Reviews of Research on Online Learners

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Abstract

Online teaching and learning are rapidly increasing across all the educational segments and, specifically, in higher education. Doo et al. (2020) noted that higher education is experiencing three interconnected trends according to Brown et al. (2020) including: (a) increased student diversity, (b) alternative pathways to education, and (c) the sustainable growth of online education. With the COVID-19 pandemic impact and transition to new pathways in online teaching and learning, e.g., HyFlex courses or universal design introduction, higher education online courses need more resources, opportunities, tools, and overall new online infrastructure because of current learners’ preferences for flexible and self-directed online learning. This literature review is focused on the findings of the current studies in relation to existing trends and challenges in online teaching and learning. These findings will help researchers and practitioners understand what current online teaching and learning need to get effective and meaningful support to move forward.

Introduction

Online learning “happens when learners are active and engaged in learning at a distance and online” (Martin et al., 2022, p. 2). In this review, we follow Ally’s (2004) definition that online learning is “the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience” (p.5).

During the last decades, studies actively examined the effects of different types of online instructional approaches and learning technologies in order to support evidence-based online learning practices (Johnson & Lowenthal, 2022; West et al., 2017). Some studies systematically examined previous studies and used them as secondary data by retrieving, synthesizing, and assessing existing knowledge on a subject of online learning in a logical, transparent, and analytical manner (Martin et al., 2020; Sadaf et al., 2021). A systematic review of the literature synthesizes both qualitative and quantitative research using a systematic procedure to minimize biases, become reproducible and have high validity of review conclusions (Stratton, 2019).

To further develop online learning and understand how to serve online learners effectively, researchers conducted systematic reviews on a variety of research problems including cognitive presence in online learning (Moore & Miller, 2022; Sadaf et al., 2021); online student privacy in higher education (Kularski & Martin, 2022), digital citizenship (Richardson et al., 2021); synchronous online learning (Martin et al., 2017; Martin et al., 2021); online teaching and learning (Martin et al., 2020); learning analytics (Ifenthaler & Yau, 2020);
and Massive Open Online Course (MOOC) (Liyanagunawardena et al., 2013; Veletsianos & Shepherdson, 2016; Zhu et al., 2018). In addition to conducting systematic review of research on online teaching and learning, some studies conducted a scoping literature review to understand extant research and develop new research questions to find answers on the effectiveness of online teaching and learning (Choi et al., 2021; Powers & Moore, 2021; Snelson & Hsu, 2020). For example, Choi et al (2021) reviewed the application of network analysis and found that this type of analysis was applicable in examining online environments to understand structural relationship, interaction and relational patterns of online learners. Researchers found that most studies using network analysis have been conducted in formal learning settings in higher education (Choi et al., 2021). Finally, in addition to conducting systematic review of research or a scoping review of literature, some studies also conducted meta-analysis to generalize the topics and themes on online teaching and learning as a result of synthesizing the findings across numerous research studies (Borenstein et al., 2009). For example, Richardson et al (2017) conducted a meta-analysis to examine social presence in relation to students’ satisfaction and learning in the online environment. The researchers identified the patterns of student outcomes (e.g., perceived learning and satisfaction) in relation to social presence through scrutiny of differences between the studies. The study found that (a) the strength of the relationship between social presence and satisfaction was moderated by the course length, discipline area, and scale used to measure social presence; and (b) the relationship between social presence and perceived learning was moderated by the course length, discipline area, and target audience of the course (Richardson et al., 2017). Another study by Caskurlu and colleagues (2020) conducted a meta-analysis addressing the relationship between teaching presence and students’ satisfaction and learning. The study reviewed the relationship between student outcomes and online teaching presence, and its three sub-dimensions (i.e., design and organization, facilitation, and direct instruction) and identified the conditions that moderate the strength of the relationships (Caskurlu et al., 2020). The study found that each dimension of teaching presence individually predicts student learning outcomes in fully online courses.

This literature review of research on online teaching and learning is focused on overviewing three and the most current studies on online learners conducted by Martin et al (2022), Doo et al. (2020), and Trespalacios et al. (2021). These three studies overviewed online teaching and learning from the perspectives of conducting a second-order meta-analysis by Martin et al (2022), a meta-analysis of scaffolding effects in online learning in higher education by Doo et al. (2020), and a scoping review of the literature on community and connectedness in online higher education by Trespalacios et al. (2021). All three studies are focused on higher education which was the main reason for selecting them for this paper.

Cognitive, Affective and Behavioral Outcomes in Online Learning

In the most current review of research on online learning “Examining Research on the Impact of Distance and Online Learning: A Second-Order Meta-Analysis Study”, Martin et al., (2022) examined the impact of online learning on students’ cognitive, affective and behavioral outcomes. The research findings revealed a statistically significant overall average effect size of distance learning impacting cognitive, affective and behavioral outcomes in comparison to face-to-face learning. The authors concluded that distance learning is effective when achieving learning outcomes, and that further careful investigation is needed on learning outcomes within each learning environment and delivery method.
In this second order meta-analysis, Martin et al (2022) identified 15 meta-analysis studies that examined cognitive outcomes (Allen et al., 2004; Jahng et al., 2007; Means et al., 2013), seven meta-analysis that examined affective outcomes and four studies with behavioral outcomes (Bernard et al., 2004; Rohwer et al., 2017; Zhao et al., 2005). In this paper, we provided examples of the studies that examined the higher education environment. Examples of cognitive outcomes that were included in the analysis were achievement, knowledge and skills. As for affective outcomes, the study included reactions, satisfaction, or attitude, and retention rates for behavioral outcomes.

Martin et al (2022) found that online learning had a statistically significant effect on cognitive outcome compared with face-to-face learning (g = 0.214, p < .001). There were no statistically significant effects on affective outcomes (g = −0.030, p = .691) or behavioral outcomes (g = 0.347, p = .209). Variances of effect sizes varied by statistically significant amounts in the reviewed meta-analysis studies. Further, the researchers also found that online learning did have a statistically significant, higher effect on cognitive outcomes than on affective outcomes (Q-value = 0.646, p = .011), but there was not a significant effect between cognitive and behavioral outcomes (Q-value = 0.221, p = .638) or between affective and behavioral outcomes (Q-value = 1.732, p = .188).

The findings suggest that distance learning appears to have a more robust effect on cognitive outcomes in comparison to affective and behavioral outcomes. Irrespective of the delivery method (online vs face-to-face), students work to meet the learning outcomes. However, according to the authors, this may not be the case in terms of affective or behavioral outcomes (Martin et al., 2022).

**Conceptual, Meta-Cognitive, Procedural, and Strategic Scaffolding in Online Learning**

One of the latest systematically conducted reviews of the research on online learners is the study “A Meta-Analysis of Scaffolding Effects in Online Learning in Higher Education” by Doo and colleagues published in 2020 (Doo et al., 2020). The authors examined the effects of scaffolding on learning outcomes in an online environment in higher education. Doo et al. (2020) referred to the Wood et al. (1976) definition of scaffolding which is “process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts” (p. 90). The authors also referred to the three features of scaffolding: (a) *contingency*, the need for an ongoing assessment of online learners’ abilities with specific tasks so the instructor can provide scaffolding activities, (b) *intersubjectivity*, a temporarily shared collective understanding or common framework among online learner to easily exchange ideas, build new knowledge, and negotiate meaning, and (c) *transfer of responsibility*, encourages online learners to take responsibility for ownership of learning from those who provide scaffolding, i.e., instructor (Doo et al., 2020). The findings revealed that scaffolding in an online learning environment has a large and statistically significant effect on learning outcomes. The analysis revealed a larger effect size than did the affective and cognitive domains. Meta-cognitive scaffolding outnumbered other types of scaffolding. The authors recommended that future research include scaffolding studies published in local languages and identified specific instructional approaches that have been effective in online environments.

Following Doo et al. (2020), in this paper, we referred to Hannafin et al.’s (1999) work “Open Learning Environments: Foundations, methods, and Models” where the authors identified four types of scaffolding: a) *conceptual scaffolding* to help online learner identify essential
themes and related knowledge; (b) meta-cognitive scaffolding to help online learners monitor and reflect on the learning process; (c) strategic scaffolding to help online learners locate alternative ways to work on a task; and (d) procedural scaffolding to help online learners use resources and tools for learning, such as providing an orientation to system functions and features.

By reviewing several studies on different types of scaffolding, Doo et al. (2020) noted that previous studies examined scaffolding strategies and found small to moderate effect size for meta-cognitive scaffolding and that the effect of scaffolding on student’s cognitive learning was statistically significant (Belland et al., 2017; Kim et al., 2018). When Doo et al. (2020) conducted the meta-analysis of previous studies, they found that the effects of scaffolding on the meta-cognitive learning outcome (g = 1.600) were larger than the affective learning outcomes (g = 0.672) and cognitive learning outcomes (g = 0.652) (Q (df = 2) = 16.493, p < .001). The reason for the large effect size of Doo et al’s. (2020) research may be explained by the population’s characteristics, i.e., higher education. The authors’ findings also support Belland et al (2017) as they find a larger effect size for scaffolded instruction with graduate students and adult learners.

Following Doo et al’s (2020), we refer to the meta-cognitive learning outcomes as the “top knowledge about one’s own cognitive processes of monitoring and controlling thoughts; this includes self-regulation of learner’s cognitive, behavioral, and emotional goal-directed behavior during the learning process” (p.66). Doo et al. (2020) also found that meta-cognitive scaffolding (g = 1.104) and conceptual scaffolding (g = 0.964) had stronger effects on learning outcomes than did procedural scaffolding (g = 0.393) and strategic scaffolding (g = .440).

Therefore, as we can see that both Martin et al. (2022) and Doo et al. (2020) found that the affective domain of learning, i.e., emotions, motivations, values, satisfaction, and attitudes received less examination than cognitive outcomes in the reviewed studies. Studies that examined affective domain of learning (Bernard et al., 2004; Rohwer et al., 2017; Zhao et al., 2005) found that affective learning outcomes had smaller effect size than meta-cognitive learning (Doo et al., 2020). The affective domain still has less robust effects in online learning in comparison to cognitive outcomes (Martin et al., 2022). Online learners do not meet and learn in the same place and time, and this can lead to a sense of disconnection and feelings of isolation and loneliness (Garrison, 2007) and high attrition rate (Boston et al., 2011). That’s why according to Trespalacios et al. (2021) “theorists, and researchers have demonstrated the importance of community in education” (p.6). Community and connectedness are two highly related concepts to explain online learners’ feeling of belonging to one another and to others, spirit, trust, and interdependence (Trespalacios et al., 2021).

**Community and Connectedness in Online Learning**

Another review of the research in distance education “Qualitative Community and Connectedness in Online Higher Education: A Scoping Review of the Literature” was done by Trespalacios and colleagues in 2021. The researchers investigated the extent, range, and nature of research in community and connectedness in online higher education published from 2001 through 2018. The findings revealed that research on community and connectedness has focused on areas such as course design, technology tools, faculty, and students. They also highlighted the important role these concepts have played in the last two decades in online higher education. The researchers found that all studies were similar in identifying the intellectual growth of the class members based on their similar goals and interests as one of the important elements within the community and connectedness. The authors noted that further research is needed on the program.
types, technology, and course design that foster a sense of community and connectedness among online students and instructors.

Trespalacios et al. (2021) conducted a scoping review of the literature to examine community and connectedness and how studies interpreted both concepts. We follow Trespalacios and colleagues’ (2021) note that a scoping review is a method used to “map the literature on a particular topic or research area and provide an opportunity to identify key concepts, gaps, types and sources of evidence to inform practice, policymakers, and research (Daudt et al., 2013, p.8). The authors found that previous studies used two frequently cited definitions of community and connectedness coined by Rovai’s (2002) and McMillan and Chavis (1986). As Trespalacios et al. (2021) noted that Rovai (2002) was interested in examining community and was influenced to some degree by McMillan and Chavis work (1986). The authors proposed the following definition of community by Rovai (2002):

A feeling that members have of belonging, a feeling that members matter to one another and to the group, that they have duties and obligations to each other and to the school, and that they possess shared expectations that members’ educational needs will be met through their commitment to shared learning goals. One can, therefore, constitutively define classroom community as consisting of two components: feelings of connectedness among community members and commonality of learning expectations and goals. (Trespalacios et al., 2021, p. 12)

Strategies

To support online learners and create a sense of community and connectedness in online courses, Trespalacios et al. (2021) recommended the following strategies based on the reviewed studies:

1. Promote group activities such as social activities, extracurricular opportunities, orientation events, live synchronous sessions, and meetups in person.
2. Support membership and belonging such as cohort structure, promote a sense of identity with students’ institutions.
3. Create communication opportunities such as personal introductions, frequent interactions, formal and informal discussions, online etiquette, a positive environment, and immediate feedback.
4. Structure classroom (online course) processes such as active learning, academic support, peer review and mentoring, assigned discussion roles, and required participation.

The authors also identified that more research on online discussion, role-based discussion, duration of discussion, synchronous sessions, in-person meetings, group activities, optimal levels of interaction, the establishment of mentoring relationships, and web pedagogy are needed.

Technology

To support online learners, Trespalacios et al. (2021) also noted that the effective use of information and communication technologies plays an important role to promote a sense of community and connectedness. Trespalacios et al. (2021) mentioned the following technologies: Web2.0, multimedia, discussion forums, chat tools, instant messaging, e-portfolios, email, audio feedback, online portals, e-learning systems, and course notification and communication tools.
However, more research is needed to examine Web2.0, virtual worlds, virtual field trips, multimedia, the interaction of technology and pedagogy, online portals, and learning management systems.

**Students**

Trespalacios et al. (2021) mentioned that research suggests that students’ differences impact their sense of community and connectedness in online courses. To support online learners and promote community and connectedness, instructors should consider students’ differences such as different needs, different communication and engagement preferences, cultural differences, gender differences, student interactions, student communication style, motivation, and satisfaction. More research is needed to explore students’ differences such as age, gender, or culture, and examination of the relationships among variables such as community, satisfaction, cognitive learning, self-regulated learning, levels of community, motivation, and the impact on practice. It is also very important to examine different course designs to support different types of online learners.

**Conclusion**

These reviews of the literature shed light on important areas of research about online learners in distance education. Studies’ findings were consistent in relation to the impact of online teaching and learning on cognitive learning outcomes than affective and behavioral outcomes. To enhance affective and behavioral learning outcomes in online teaching and learning, instructors need to create a sense of community and connectedness.

The scoping review conducted by Trespalacios et al. (2021) identified some examples of instructional strategies, the types of technologies, and students’ characteristics to promote online community and connectedness – two interrelated concepts that can help increase retention rate and successful completion of online courses. More research is needed to examine relationships between cognitive outcomes and affective and behavioral outcomes, specifically, how different instructional strategies can be used to enhance all three types of learning outcomes (cognitive, affective and behavioral).


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References


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