year colleges and universities offered courses taught fully online, hybrid/blended online, or other forms of distance/non-face-to-face instruction (Parker, Lenhart, & Moore, 2011). The growth has been progressing and is going strong. By Fall 2014, there were 5.8 million online students, which depicts a 7% increase within the previous two years, missing approximately 400,000 traditional students each year between 2012 to 2014 (Allen, Seaman, Pouline, & Straut, 2016). Observing the steady growth, it is not a surprise that online learning was still a trend in 2015. Thus, the number reached 6,022,105 students, and the report revealed that 67.8% of these students preferred programs offered at public universities (Allen & Seaman, 2017). One of the most recent reports in 2018 even discovered 337,000 additional students taking at least one distance course, giving a total of 6,359,121 distance students by Fall 2016 (Seaman, Allen, & Seaman, 2018). To summarize, the growth rate has consistently increased each year: 3.4% in 2013, 3.3% in 2014, 3.9% in 2015, and peaked at 5.6% in 2016.

Online learning holds a wide variety of advantages for learners. First and foremost, online learning provides flexibility which explains the popularity of online course enrollment (Zimmerman, 2012). Some institutions even offer fully online undergraduate programs. Not being restricted by time and location is an attractive invitation for learners to enroll in online courses (Lee & Choi, 2011). The flexibility of online learning allows students to work through their education while being employed at the same time. The employers, nowadays, also support this online learning opportunity since it helps reduce training costs and time away from the office (Appana, 2008). The rapid growth of technology is also helping online learning to expand in enrollment (Lee & Choi, 2011). Technology brings students, who are at different locations, together to interact, collaborate and build a learning community (An & Kim, 2006). Drab-Hudson et al. (2012) commented that students nowadays live with techno-

logical comfort. Therefore, this convenience encourages the use of multiple modes and modalities of learning that reflect the diversity of learner characteristics. Online learning can be friendlier and more accommodating to specific groups of students. For example, introverted students may feel more comfortable contributing to an online discussion rather than speaking up in a face-to-face course. Appana (2008) stated that "the lack of visual cues allows the instructor to treat all students in the same manner" (p. 9).

Despite the popular demand and advantages, online learning has been suffering from low retention rates. With the advent of digital technology and the everlasting changes in online and open learning, educational researchers and practitioners become increasingly interested in student retention as it has been an ongoing challenge for all educational stakeholders. The dropout numbers in online learning environments are reportedly higher than the traditional learning environment. Completion rates in online courses are historically lower, about 8-14%, than in the traditional face-to-face courses (Xu & Jaggars, 2011a, 2011b). Moore and Fetzner (2009) contended that the completion rates in online classes are claimed to be 10-20% lower than in traditional ones, along with graduation rates for undergraduate degree being only 56%. The completion rates for graduate online courses in business statistics and finance are also similar (Terry, 2001). A study performed by Friðriksdóttir (2018) on 43,000 students enrolled in Icelandic Online just recently reconfirmed that the completion rates of blended learning mode were significantly higher than those of other online modes. Specifically, distance programs and self-paced programs were revealed to be less effective in supporting students to complete the courses (Friðriksdóttir, 2018). From an institutional perspective, the online programs at educational institutions with high incompletion rates may be seen as ineffective and therefore become unsustainable (Liu, Gomez, & Yen, 2009; Willging & Johnson, 2009). From the students' perspective, inability to persist through an online course may cause a deterrence from registering an online course in the future (Poellhuber, Chomienne, & Karsenti, 2008).

An additional problem was posed by Moore and Greenland (2017) through the findings revealed from 226 interviews with online students at Australia's largest online education organization. Online students hold multiple responsibilities including occupational commitments. However, these two scholars have found non-supportive policies and procedures among five Australian universities, in which employment-related circumstances were not justifiable to grant an assignment extension. Such a phenomenon represents a serious issue that online learning environments are inadequately designed to meet the needs of online students.

Based on the above-mentioned rationales, there is a need to improve online learner satisfaction and retention (Garratt-Reed, Roberts, & Heritage, 2016; Lee & Choi, 2011; Moore & Greenland, 2017; Murphy & Stewart, 2017; Wuellner, 2013). The systematic literature review investigates underlying factors that influence the gap between the popularity of online learning and its completion rates. The review scope within this paper includes observation of possible causal aspects within the non-ideal completion rates and identification of recommended strategies to increase the rates according to empirical, peer-review articles published from 2010-2018. The outcome of this paper will advocate for administrators, faculty, and support personnel to considerably reflect and augment the current approach for improving the retention rates of online programs. Additionally, we intend to inspire fellow scholars to contemplate the findings while exploring future research opportunities.

CONCEPTUAL FRAMEWORK

In recent years, the definition of online learning has evolved. Aspects influencing the change of the definition revolve around the technologies utilized in online environments and the advantageous flexibility without constrained by temporal and geographical issues. We elaborate the definition that constitutes online learning and the concept about the openness characteristic. Through the lens of systems theory, these aspects are interrelated and thus explaining the openness of online learning environments.

DEFINING ONLINE LEARNING

The term online learning is often used interchangeably with e-learning, Internet learning, distributed learning, networked learning, virtual learning, computer-assisted learning, web-based learning, distance learning and so on. As all these terminologies imply, online learning encompasses the use of a wide variety of electronic media as well as information and communication technologies to achieve educational purposes. Technologies used in online learning typically include the Internet, one-way and two-way transmissions (Allen & Seaman, 2017), and video conferencing. These media are the delivery means that mediate the learners and instructor (Angelino, Williams, & Natvig, 2007; Rovai, 2002). Essentially, in online environments, the learners and the instructor are often geographically isolated; the instructor delivers the instruction via some forms of online delivery platforms and the learners on the other end access learning materials and interact with the instructor through the same virtual means (Anderson, 2008).

Online learning is often characterized as a flexible mode of learning, as it allows for flexibility and easy access to learning materials from anywhere and usually at any time. In comparison to traditional face-to-face learning environments, online learning provides a higher level of flexibility and free access to vast amounts of information, which is powerful (Sitzmann, Kraiger, Stewart, & Wisher, 2006). Online learning enables learners to collapse geographical and temporal barriers and access the most up-to-date and relevant learning materials ubiquitously (Driscoll, Jicha, Hunt, Tichavsky, & Thompson, 2012). Particularly in asynchronous online environments, learners have the free option to learn at their own pace. Using synchronous means, learners can interact with classmates, instructors, and experts in the field. With multiple web technologies, learners are equipped with the abilities to review, revisit the challenging portions of learning materials, and study at their most comfortable time and place.

The annual higher education reports by Babson Survey Research Group and Online Learning Consortium interestingly shifted the definition of online learning to distance education. Respectively in 2013, 2014, 2015, and 2016, the reports defined online courses as "those in which at least 80 percent of the course content is delivered online" (Allen & Seaman, 2013, p. 7 ; 2014, p. 6; 2015, p. 7; Allen et al., 2016, p. 7). While the 2016 report still uses the same definition, the research group began to additionally adopt another definition to signify the temporal, geographic and technology aspects to support the interaction. Hence, the new definition employs a term of distance education, which refers to:

> … education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously. Technologies used for instruction may include the following: Internet; one-way and two-way transmissions through open broadcasts, closed circuit, cable, microwave, broadband lines, fiber optics, satellite or wireless communication devices; audio conferencing; and video cassette. DVDs, and CD- ROMS, if the cassette, DVDs, and CD-ROMS are used in a course in conjunction with the technologies listed above. (Allen & Seaman, 2017, p. 41)

It seems that 2015, in which the survey results were included in 2016, was the year when the transition occurred due to the rise of Massive Open Online Courses (MOOCs) offered to students outside the institution and living in various locations (Allen et al., 2016). The reports published in 2017 and 2018 exclude the earlier definition and adheres to the latter definition (Allen & Seaman, 2017; Seaman et al., 2018). The definition shift implies that the temporal, geographical and technology components in the online learning environments are inseparable factors for promoting the unique learning process in an online environment.

ONLINE LEARNING ENVIRONMENTS AS OPEN SYSTEMS

The systems theory postulates that institutions facilitating online learning is considerably an open system (Davidson-Shiver & Rasmussen, 2006; Davidson-Shiver, Rasmussen, & Lowenthal, 2018). The term system refers to "a set of objects together with relationships between the objects and between their attributes" (Hall & Fagen, 1975, p. 52). The concept has been posited in two types: closed and open systems. The distinct contrast is that the closed system is stable and can withstand any changes occurred in the environment whereas the open system is continuously evolving through the effects from the interrelation amongst entities or sub-systems within its environment (Richey, Klein, & Tracey, 2011). In other words, institutions offering online learning consists of entities that bring influences on the inputs, processes, and outputs involved in the system (Davidson-Shiver & Rasmussen, 2006; Davidson-Shiver et al., 2018).

Davidson-Shivers, Rasmussen, and Lowenthal (2018) listed both the external and internal elements of open educational environments. Specifically, institutions providing online education are affected by external factors like governmental administrators, taxpayers, parents, accrediting agencies and more. On the other hand, the internal elements of open educational environments consist of "administrators, faculty, staff, learners; buildings and other facilities; and organizational policies and procedures" (p.58). Supporting the notion regarding the openness of online learning environments, it was posited that the effectiveness of online learning relies on factors like (1) technology, (2) instructor characteristics, (3) student characteristics (Dillon & Gunawardena, 1995; Leidner & Jarvenpaa, 1995; Volery & Lord, 2000). Similarly, Volery and Lord (2000), as well as Ozkan and Koseler (2009) stated that e-learning includes "a combination of learner, faculty, instructor, technical staff, administrative, learning support and use of the Internet and other technologies" (p. 1286). Thus, the determination of successful e-learning is a shared responsibility among these entities. Table 1 presents the external and internal components of an open system.

Table 1. Internal and External Components of Open Systems

EXTERNAL COMPONENTS	INTERNAL COMPONENTS
Legislatures (governmental administrators)	Institutional administrators*
Taxpayers	Faculty members*
Parents	Staff members or personnel*
Accrediting agencies	Students*
	Building and other facilities
	Organizational policies and procedures

Note. This systematic review explores the issues within the internal aspects of the open systems' factors with an asterisk mark.

The open systems concept is essential in this literature review as it helps disclose some of the factors—such as administrators and technical support, instructor, student, and other support personnel—that are influential to student retention in online learning environments and identify recommended strategies to ameliorate it. Notably, while the general system theory was established decades ago, research adopting this theory as a theoretical framework for investigating student retention in online learning is scarce. As Lee and Choi (2011) stated, "few studies have actually examined the interrelationship among diverse dropout factors" (p. 615). This literature review explored the issues within some of the internal aspects in the open systems, which are (1) institutional factor (support from administrators and staff); (2) instructor factor (referred as faculty); and (3) learner factor (interchangeably referred as student). It is imperative to note, however, that these three factors are also interrelated with the other two factors, such as policies and procedures as well as facilities like technology infrastructure. As a result, the findings may also suggest an association with the two remaining internal factors.

Based on the rationales presented above, the following research questions were formulated to guide our systematic literature review:

1. What are the factors—within the aforementioned internal aspects of the open systems framework—that contribute toward student retention within the online learning environments?
2. What are the recommended strategies for improving student retention in online learning environments?

METHODS

SELECTION CRITERIA

To address the research questions, we established a set of selection criteria:

1. Research must focus on the overall broader concept of online learning in higher education and address issues of one of the three internal factors in the open system theory: (a) institutional factor (also includes administrators and staff members), (b) instructor factor (also referred to faculty) and, (c) learner factor (also referred to student). Published research not addressing these factors was excluded.
2. Research must be empirical, reporting data resulting from actual observations or experimentations. Articles based on personal opinions or anecdotal experiences were excluded. Theoretical and conceptual parts were also excluded from the analysis but were carefully reviewed to strengthen our background knowledge and to broaden the theoretical foundation.
3. Research must be published in peer-reviewed, English-language, academic journals from 2010 through 2018 in order to review the most up-to-date studies and issues on online learning. Papers published in non-peer-reviewed, non-English-language journals, or outside this time frame were excluded.

IDENTIFICATION OF ELIGIBLE STUDIES

We adopted the following identification process implemented by Karabulut-Ilgu, Cherrez, and Jahren (2018) to provide the transparency of article selection and inclusion.

Searching phase

Relevant studies were retrieved through a series of search efforts. Eligible research that meets the selection criteria were then identified. The search was carried out in two stages. First, an initial search was performed in the major databases such as Education Research Complete (n = 11), ProQuest (n = 35), ERIC (n = 8), JSTOR (n = 24), and PsychInfo (n = 15). Keyword searches were conducted using the combinations of "retention," "attrition," "online learning," "online courses," "online strategies," and "higher education." This first searching phase yielded 93 articles.

Second, a further round of search was conducted on Google Scholar to expand the existing pool. Using the same combination of keywords, the search result gained approximately 700 articles in total. However, we identified 71 peer review articles from this second phase of searching. After removing 10 duplicates from the pool of these both rounds, the number of articles expanded to 154 articles in total.

Screening phase

The next phase was screening the current pool of articles to determine the eligibility. This stage served as a function to further identify articles according to the selection criteria. The screening process was performed by reading the abstract. Non-empirical and non-peer-review articles not touching upon student retention in online learning environments within higher education setting were excluded. The abstract screening alone yielded in 38 articles.

Analysis phase

The next step was performed through full-text reading. We found one duplicate and excluded it immediately. We additionally identified a few non-empirical articles and as well as literature that did not discuss issues on student retention in online learning environments. This action resulted in an inclusion of 30 articles from the screening phase.

All articles were organized and tabulated in alignment with the research questions for further analysis. The following factors were analyzed: (a) theoretical or conceptual framework; (b) institutional factors influencing student retention; (c) instructor factors influencing student retention; (d) student internal factors influencing retention; and (e) recommendations for future research. The analysis of the theoretical or conceptual framework was helpful in strengthening our background knowledge. The remaining analyzed factors served the purpose to address the research questions. See Appendix for the table tabulating the aspects analyzed in this study.

During the analysis phase, we identified additional literature by using reference lists and included those that meet the selection criteria. From this action, 11 articles were selected and added to the existing pool. Hence, we were ready to proceed to the synthesis phase. As shown in Figure 1, 40 articles published in 2010-2018 were included.

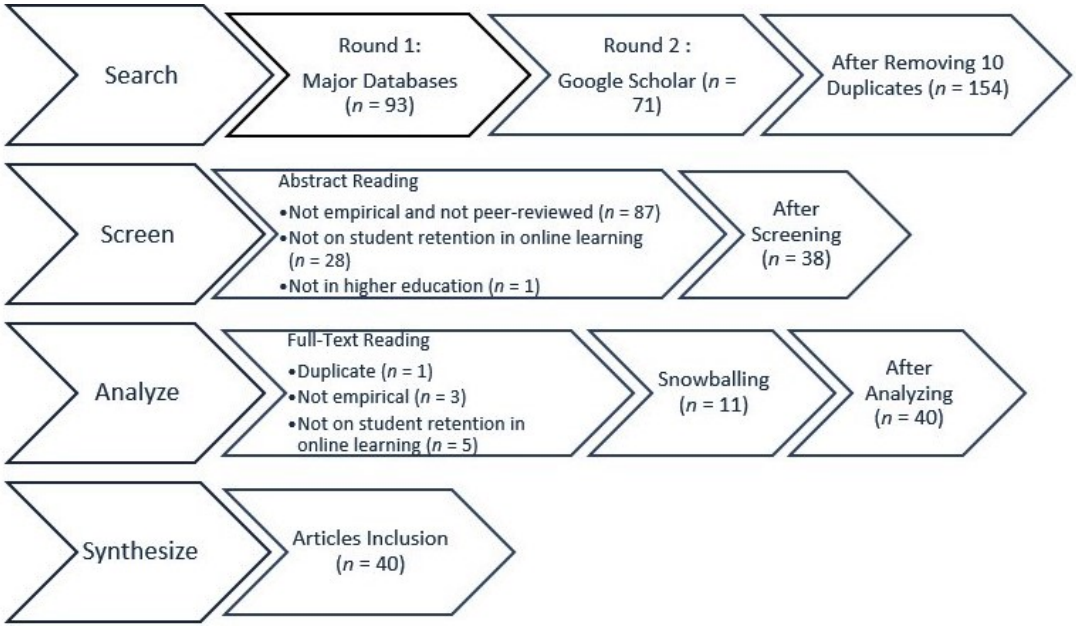

Figure 1. Flowchart for article selection, screening, and analysis phases (adapted from Karabulut-Iglu et al., 2018).

RESULTS

We have discovered salient findings resulting from the systematic review of 40 empirical studies on student retention in online learning environments within a higher education setting. The review performed on the identified articles resulted in the discussion below, which is categorized into two primary topics: (1) factors influencing online student retention—from institutional, instructor, and student levels—and (2) recommended strategies to alleviate the issues.

FACTORS INFLUENCING STUDENT RETENTION: INSTITUTIONAL LEVEL

The first set of results addressing the first research question encompasses influential aspects found at the institutional level. Institutional support and curriculum or program level of difficulty were discovered as essential factors. See Table 2 for the summary.

Table 2. Factors Affecting Online Student Retention at the Institutional Level.

INSTITUTIONAL FACTORS	DETAILED FACTORS
Institutional support	Student support services and online course orientation (Aversa & MacCall, 2013) Tutoring services (Nichols, 2010) Technological support (Parkes, Gregory, Fletcher, Adlington, & Gromik, 2015) Outreach and resources-sharing (Shaw, Burrus, & Ferguson, 2016; Smailes & Gannon-Leary, 2011) Deficient understanding of online students' needs and circumstances (Friðriksdóttir, 2018; Parkes et al., 2015)
Curriculum or program level of difficulty	Too-easy or too-difficult curriculum (Boston, Ice, & Gibson, 2011) Nature of the course such as elective, distributional, or major requirement courses (Wladis & Hachey, 2017) or STEM domain courses (Wladis, Hachey, & Conway, 2014)

Institutional support

Institutional support entailed efforts and services aiming to impact student retention. It may include student support services, online course orientation (Aversa & MacCall, 2013), tutoring services (Nichols, 2010), and technological support (Parkes et al., 2015). Unanimously, institutional stakeholders reached a consensus that support services offered by the institution make a difference in student retention rates. Administrators in higher education affirmed that institutional support is the number-one factor in helping students complete online courses successfully, in addition to fostering student interaction with the institution (Heyman, 2010). Faculty members rated institutional support as the third-top factor influencing student retention, whereas students rated it as the fifth-top factor helping them succeed in online learning (Gaytan, 2015). Although not rating it as high as other stakeholders did, students admitted that the absence of this support made an influence on their academic success (Nichols, 2010). Consequently, students who received tutoring services felt encouraged to persist and believed these services helped them continue their learning journey (Nichols, 2010). Not surprisingly, a study employing an experimental design verified that intervention in the form of outreach and resources sharing engendered lower attrition rates (Shaw et al., 2016).

Despite the awareness about the crucial role of institutional support in promoting student retention, many institutions reportedly could have demonstrated improved efforts in supporting online students. For instance, online gatekeeper courses were designed to deploy common traditional strategies and, thereby, the support provided to online students was not as effective or adequate as the support for on-campus students (Xu & Jaggars, 2011b). Another example, provided by Friðriksdóttir (2018) and Parkes et al. (2015), revealed a lack of understanding from the institution regarding online students' needs and circumstances. Not surprisingly, the technological support provided was insufficient for remote students (Parkes et al., 2015).

Curriculum or program level of difficulty

The difficulty level of the academic program or subject matter was another influential determinant of student retention in online courses. Revealed by Boston, Ice, and Gibson (2011), students tended to drop out when the curriculum or program was found to be too easy or too difficult. Meanwhile, the nature of the course—elective, distributional or major requirement—was an additional predicting

factor to student retention in online learning environments (Wladis & Hachey, 2017). Moreover, lower-level online courses were also at risk of high attrition as Wladis et al. (2014) revealed a positive association between lower-level courses in the Science, Technology, Engineering, and Math (STEM) and attrition rates.

FACTORS INFLUENCING STUDENT RETENTION: INSTRUCTOR LEVEL

The second set of results consists of influential aspects that were found at the instructor level. The primary factors revealed are facilitation of student engagement and promotion of a sense of belonging, facilitation of learning, and course design. Table 3 depicts the summary.

Facilitation of student engagement and a sense of belonging

As reported by Harris, Larrier, and Castano-Bishop (2011), online students expected active facilitation from the instructor to promote students' social interaction. Unlike in a traditional learning environment, online environments did not exhibit obvious spoken and visual cues of communication (Alman, Frey, & Tomer, 2012). As a result, online students felt isolated and unsupported by their peers (Aversa & MacCall, 2013; Hammond & Shoemaker, 2014; Pinchbeck & Heaney, 2017), mainly when there was an expectation for equivalent interaction like in the traditional learning environment (Eliasquevici, Seruffo, & Resque, 2017). Ironically, this negative feeling was also linked to a low sense of community and poor student integration (Aversa & MacCall, 2013), which posed a barrier in breaking the ice among students and consequently influenced their decision in continuing. Analyzing student engagement from the lens of social presence, an aspect of Community of Inquiry (CoI), Alman, Frey, and Tomer (2012) posited that low degree of student engagement was found to be associated with the uncomfortable social presence that could yield a poor sense of community.

Another example of how the sense of community can affect student retention was revealed by Nistor and Neubauer (2010) as well as by Shah and Cheng (2018). Students with a low sense of belonging—or even worse, with no sense of belonging—who usually did not demonstrate active social interaction were likely to be "quiet" during discussions. These students, unfortunately, were inclined to drop out of online classes (Nistor & Neubauer, 2010). When students intended to participate, they reportedly felt intimidated by the dominantly active classmates (Alman et al., 2012), which unfortunately undermined the intent to participate and thereby affecting the sense of belonging.

Facilitation of learning

Effective facilitation served as a bridge between deep learning and student engagement (Alman, et al. 2012). Students appreciated instructor presence to foster their knowledge acquisition and mediate the engagement with other students in meaningful dialogues (Alman et al., 2012). In essence, from the perspective of CoI, instructor presence was a mediacy for connecting cognitive presence and social presence. In relation to student retention phenomenon, the guidance provided by the instructor to the class towards understanding course topic was found to be a predictor of low enrollment (Ice, Gibson, Boston, & Becher, 2011).

We found an agreement among stakeholders regarding this factor. Both administrators and faculty nominated the quality of faculty and student interactions as the second highest factor leading to student retention (Gaytan, 2015; Heyman, 2010). Likewise, students hoped to receive effective communication from the instructor (O'Neill & Sai, 2014), including adequate feedback for learning (Shah & Cheng, 2018). Assignment type could also be a factor affecting students' decision to continue the course. It was discovered that online students were not in favor of group assignments due to a lack of personal interaction with the instructor (Fredrickson, 2015; Garratt-Reed et al., 2016). Not surprisingly, time spent by the instructor during course facilitation also contributed to student retention to an extent, as noted by Wuellner (2013).

Table 3. Factors Affecting Online Student Retention at the Instructor Level.

INSTRUCTOR FACTORS	DETAILED FACTORS
Facilitation of student engagement and promotion of a sense of belonging	Absent verbal and visual cues (Alman, Frey, & Tomer, 2012) Isolated and unsupported students (Aversa & MacCall, 2013; Hammond & Shoemaker, 2014; Pinchbeck & Heaney, 2017) Expectation of equivalent engagement as in traditional environment (Eliasquevici, Seruffo, & Resque, 2017). Low social presence (Aversa & MacCall, 2013) leading to a poor sense of belonging and passive engagement (Alman et al., 2012; Nistor & Neubauer, 2010; Shah & Cheng, 2018) Insufficient promotion of student interaction (Harris, Larrier, & Castano-Bishop, 2011; Nistor & Neubauer, 2010)
Facilitation of learning	Inadequate instructor presence for fostering knowledge acquisition and mediating meaningful engagement (Alman et al., 2012) including instructor's time investment during course facilitation (Wuellner, 2013) Lack of instructor guidance for promoting topic understanding (Ice, Gibson, Boston, & Becher, 2011) Low quality of interaction between instructor and students (Gaytan, 2015; Heyman, 2010) and inadequate feedback to learning (Shah & Cheng, 2018) Ineffective communication from instructor (O'Neill & Sai, 2014) Assignment types along with lack of personal interaction with instructor (Fredrickson, 2015; Garratt-Reed et al., 2016)
Course design	Lack of course organization, illogical course structures (Hammond & Shoemaker, 2014; Ice et al., 2011), and difficult-to-locate materials (Hammond & Shoemaker, 2014) Uninteresting and irrelevant course elements (Garratt-Reed et al., 2016; Harris et al., 2011; Pittenger & Doering, 2010) Vague expectations (Hammond & Shoemaker, 2014; Harris et al., 2011).

Course design

Course design and organization were also among the predictors of student satisfaction which affected students' decision to withdraw from the class (Ice et al., 2011). Ice and colleagues (2011) further signified the value of course design and organization in promoting cognitive presence. Scaffolding incorporated in course design resulted in attractive, interesting, and relevant learning elements that foster student motivation (Pittenger & Doering, 2010). In fact, students expressed an appreciation towards instructional guidance demonstrated through interactive materials (Garratt-Reed et al., 2016; Harris et al., 2011), clear instructions, logical course structure, unambiguous label on course elements and findability of instructional materials (Hammond & Shoemaker, 2014; Harris et al., 2011).

FACTORS INFLUENCING STUDENT RETENTION: STUDENT LEVEL

The third set of results involves determinants found at the student level. The determinant factors discovered from the review are behavioral characteristics, demographic variables, and other personal variables. The summary is displayed in Table 4.

Behavioral characteristics

Behavioral characteristics contributed to sustainable persistence that led to academic achievement and improved student retention (Cochran, Campbell, Baker, & Leeds, 2014; Wladis et al., 2014). These characteristics include (a) self-regulation (Gomez, 2013; Lee, Choi, & Kim, 2013; O'Neill & Sai, 2014), metacognition (Lee et al., 2013), self-discipline (Gaytan, 2015), and self-efficacy (Gomez, 2013); (b) locus of control, learning strategies, satisfaction, and flow experience (Lee & Choi, 2013); and (c) clear goals, college readiness and technological skills (Shaw et al., 2016). Gomez (2013) confirmed that students' perseverance to complete was another determinant of student retention as this behavior was associated with self-regulation and self-efficacy. In essence, students possessing a determination to complete and pass the course were likely to remain in an online program (Nichols, 2010). Thus, students taking career-related STEM courses—those who knew the career path to pursue—were inclined to continue than those taking general STEM courses (Wladis et al., 2014). Interestingly, time management was also another predictor (Leeds et al., 2013). As Leeds et al. (2013) revealed, a miscalculation or mis-expectation of time required for completing the workload in an online course could influence students' decision to withdraw.

Demographics variables

Demographic variables were additionally revealed amongst factors leading to student retention (Aversa & MacCall, 2013; Raju & Schumacker, 2015; Colorado & Eberle., 2010; Traver, Volchok, Bidjerano, & Shea, 2014; Wladis & Hachey, 2017), although the results were found mixed. For example, younger students were discovered to be comfortable with in-person guidance and hence might lack online learning readiness and skills (Wuellner, 2013). Inversely, older students reportedly tended to perform better and likely to retain, according to Wladis, Conway, and Hachey (2015) who studied student retention phenomenon in online STEM courses. In terms of class standing, non-seniors were inclined to withdraw from online courses than those in senior status (Cochran et al., 2014). However, the year status did not reliably predict retention in a study performed by Traver, Volchok, Bidjerano, and Shea (2014). The mixed results were explained by a possible rationale regarding specific strong traits associated with academic success that were possessed by students regardless of their age (Colorado & Eberle, 2010; Wladis et al., 2015, 2014). Prediction through genders also yielded mixed results. While women might be worse in online courses in STEM fields (Wladis et al., 2015), there also existed a likelihood of men withdrawing from online courses (Cochran et al., 2014). Therefore, Eliasquevici et al. (2017) believed that genders were not necessarily associated with student retention in online learning environments.

Table 4. Factors Affecting Online Student Retention at the Student Level.

STUDENT FACTORS	DETAILED FACTORS
Behavioral characteristics	Self-regulation (Gomez, 2013; Lee, Choi, & Kim, 2013; O'Neill & Sai, 2014),
	Metacognition (Lee et al., 2013)
	Self-efficacy (Gomez, 2013; Ice et al., 2011)
	Self-discipline (Gaytan, 2015)
	Student motivation (Blau, Drennan, Hochner, & Kapanjie, 2016)
	Locus of control, learning strategies, learning satisfaction, and flow experience (Lee & Choi, 2013)
	Clear goals, college readiness and technological skills (Shaw et al., 2016)
	Self-determination (Nichols, 2010; Wladis et al., 2014)
	Time management (Leeds et al., 2013)
Demographics variables	Age (Wladis, Conway, & Hachey, 2015; Wuellner, 2013)
	Academic standing (Cochran, Campbell, Baker, & Leeds, 2014) but Traver, Volchok, Bidjerano, and Shea (2014) revealed mixed findings
	Genders (Wladis et al., 2015) but Cochran et al. (2014) and (Eli-asquevici et al., 2017) posed an opposite argument
Other personal variables	Family support, home environment and time management (Harris et al., 2011).
	Family responsibilities (Nichols, 2010; Parkes et al., 2015; Shah & Cheng, 2018; Xu & Jaggars, 2011b)
	Job employment and responsibilities (Aversa & MacCall, 2013; Moore & Greenland, 2017; Shah & Cheng, 2018)
	Financial issues (Aversa & MacCall, 2013; Boston et al., 2011; Parkes et al., 2015), but findings are mixed (Cochran et al., 2014)
	Life issues related to health and disability (Shah & Cheng, 2018)
	Grades and GPA (Boston et al., 2011; Cochran et al., 2014; Stewart, Mallery, & Choi, 2013; Colorado & Eberle, 2010), however, Hachey, Wladis, and Conway (2013) revealed contra-dicting results
	Perceived ease-of-use on technology (Blau et al., 2016)
	Technology limitations (Parkes et al., 2015).

Other personal variables

Students confessed that other domestic variables such as family support, home environment, and time management affected their online learning performance (Harris et al., 2011). Substantially, some first-generation college students faced retention issues (Xu & Jaggars, 2011b). Withdrawing from the online program due to family responsibilities (Xu & Jaggars, 2011b) was the number-two reason af-

firmed by online students, following the difficulty to manage time as the first reason (Nichols, 2010). Holding multiple responsibilities and time management were admittedly an issue for online students. Students usually worked part-time or even full-time (Aversa & MacCall, 2013), necessitating them to balance all demands between job and college tasks. Unsurprisingly, part-time students were more likely to withdraw (Boston et al., 2011). Furthermore, the unanticipated changing workload was confirmed to be another reason why students withdrew from online courses (Moore & Greenland, 2017). More confessions were expressed that online students barely had time to study due to busy lifestyles (Boston et al., 2011; Nichols, 2010).

Amidst the busy life and multiple responsibilities, finance was also a contributing issue (Aversa & MacCall, 2013; Boston et al., 2011). Many online students paid the tuition fees out of pocket (Aversa & MacCall, 2013). It was considered as an additional responsibility and thereby causing a financial issue that influenced the decision to continue (Boston et al., 2011). Interestingly, one study revealed mixed results, in which students receiving financial aid were likely to withdraw except those in education majors (Cochran et al., 2014). This study additionally found that students with loans were inclined to withdraw from an online class if they were majored in education, science or math and social science.

GPA and grades were also among the predictors of online attrition. However, predictions using these variables have received controversy. Scholars generally agreed that students with a history of low grades and GPA were more likely to withdraw (Boston et al., 2011; Cochran et al., 2014; Stewart et al., 2013; Colorado & Eberle, 2010; Xu & Jaggars, 2011b), whereas others posed a different perspective. For instance, one study found that restricting students with a GPA below 2.0 from registering an online class displayed no statistically significant differences in online attrition (Hachey et al., 2013). This research team presented a comparison between the attrition rate of online and traditional programs through a classification of GPAs. It was discovered that the ratio of online versus face-to-face withdrawal rates occurred with students receiving a GPA below 2.0 was, in fact, the lowest ratio compared to that with a GPA between 2.0 and 3.5. Despite mixed findings, both faculty and students, nonetheless, rated GPA and grades among the top-five factors influencing student retention in online learning environments (Gaytan, 2015). Other than the aforementioned variables, technology challenges such as limited access technology and Internet speed, further contributed to a low online course completion rate as discussed by Parkes, Gregory, Fletcher, Adlington, and Gromik (2015).

RECOMMENDED STRATEGIES FOR IMPROVING STUDENT RETENTION IN ONLINE LEARNING ENVIRONMENTS

Several recommendations were identified from the reviewed studies, primarily requiring support to faculty and students. Table 5 contains a summary of recommended tactics for improving student retention.

Early interventions targeting students

A "catch them early" theme emerged frequently as a leading recommendation. Mining and analyzing pre-college and beginning-semester data is useful in identifying and predicting at-risk students (Raju & Schumacker, 2015; Colorado & Eberle, 2010). Findings gained from the analysis are beneficial for informing decision-making to establish policies, procedures, criteria, and resources (Haydarov, Moxley, & Anderson, 2013). Specifically, this decision-making action can be targeted to engage and coach students (Boston et al., 2011; Cochran et al., 2014; Hachey et al., 2013) and to develop resources for improving student retention (Xu & Jaggars, 2011b). Resources are aimed to assist students who pose signs of struggling (Shah & Cheng, 2018), such as freshmen (Wladis et al., 2015), those who have withdrawn from an online class (Cochran et al., 2014), and those enrolling in course(s) with high attrition rates (Wladis & Hachey, 2017; Wladis et al., 2014). Another early intervention is applicable through the development of entrance orientations covering topics in regard to college readiness, learning strategies, self-discipline, time management, self-efficacy, technological skills and expectation

pertaining to online learning (Eliasquevici et al., 2017; Gaytan, 2015; Hachey et al., 2013; Ice et al., 2011; Lee et al., 2013; Wuellner, 2013). As aforementioned, these student characteristics were found to be positively linked to the retention rates.

Table 5. Summary of Recommended Strategies for Student Retention Improvement.

RECOMMENDED STRATEGIES	DETAILED STRATEGIES
Early interventions targeting students	Early assessment of students' prior knowledge and behavioral characteristics to inform decision making in deploying interventions and ongoing progress monitoring (Lee et al., 2013; Nistor & Neubauer, 2010)
	Use of early alert system (Shaw et al., 2016)
	Mining and analyzing pre-college and early semester data (Raju & Schumacker, 2015; Colorado & Eberle, 2010)
	Establishing policies, procedures, practices, and resources for maximizing student success (Boston et al., 2011; Cochran et al., 2014; Hachey et al., 2013; Haydarov, Moxley, & Anderson, 2013; Xu & Jaggars, 2011b)
	Focusing on at-risk students (Shah & Cheng, 2018) such as freshmen (Wladis et al., 2015), those who previously withdrew from online courses (Cochran et al., 2014), and those enrolled in courses with high attrition rates (Wladis & Hachey, 2017; Wladis et al., 2014)
	Entrance orientations on online learning readiness, learning behaviors, and technological skills (Eliasquevici et al., 2017; Gaytan, 2015; Hachey et al., 2013; Ice et al., 2011; Lee et al., 2013; Raju & Schumacker, 2015; Wuellner, 2013)
At-all times support for students	In-depth understanding about students' perceptions of online learning (Pittenger & Doering, 2010)
	On-going research through collection of data from large-size online classes to analyze learning progress and design suitable interventions (O'Neill & Sai, 2014)
	Active communication and outreach (Aversa & MacCall, 2013; Smailes & Gannon-Leary, 2011)
	Technology support (Aversa & MacCall, 2013; Blau et al., 2016; Eliasquevici et al., 2017)
	Tutorial, counseling or advising services, and remedial programs (Boston et al., 2011; Eliasquevici et al., 2017; Gaytan, 2015; Heyman, 2010)
	Ongoing improvement of student services and policies and procedures (Moore & Greenland, 2017; Nichols, 2010)

Support for faculty	Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, high quality feedback, appropriate delivery methods and technology (Alman et al., 2012; Blau, Mittal, Schirmer, & Ozkan, 2017; Boston et al., 2011; Gaytan, 2015; Harris et al., 2011; Parkes et al., 2015) Instructional design assistance for designing and developing courses that provides educational scaffolding (Boston et al., 2011; Fredrickson, 2015; Garratt-Reed et al., 2016; Leeds et al., 2013; Pittenger & Doering, 2010) Technological assistance (Boston et al., 2011; Parkes et al., 2015) Peer-mentoring program among instructors who teach online students (Parkes et al., 2015)
Active interaction between instructor and students	Maintain weekly interaction, including weekly email prompts (Boston et al., 2011; Pittenger & Doering, 2010) Clear expectations (Heyman, 2010) Immediate, meaningful feedback (Gaytan, 2015; Heyman, 2010; Shaw et al., 2016)
Sound pedagogy course design and delivery	Course orientation (Eliasquevici et al., 2017) Multimodal instructions through various facilitation and materials (Parkes et al., 2015; Stewart et al., 2013) Interactive and motivational instructional materials (Garratt-Reed et al., 2016; Ice et al., 2011) Employment of collaborative learning (Eliasquevici et al., 2017) Responsive, meaningful feedback (Fredrickson, 2015) Recognition of individual students' contribution to group assignments (Fredrickson, 2015) Special make-up assessments or timeline extension for accommodating not only medical and personal circumstances but also work-related issues (Moore & Greenland, 2017) Consideration to allow assignment resubmission or revision for increasing the quality of students' work (Pinchbeck & Heaney, 2017)
Fostering synergy among stakeholders	Encouraging advisors to communicate with students (Harris et al., 2011; Shaw et al., 2016) Promoting collaboration between faculty and advisors (Shaw et al., 2016) Administrators to solicit insights from advisors and faculty (Aversa & MacCall, 2013; Leeds et al., 2013) Peer-mentoring among online students to promote their engagement(Smailes & Gannon-Leary, 2011)

In line with the "catch them early" spirit, an early measurement for identifying students' prior knowledge and behavioral characteristics provides a clue for deciding on proactive intervention appropriately and necessarily (Lee et al., 2013; Nistor & Neubauer, 2010). Means to track students' progress using an early system (Shaw et al., 2016), typically found in the Learning Management System (LMS) should be pursued. The results of early measurements are helpful in guiding the instructor and/or advisor to detect possible forthcoming issues throughout the course term (Nistor & Neubauer, 2010).

At-all-times support

Maintaining continuous engagement with students, at-all-times or ongoing support is brought up as one of the top recommendations. The support entails institutional active communication—social media is an effective channel (Aversa & MacCall, 2013; Smailes & Gannon-Leary, 2011),—technological support including robust course management system and convenient access to technological tools (Aversa & MacCall, 2013; Blau et al., 2016; Eliasquevici et al., 2017). Tutoring centers, counseling or advising services, remedial programs (Boston et al., 2011; Gaytan, 2015; Heyman, 2010), and financial assistance (Aversa & MacCall, 2013) are essential as well and should be equivalently accessible to online students (Eliasquevici et al., 2017). It is also imperative to consider deploying ongoing efforts to improve student services and policies and procedures that can flexibly accommodate online students (Moore & Greenland, 2017; Nichols, 2010).

Support for faculty

An additional theme emerged is institutional support offered to faculty members. In the spirit of sustaining equal quality between online and traditional environments, institutions should actively invite the faculty members to participate in professional development programs, such as training and workshop sessions (Blau et al., 2017; Gaytan, 2015; Harris et al., 2011). The intent of this professional development is for encouraging faculty to consult with pedagogical theories linked to effective online learning—CoI is an example (Alman et al., 2012)—and theoretical background on student engagement and retention (Boston et al., 2011). Other topics include an understanding online students' needs (Harris et al., 2011), promotion of dynamic class dialogue along with the use of meaningful feedback (Gaytan, 2015), and employment of best-appropriate delivery methods as well as adoption suitable technology (Parkes et al., 2015). Instructors who have gone through this kind of professional development and have taught online can be paired up with soon-to-be online instructors (Parkes et al., 2015). Through this peer-mentoring program, the support given is more meaningful and relevant since it derives from those who have experienced it.

Another essential faculty support takes form in instructional design and technological assistance (Blau et al., 2017), which reinforces the application of the key points gained from the professional development through course design and development practices (Boston et al., 2011). While receiving the assistance, faculty members have further opportunity to discuss any technological issues with the support personnel for enhancing their decision-making on selecting appropriate online delivery means (Parkes et al., 2015). The collaborative effort yields effective course structure, engaging instructional materials (Garratt-Reed et al., 2016; Leeds et al., 2013) and well-designed assignments (Fredrickson, 2015) as these elements are beneficial in scaffolding motivation and active learning. In line with active learning principles, students receiving such scaffolding will likely be able to control their own learning and sustain their motivation (Pittenger & Doering, 2010).

Active interaction between instructor and students

As aforementioned, active interaction between instructor and students was rated as one of the most influential factors stirring online student retention (Gaytan, 2015; Heyman, 2010). Supporting this notion, one study verified that instructors maintaining their weekly interaction with students made an impact on student satisfaction and perceived learning (Boston et al., 2011). Such an active communi-

cation takes fold in clear expectations (Heyman, 2010), immediate and meaningful feedback (Gaytan, 2015; Heyman, 2010; Shaw et al., 2016), and weekly email prompts (Pittenger & Doering, 2010). Put simply, active communication helps collapse the distance between instructor and students (Pittenger & Doering, 2010). Hence, based on our review results, instructors are recommended to maintain active interaction with online students.

Sound pedagogy delivery strategies

Employment of sound pedagogy delivery strategies is also among the recommendations. One strategy is by conveying expectations and responsibilities pertaining to online learning through a course orientation early in the semester (Eliasquevici et al., 2017). Since students' background and needs may vary, it is further suggested for the instructor to adopt multimodality when facilitating the instructions (Stewart et al., 2013). Motivating instructional materials with high-level interaction, such as by using multimedia, serves this purpose (Garratt-Reed et al., 2016) in addition to triggering intellectual curiosity (Ice et al., 2011). If collaborative learning is employed for aiming the promotion of student engagement and sense of community (Eliasquevici et al., 2017), it is also essential for instructors to be actively responsive in providing feedback (Fredrickson, 2015). In project groups, personalized feedback recognizing individuals' contributions is helpful in encouraging students to monitor their own progress (which is also known as a behavior impacting student persistence), in addition to giving group feedback (Fredrickson, 2015). Further, it is important to note again that online programs are attractive to working professionals due to the flexibility and thus many online students usually have a steady job. Therefore, an establishment of assessment policies should consider providing learner flexibility, such as by allowing special make-up assessments or timeline extension for accommodating not only medical and personal circumstances but also work-related issues (Moore & Greenland, 2017).

Fostering the synergy among stakeholders

Retention issue is quite complex, and it takes a collaboration to address it. While the institutions are recommended to remain encouraging advisors to actively communicate with students (Harris et al., 2011; Shaw et al., 2016), fostering collaboration between advisors and faculty in co-supporting students is recommended as well (Shaw et al., 2016). Further, administrators may consider soliciting information from advisors and faculty and using it to inform the decision-making about improvement ideas pertinent to online programs (Aversa & MacCall, 2013). Through this collaboration, policies can be established according to real-setting observations and consequently help maximize academic success (Leeds et al., 2013). As far as the synergy among online students, student peer-mentoring program was additionally recommended to be helpful in providing guidance on online learning strategies and course expectations especially to the new students (Harris et al., 2011).

DISCUSSION

This systematic literature review was aimed to explore the underlying factors influencing the gap between the popularity of online learning and its completion rate. We additionally sought insights in regard to recommended strategies pertinent to improving student retention in online learning. By reviewing 40 empirical and peer-reviewed articles published from 2010 to 2018, we have found that interrelated entities in the open systems or environments have an influence on student retention phenomenon in online learning and can work together in making improvements.

FACTORS INFLUENCING STUDENT RETENTION: INSTITUTIONAL LEVEL

As far as the influence analyzed through the lens of the institutional level, our review has engendered two primary factors. Firstly, institutional support—such as student services, entry orientation, technology support, and outreach programs—is shown to be a top factor impacting student retention in online learning environments. We detected a few explanations as to why institutional support holds an essential key in improving student retention. Online students coming to higher education envi-

ronments are in need to be prepared in regard to online learning readiness. Unfortunately, the reality oftentimes exhibits the opposite state. In many cases, online students entering college are not ready for college-level tasks (Xu & Jaggars, 2011b). Another explanation is that online students may not live on-campus or nearby. Therefore, there is an imperative need to conquer geographical and temporal barriers (Driscoll et al., 2012). Additionally, online students also expect an equivalent experience as that of on-campus students (Eliasquevici et al., 2017) albeit the geographical and time differences. This notion indicates that there is always room for improvement in terms of policies and procedures of how institutions provide the support so that online students will receive equal and flexible access to campus services, entry orientation, advising, tutoring, technology support, and outreach programs to promote their academic success as we agree with Moore and Greenland (2017).

Secondly, students are inclined to leave the online program if there are many low-level, easy assignments, or if the program curriculum is too difficult, confirming an earlier study by Willging and Johnson (2009) who investigated factors influencing students' decision to drop out of online courses. The fact that online students decide to un-enroll if the curriculum is found to be too easy or too complicated demonstrates that they wish for a "just-right" curriculum for meeting their current learning needs. To reiterate, this is in line with their circumstances in which many of them hold multiple responsibilities between family, work, and education (Willging & Johnson, 2009; Xu & Jaggars, 2011b). In essence, they take online classes to meet an urgent need necessitated for competing in the professional world, as employers generally support this type of learning opportunity in an effort to enhance performance outcomes through cost-effective and efficient ways, as stated by Appana (2008).

Aside from the two abovementioned institutional factors, it is further noted that the number for retention rates for online learning environments may be concluded incorrectly. Some institutions label the on-leave students, those who do not enroll in classes without giving notice, with a dropout status. Paradoxically, considering their multiple responsibilities, some students may work through an online program in a non-typical fashion (Haydarov et al., 2013). In their study report, Haydarov, Moxley, and Anderson (2013) signified a false interpretation of retention-related terms, resulting in misleading outcomes. This misuse of terms did not take account of students who came back at a later time. It has also been affirmed that on-leave status is not an indicator of unsuccessful academic achievement (Haydarov et al., 2013). There appears a notion in regard to the inconsistent use and interpretation of the term retention among institutions offering online programs. This example serves as a reminder for higher-education institutions to carefully define the scope and parameters for measuring retention before examining the causal factors and determining any improved interventions.

FACTORS INFLUENCING STUDENT RETENTION: INSTRUCTOR LEVEL

From our review, we have found pedagogical-related aspects among the most prominent factors affecting the effectiveness of online learning, such as facilitation of student engagement and sense of belonging, facilitation of the instructions, and course design. Characteristics found in the instructors, such as in the pedagogical aspect, additionally contribute to student retention outcomes. Many online students are aware that the instructional strategies deployed in the course, in fact, encourage students to remain persistent (Nichols, 2010). It is not a surprise that students receiving strategic instructional intervention are inclined to complete the course successfully (Pittenger & Doering, 2010). In other words, the effective didactic strategies deployed during instructions—instead of the learning mode such as online, blended or traditional—are believed to impact the learning success (Xu & Jaggars, 2011b). The strategic pedagogy should be well-planned to catch the early leavers and carried out at all times to help online students retain (Nistor & Neubauer, 2010) since drop-outs peaks at the beginning of the course term but remain occurring throughout the course term. Simply put, online pedagogy holds a vital role in driving the course completion (Nistor & Neubauer, 2010).

Factors Influencing Student Retention: Student Level

Students have a pre-existing preference of course delivery mode (Blau et al., 2017). There indicates a prior conception of online learning. Specifically, student perceptions toward enrollment of online courses are influenced by perceived ease of technology use, motivation and new learning opportunity (Blau et al., 2016). Amidst these aspects, student motivation is the greatest (Blau et al., 2016) since it helps sustain their persistence to complete online courses (Eliasquevici et al., 2017; Shaw et al., 2016). It does not imply that students in traditional learning environments are unmotivated. There seems to be a fear among these students that online courses are demanding and that they are afraid of the risks of not being able to keep up with online learning tasks, as confirmed by O'Neill and Sai (2014). This phenomenon conveys that students have an extent of awareness in regard to proper strategic planning and learning tactic needed for successfully completing online courses. One possible explanation is that they may have insufficient other determinant characteristics such as self-regulation and perseverance. It is also plausible that they lack guidance in finding and deploying suitable learning strategies. As Keller and Deinmann (2018) affirmed, "motivation to learn is promoted and maintained when learners employ volitional (self-regulatory) strategies to protect their intentions" (p. 81).

Recommended Strategies for Improving Student Retention in Online Learning

This study has also synthesized the recommended strategies regarding how to improve student retention in online learning environments. Our findings suggest that administrators, together with other personnel, should consider employing proactive actions such as analyzing pre-college and early semester data to detect any students and areas in need of interventions. Oftentimes, these data are readily available but rarely utilized (Li, Bao, & Xu, 2017; Macfadyen, Dawson, Pardo, & Gašević, 2014). Consequently, the advantages have not been fully recognized (Muljana & Placencia, 2018). By using an analytics technique, the data can reveal patterns associated with student characteristics and learning outcomes—such as those who have withdrawn from a class and/or who are enrolling in the courses with high incompletion rates. Potentially, the analysis results are helpful in generating policies, procedures and resources (Haydarov et al., 2013), such as outreach programs targeted to those students with higher risks and professional development for faculty teaching courses with high attrition rates. Student services, enrichment programs, and support targeted to foster positive learning behaviors are also useful in promoting student retention in online learning environments as we have discussed student traits associated with academic success. In terms of offering professional development, administrators should consider collaborating with other faculty and staff, who possess particular expertise in providing programs like training, workshop, and consultation related to pedagogical strategies for facilitating effective online learning and fostering positive learning behaviors.

Overall, the findings are in a coherence with the Open Systems framework, verifying that an open system is continuously evolving through the effects from the interrelation amongst entities or subsystems within its environment (Richey et al., 2011). We have highlighted the role of internal entities—administrators, faculty, support personnel, and students—within open systems of online learning in identifying the issues and appropriate interventions. Moreover, the findings have confirmed that the identified entities can contribute to improving retention and student success. Additionally, the aforementioned interrelated factors are in line with an earlier systematic literature review by Lee and Choi (2011) that factors from students, course/program, and environment influence each other. As confirmed by Lee and Choi (2011)—while citing Holder (2007), Morgan and Tam (1999), and Perry, Boman, Care, Edwards, and Park (2008), — "it is the interaction of numerous factors that eventually lead to a student to complete or not complete a course" (p. 615).

The key findings in regard to the importance of active communication, engagement, and instructional guidance convey a message that learning is social in nature (Lei, 2010; McDonald, 2011; Meltzoff, Kuhl, Movellan, & Sejnowski, 2009; Wigfield, 1997). While students' behavioral traits and variables can predict academic success, we reiterate that other entities, such as administrators, faculty and sup-

port personnel or staff members can help students perform and achieve better. There indicates an important notion of shared responsibilities amongst these entities. Addressing issues around student retention in online learning is a multifaceted matter that requires a collective effort from both international and external entities. For example, early interventions (Lee et al., 2013; Nistor & Neubauer, 2010; Raju & Schumacker, 2015; Shaw et al., 2016; Colorado & Eberle, 2010), ongoing support for students (Aversa & MacCall, 2013; Moore & Greenland, 2017; Nichols, 2010; Smailes & Gannon-Leary, 2011), and support for faculty and collaborative efforts all require synergies from multiple stakeholders (Aversa & MacCall, 2013; Harris et al., 2011; Leeds et al., 2013; Shaw et al., 2016; Smailes & Gannon-Leary, 2011). A dedicated investment in these areas also involves revisiting existing policies and procedures as well as refining the facilities like technology infrastructure (Aversa & MacCall, 2013; Blau et al., 2016; Eliasquevici et al., 2017).

CONCLUSION

Guided by the Open Systems framework, the current review has engendered a confirmation that influential factors driving online student retention are found at multiple entities within the open systems of online learning: administrators, instructors, personnel, and students. Equally, these entities hold a vital role in contributing to improvements and success. Institutional support and curriculum level of difficulty found at the institutional level were revealed to be influential in stirring the online retention. Investigated through the instructor factor, we identified further influences: (1) facilitation of student engagement and promotion of a sense of belonging; (2) facilitation of learning; and (3) course design. Students can additionally drive online retention rates. For example, academic success necessitates behavioral characteristics like self-regulation, self-determination, and self-efficacy that lead to the deployment of suitable learning strategies and online learning readiness. As far as the improvement for achieving higher retention rates, the recommended tactics signify the employment of early intervention, effective communication, high-quality instructional feedback and strategies, guidance to foster the appropriate behavioral characteristics, and collaboration among stakeholders to support online students. These findings offer implications for academic practitioners such as administrators, faculty and support personnel seeking to enhance online student retention.

Reflecting upon the limitations of the study, we are also extending the implications to research in regard to the student retention topic. The review discusses the influential factors and improvement strategies of online student retention from a broad view. Future studies may profoundly concentrate on each aforementioned influential factor and recommendation. For example, data-mining and analytics techniques pertaining to the detection and prediction of at-risk students deserve in-depth exploration and experimentation so that results can be achieved as accurate as possible. Another limitation is that the specific ways of providing support to other stakeholders such as faculty members were not discussed profoundly. We recommend an exploration that examines the efficacy of faculty support, such as professional development opportunities such as a summer institute, training, and workshop. Other types of faculty support, like procedures and ways to provide instructional design and technology assistance, are also in need of further research. Instead of reinventing the wheel, other institutions can learn from these institutions that have implemented such faculty programs successfully. While student characteristics are among determinants of student retention in online learning, the results of this study do not include a detailed discussion on suitable instructional strategies for fostering behaviors associated with academic success. Forthcoming studies may consider exploring this topic in depth by using triangulated methods for measuring learning behaviors. For instance, in addition to utilizing self-report measurements, other types of data, such as course usage data, are helpful in cross-verifying student characteristics and generating patterns. Essentially, perceptions, behaviors, and strategies of high-performing students can be analyzed and encouraged to low-performing students.

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APPENDIX

Items Reviewed and Analyzed from the Studies

NUMBER	AUTHOR(S)	CONCEPTUAL / THEORETICAL FRAMEWORK	INSTITUTIONAL FACTORS	INSTRUCTOR FACTORS	STUDENT FACTORS	RECOMMENDATIONS FOR IMPROVEMENT	RECOMMENDATIONS FOR FUTURE RESEARCH
1	Almand, Frey, and Tomer (2012)	Community of Inquiry (CoI)	--	Absent verbal and visual cues Poor sense of belonging and passive engagement Inadequate instructor presence for fostering knowledge acquisition and mediating meaningful engagement	Poor sense of belonging to the community Passive engagement	Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, meaningful feedback, appropriate delivery methods, and technology	Strengthening the association between social and cognitive presences Investigating teaching presence in relation to student retention and students' variables like age and educational background
2	Aversa and MacCall (2013)	Low online student retention	Student support services and online course orientation	Insufficient support to promote engagement with students	Low social interaction or presence Job employment and responsibilities Financial issues	Active communication and outreach Technology support Administrators to solicit insights from advisors and faculty	Examining students' educational background, responsibilities, professional obligations and aspirations about student retention Studying the differences in retention rates and factors between synchronous and asynchronous c4ourses
3	Blau, Drennan, Hochner, and Kapanjie (2016)	Perceived learning Perceived timeline graduation	--	Effectiveness of instructions (prompt response and grading, meaningful feedback, and promotion of learning atmosphere)	Student motivation Perceived ease-of-use of technology	Online/hybrid courses to supplement traditional courses as a means to help student persevere toward timely graduation Technology support	Examining other course-related variables, perceived course engagement, technology-related variables, perceived usefulness of technology Expanding the generalizability to various institutional settings

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4	Blau, Mittal, Schirmer, and Ozkan (2017)	Perceived outcomes Comparisons of student retention across delivery modes	--	--	Preferences on course modes	Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, high-quality feedback, appropriate delivery methods, and technology Equivalent integrity between face-to-face and online sections	Investigating the comparisons of synchronous and asynchronous courses Exploring the comparisons of students' perception who majored in various disciplines
5	Boston, Ice, and Gibson (2011)	Tinto's model of student persistence	Too-easy or too-difficult curriculum	--	Financial issues Grades and GPAs Time management	Establishment of policies, procedures, practices, and resources for maximizing student success Tutorial, other counseling or advising services, and remedial programs Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, high-quality feedback, appropriate delivery methods, and technology Instructional design assistance for designing and developing courses that provides educational scaffolding	Exploring the effect of social presence on student retention Examining the comparisons between students trying out online classes and transfer students

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						Technological assistance for faculty Instructor to maintain weekly interaction, including weekly email prompts	
6	Cochran, Campbell, Baker, and Leeds (2014)	Student characteristics Student variables	--	--	Academic standing Genders (opposite results) Financial issue (opposite results) Grades and GPAs	Establishment of policies, procedures, practices, and resources for maximizing student success Focus on supporting students who previously withdrew from online class	Conducting a longitudinal and/or cross-institutional research to explore online student retention from a broader perspective Exploring the perspective of first-generation students
7	Eliasquevici, Seruffo, and Resque (2017)	Rovai's Composite Persistence model	--	Expectation of equivalent engagement as in traditional environment	Genders (opposite results)	Entrance orientations on online learning readiness, learning behaviors, and technological skills Technology support Tutorial, other counseling or advising services, and remedial programs Course orientation Employment of collaborative learning	Considering exploring other elements of Rovai's Composite Persistence model
8	Fredrickson (2015)	Chickering and Gamson's Seven Principles for good practice	--	Assignment types along with a lack of personal interaction with instructor	--	Instructional design assistance for designing and developing courses that provides educational scaffolding Responsive, meaningful feedback Recognition of individual students' contribution to group assignments	Considering recruiting larger population to examine student engagement and satisfaction Investigating instructors' perspective regarding timely response, student engagement, and learning satisfaction

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9	Friðriksdóttir (2018)	Data tracking/analytics Modes of delivery	Inflexible policies of online learning	--	--	Assessment of the policy on defining pass or completion status	Exploring students' reasons to leave or stay in an online program
10	Garratt, Reed, Roberts, and Heritage (2016)	Equivalency theory	--	Assignment types along with lack of personal interaction with instructor Uninteresting and irrelevant course elements	--	Instructional design assistance for designing and developing courses that provides educational scaffolding Use of interactive and motivational instructional materials	Extending research on effective facilitation of collaborative work Focusing the exploration on students who withdrew online course(s)
11	Gaytan (2015)	Tinto model Student characteristics	Institutional support to online students	Low quality of interaction between instructor and students	Poor self-discipline	Entrance orientations on online learning readiness, learning behaviors, and technological skills Tutorial, other counseling or advising services, and remedial programs Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, high-quality feedback, appropriate delivery methods, and technology Instructor to provide immediate, meaningful feedback	Considering various research methodologies and larger samples

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12	Gomez (2013)	Student characteristics Modeling the Way	--	--	Individual's ability to persist, which is associated with self-regulation and self-efficacy	Efforts to foster behavioral strategies linked to persistence	Exploring Modeling the Way in various contexts Investigating behaviors and constructs related to persistence and retention such as self-efficacy, self-regulation, and self-leadership
13	Hachey, Wladis, and Conway (2013)	Tinto's model Student variables	Restricted enrollment policies	--	Grades and GPAs (mixed results)	Establishment of policies, procedures, practices, and resources for maximizing student success Entrance orientations on online learning readiness, learning behaviors, and technological skills, instead of restricting the enrollment through GPAs	Comparing the differences in online experiences, expectations, and perceptions amongst students with different GPAs Considering try the interventions on students with mid-level of GPAs and analyze the results on the student retention
14	Hammond and Shoemaker (2014)	Academic integration Social integration	Lack of understanding about the importance of student engagement in online environments	Insufficient support to promote student-to-student engagement Inadequate promotion of social presence Lack of course organization Illogical course structures Difficult-to-locate materials Vague expectations	--	Facilitation of two-way synchronous communication between advisor and student Deeper understanding of online teaching and learning strategies	Further exploring the impact of social presence

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15	Harris, Larrier, and Bishop (2011)	Expectancy theory	--	Instructor's facilitating style Rigor of course content Clarity of instructions Lack of promotion of student interaction	Family support, home environment, and time management	Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, high-quality feedback, appropriate delivery methods, and technology Active communication between advisors and students Instructor to engage in dialogue regarding online learning expectations Peer-mentoring program among online students	Validating Student Expectations of Online Learning Survey (SEOLS) to analyze student retention issue Considering recruiting larger size of participants from various settings
16	Haydarov, Moxley, and Anderson (2012)	Student characteristics Other terms representing student retention	Inflexible policies and procedures	--	Multiple responsibilities between family and employment	Establishment of policies, procedures, practices, and resources for maximizing student success Consideration for revisiting the terms used to define student retention	Taking a look at other measurements of online program performance
17	Heyman (2010)	Student characteristics Tinto's Student Integration model Bean's Model of Student Departure Learner-centeredness	--	Low quality of interaction between instructor and students	--	Tutorial, other counseling or advising services, and remedial programs Instructor to convey clear expectations Instructor to provide immediate, meaningful feedback	--

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18	Ice, Gibson, Boston, and Becher (2011)	CoI	--	Lack of instructor guidance for promoting topic understanding Lack of course organization Illogical course structures	Low self-efficacy affecting student engagement	Entrance orientations on online learning readiness, learning behaviors, and technological skills Interactive and motivational instructional materials	Triangulating data with other sources, such as LMS data and student characteristics Considering employing decision trees for data analysis
19	Lee and Choi (2013)	Internal Locus of Control (LOC) Academic Locus of Control (ALOC) Flow experience Learner strategies (e.g., metacognition) Learner satisfaction			Locus of control, learning strategies, learning satisfaction, and flow experience		Adding the retention data in future research Examining the relationships among factors influencing dropout rates in various contexts
20	Lee, Choi, and Kim (2013)	Tinto's Student Integration model Bean and Metzner's Student Attrition model Rovai's Composite Persistence model	--	--	Metacognition Self-regulation Learning satisfaction Flow experience	Early assessment of students' prior knowledge and behavioral characteristics to inform decision making in deploying interventions and ongoing progress monitor Entrance orientations on online learning readiness, learning behaviors, and technological skills	Investigating the interrelation of the variables within Academic Locus of Control (ALOC) Examining other variables such as working hours, study hours and previous academic performance
21	Leeds, Campbell, Baker, Ali, Brawley, and Crisp (2013)	Student integration and engagement Learner-centeredness	--	--	Time management such as a miscalculation of workload	Instructional design assistance for designing and developing courses that provides educational scaffolding	Examining the relationship between individual differences on retention rates Further exploring the student profile such as GPA

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						Administrators to solicit insights from advisors and faculty	and previous online experience
22	Moore and Greenland (2017)	Low online student retention Student characteristics Strategies to support online students	Lack of acknowledgment about the different needs of on-campus and online students	--	Job employment and responsibilities	Consideration for allowing special make-up assessments or timeline extension for accommodating not only medical and personal circumstances but also work-related issues Adjustment of policies and procedures to flexibly accommodate online students with employment	Studying ways of offering flexible accommodation to online students Focusing on learning challenges related to employment responsibilities held by online students Gaining an understanding of flexible accommodation for online students from the institutional and instructors' perspective
23	Nichols (2013)	Rovai's Composite Persistence model	Deficient institutional support performed through student services	--	Self-determination Family responsibilities	Promotion and improvement of support services for students	Further investigating students' intrinsic and extrinsic reasons to drop out and behaviors leading to success
24	Nistor and Neubauer (2010)	Problem-based online learning	--	Online didactics for encouraging student participation	Poor sense of belonging and passive engagement	Early assessment of students' prior knowledge and behavioral characteristics to inform decision making in deploying interventions and ongoing progress monitor	Pursuing an in-depth concentration of quantitative data to investigate the correlation with Rovai's attrition variables Employing a triangulation by using qualitative data Examining other attrition models and the inclusion of other variables such as individual, institutional, and social variables in addition to course didactics

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25	O'Neill and Sai (2014)	Student characteristics Strategies to support online students	--	Ineffective communication from instructor	Pre-perception about online learning Self-regulation	For the institution to create a system that collects data from students enrolling in mega classes regarding their learning progress and conduct a research For course designers to integrate the affordances learned from the aforementioned research	Considering an exploration of perceptions from various stakeholders such as administrators, online learning researchers, program developer, and program manager Exploring the type of students who select face-to-face versus online courses and their reasons
26	Parkes, Gregory, Fletcher, Adlington, and Gromik (2015)	Online learning from rural and remote areas Sense of belonging	Inadequate technological support	Inadequate facilitation of social presence and for meeting diverse learning needs	Technology skills Limited access to technology Family obligations Financial issue	Professional development, training, and workshops to inform faculty practices associated with online learning theories, student engagement, students' needs, dynamic dialogue, high-quality feedback, appropriate delivery methods, and technology Support for peer instructors who teach online students living in a remote or rural area Technological assistance For instructor to use multiple formats of materials to meet diverse learning needs	Extending the current studies regarding the improvement of online program for students from rural and remote areas
27	Pinchbeck and Heaney (2017)	Sense of belonging	Proactive support from the institution	Insufficient engagement with student	The feeling of isolated and unsupported	For instructor to allow resubmission or revision of assignments for increasing the quality of students' work	Considering a more in-depth exploration of other influential factors such as family, work, and life responsibilities

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							Investigating the assignment resubmission intervention in relation to student engagement
28	Pittenger and Doering (2010	Keller's ARCS model Moore's theory of transactional distance	--	Educational scaffolding incorporated into course design Uninteresting and irrelevant course elements	Motivation	Instructional design assistance for designing and developing courses that provides educational scaffolding Instructor to maintain weekly interaction, including weekly email prompts Comprehension of students' perceptions regarding online learning before educating them about online learning readiness	Examining the relationship between motivational design and student retention in a larger and more diverse population Including other variables such as social presence, instructor-student engagement and student-student engagement in a self-study course
29	Raju and Schumacker (2015)	Student characteristics	Proactive intervention	--	Demographic profile including pre-college and college performance	Mining and analysis of pre-college and early semester data Programs discussing college readiness that are targeted for incoming students	Pursuing a deeper investigation of early prediction
30	Shah and Cheng (2018)	Student engagement	--	Inadequate feedback to learning	Poor sense of belonging and passive engagement Family and employment obligations Life issues related to health and disability	Focus on supporting at-risk students Instructor to provide immediate, meaningful feedback	--

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31	Shaw, Burrus, and Ferguson (2016)	Individual attributes Life factors	--	A need of multimodality of learning	Goal-setting strategy, college readiness, and technological skills	Early intervention and support Use of early alert system Instructor to provide immediate, meaningful feedback Faculty peer-mentoring program Active communication between advisors and students Collaboration between faculty and advisors	Focusing on factors underlying students' technology skills Exploring students' characteristics associated with course withdrawal and triangulation of qualitative data regarding reasons for withdrawing
32	Smailes, Gannon, and Leary (2011)	Peer mentoring Community of Practice (CoP)	Institutional support promoting engagement	--	Student-to-student engagement	Active communication and outreach Use of social media and peer-mentoring to encourage student engagement	Considering a further examination of effective peer-mentoring program associated with student engagement
33	Stewart, Mallery, and Choi (2013)	Student characteristics Diversity	--	--	Grades and GPAs	Use of multimodality through various facilitation and materials	Including qualitative data to gain an in-depth understanding of students' decision to withdraw Recruiting of larger size of participants in a more diverse context
34	Colorado and Eberle (2010)	Student characteristics Student variables	--	--	Grades and GPAs Self-regulation	Mining and analysis of pre-college and early semester data In-depth understanding about online student demographic and online students' needs	Comparing various entry student characteristics in undergraduate and K-12 online programs associated with student success in online learning

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35	Traver, Volvhov, Bidjerano, and Shea (2014)	CoI	--	--	Academic standing (opposite results)	In-depth understanding of student variables such as prior knowledge and skills, life circumstances, and educational commitment	Replicating the study using a comparison group Administering CoI survey to students who have dropped or unenroll from courses
36	Wladis, Conway, and Hachey (2015)	Student characteristics Student variables Tinto's Student Integration model Bean and Metzner's Student Attrition model	Institutional support offered to at-risk students	--	Age Genders	Focus on supporting freshmen	Replicating the study in various contexts
37	Wladis and Hachey (2017)	Student characteristics	Nature of the course such as elective, distributional, or major requirement courses Institutional support	--	Demographic characteristics	Focus on supporting students who enroll in courses with high attrition rates	Examining the effectiveness of interventions performed on courses with high attrition rates Considering further studies on course design and instructor's pedagogical strategies affecting learning outcomes
38	Wladis, Hachey, and Conway (2014)	Course-level factors	Institutional support such as advising, mentoring and tutoring Course subject difficulty	--	Self-determination	Focus on supporting students who enroll in courses with high attrition rates	Identifying student characteristics that stir the retention rates Closely looking at course design and instructor's pedagogical strategies affecting learning outcomes

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39	Wuellner (2013)	Student variables Student satisfaction	--	Time-spent by the instructor during the learning facilitation	Demographic characteristics Motivation Self-regulation Self-discipline	Entrance orientations on online learning readiness, learning behaviors, and technological skills	Focusing on other characteristics such as educational background, prior academic success, and self-regulated learning Investigating a relationship between demographic profile and learning success if diverse learning contexts Examining the time-spent by instructors in designing and facilitating the course
40	Xu and Jaggars (2011b)	Multilevel design	Institutional support in providing programs to help students persist and improve online environment	--	College readiness Family responsibilities Demographic profile such as first-generation college students	Establishment of policies, procedures, practices, and resources for maximizing student success	Exploring various instructional factors, student supports, and institutional structures

Note. Items reviewed and analyzed from 40 empirical studies. The review of the theoretical or conceptual framework was purported to increase our background knowledge. The remaining factors serve the purpose to provide insights into answering the research questions. Due to differing research *scopes, each study may not address all influential factors of online student retention.*

BIOGRAPHIES

Pauline Salim Muljana is a doctoral student in the Instructional Design and Technology (IDT) program in College of Education at Old Dominion University. Her research interests revolve around the investigations of how learning analytics informs instructional design to foster learning behaviors and strategies associated with academic success. Before joining the IDT program, she held instructional design responsibilities for 12 years at California State Polytechnic University Pomona that included design and development of courses with various delivery modes and multimedia learning objects, as well as facilitation of faculty workshops on instructional strategies and effective technology integration.

Tian Luo is an Assistant Professor in the Instructional Design and Technology (IDT) program at Old Dominion University. Formerly, she worked as an instructional design professional in both higher education and corporate settings. Her research interests center on using social media to facilitate student learning in both formal and informal contexts, and designing collaborative and authentic learning environments supported and enhanced by emerging technologies. Her work has been published in peer-reviewed journals, such as, British Journal of Educational Technology, and Journal of Computing in Higher Education.