Brief Peer Reviewed Article

College Student Satisfaction with Online Learning during COVID-19: A review and implications

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Abstract
The purpose of this research is to summarize the studies examining college student satisfaction with online learning, with a focus on the studies investigating the elements of the online courses designed by the instructors who moved face-to-face courses to online during the COVID-19 pandemic. Research that describes the elements of online course design is included. Previous reviews pointed out that due to individual differences, students differed in their online learning outcomes This review discusses how asynchronous and synchronous components of online learning contribute to student online learning satisfaction despite student individual differences, and suggests that instructors can proactively help student online learning by modifying elements in online courses.

Keywords: synchronous, asynchronous, online learning, learning satisfaction, college students

Recently, due to the COVID-19 pandemic, face-to-face courses have been suddenly changed to online courses (Means & Neisler, 2020). Researchers found that online learning and face-to-face learning could achieve

equivalent learning outcomes (Garratt-Reed, Roberts & Heritage, 2016; Paul & Jefferson, 2019), According to the equivalence theory (Simonson, Smaldino, Albright, & Zvacek, 2011), student learning outcomes can be similar despite the differences in the course formats, face-to-face and online, if the learning activities are comparable. While student learning outcomes can be made equivalent between online and face-to-face courses through the design of learning activities (Simonson et al., 2011), how can online learning be satisfying for students?

Student learning satisfaction is important because it is related to student academic performance (Dhaqane, 2016), retention and continued effort in learning (Edwards & Water, 1982; He, Xu & Kruck, 2014). As Cole, Shelley, and Swartz (2014, p. 1) pointed out,

> Acknowledging that learning outcomes are equivalent, the question of how satisfied students are with their experiences with e-learning persists. This is important from the standpoint of student retention which is, of course, relevant to enrollment and maintaining institutional revenue streams. Also, analysis of student satisfaction may point to improvements in e-learning practices which in turn could improve outcomes.

Student satisfaction is important for universities (Green, Hood, & Neumann, 2015; Douglas, Douglas, McClelland, & Davies, 2015) and faculties (Dhaqane & Afrah, 2016; Rothman, Romeo, Brennan & Mitchell, 2011). Student satisfaction with an online course is typically a part of course evaluations (Rothman et al., 2011). While people agree that growth of online courses is incredible fast, concerns about the success of online courses still exist (Brewer & Brewer, 2015; Cole, Shelley, & Swartz, 2014; Tanner, Noser & Totaro, 2009; Mandernach, Mason, Forrest, & Hackathron, 2012). Opinions differ concerning appropriateness of online courses. As Mandernach et al. (2012, p. 203) pointed out,

> Faculty favoring virtual education claim there is more interaction online than in face-to-face classes and that online students are more actively immersed in the course content. Opponents counter that online course creation is too time intensive and that there is limited contact among online students compared to face-to-face learners. When it comes to the topic of online versus face-to-face classes, almost everyone has an opinion.

This study summarizes recent research on student online learning satisfaction , focusing on the research examining college student satisfaction with online learning during the COVID pandemic. Previous

review research (e.g., Green, Hood, & Neumann, 2015; Kauffman,2015) summarized research that compared student learning outcomes and satisfaction in face-to-face and online context emphasizing student individual differences, and pointed out that because of individual differences, online learning may benefit some students more than others. This study intends to summarize findings of the research on online course elements that influence student online learning satisfaction to inform online course design to benefit student online learning in spite of individual differences. Only research, which describes elements of online courses that influence student learning satisfaction, are included in the study.

Research of Student Online Learning Satisfaction

Student online learning satisfaction has been examined by comparing student online learning satisfaction with student face-to-face learning satisfaction in the lecture courses. Research findings have not been consistent, with some research showing similarity in student satisfaction between the online course and the face-to-face course (e.g., Garratt-Reed, Roberts, & Heritage, 2016; Yen, Lo, Lee, & Enriquez, 2018) and other research indicating that students are more satisfied with a face-to-face course than an online course (e.g., Dinh & Nguyen, 2020; Tratnik, Urh, & Jereb, 2019). When students are not satisfied with an online course, it is important to understand what elements in the online course contribute to student dissatisfaction.

Some research examined student satisfaction with online courses and face-to-face courses without providing specific information about the elements of the online courses , which influenced student online learning satisfaction. For example, Dinh and Nguyen (2020) compared college student satisfaction with online courses and face-to-face courses in the following aspects:content knowledge, learning activities, teaching pedagogy, interactions of students, interactions of students and instructors, methods for assessing student learning, and overall course satisfaction. The participants were college students majoring in social works in Vietnam, who answered the survey questions posted online. The participants indicated that there were few difficulties in internet connection or problems in internet quality, but they were more satisfied with face-to-face courses.While the study contributed to the literature about student satisfaction with different aspects of learning, the study did not further describe what the content was taught, what the learning

activities were, how students interacted, how students and their instructor interacted, and how the student learning was assessed in the face-to-face courses and in the online courses, and why there were differences in student satisfaction with online learning and face-to-face learning. Because of the limit of one single study for identifying different elements in online learning that contribute to student satisfaction, it is important to summarize different studies to provide more information about how elements of online learning influence student online learning satisfaction to inform the design of more satisfying online courses.

Elements in the Design of Online Courses during COVID-19

Online courses have been quickly developed during the COVID-19 pandemic to meet the need for maintaining social distancing ((Means & Neisler, 2020). Studies have been conducted recently during COVID-19 pandemic to examine student learning satisfaction (e.g., Amir, Tanti, Maharani, Wimardhani, Julia, Sulijaya, & Puspitawati, 2020; Baber, 2020; Basuony, EmadEldeen, Farghaly, El-Bassiouny, & Mohamed, 2020; Chung, Subramaniam, & Dass, 2020; Demuyakor, 2020; Nambiar, 2020; Nugroho, Basari, Suryaningtyas, and Cahyono, 2020; Hussein, Daoud, Alrabaiah & Badawi, 2020; Ramo, Lin, Hald, & Huang-Saad, 2020). The studies suggest two broad themes in discussing how the elements in online learning influence college student online learning satisfaction, the synchronous component and the asynchronous component.

In terms of the synchronous component, students like synchronous meetings, which offer the opportunity for real-time discussion, questioning, feedback and reflections, which has a positive effect on student online learning satisfaction (Wart, Ni, Ready, Shayo, & Court, 2020). Synchronous online meetings are used to give a match to the learning process in the face-to-face meetings (Amir, Tanti, Maharani, Wimardhani, Julia, Sulijaya, & Puspitawati, 2020;Basuony, EmadEldeen, Farghaly, El-Bassiouny, & Mohamed, 2020; Chung, Subramaniam, & Dass, 2020; Demuyakor, 2020; Nambiar, 2020; Ramo et al., 2020; Nugroho, Basari, Suryaningtyas, & Cahyono, 2020). Students consider in-class interactions important for learning (Amir et al., 2020). Synchronous meetings via web applications, such as Zoom meetings, allow for immediate feedback and interactions in a way similar to face-to-face meetings. The similarities between synchronous meetings and face-to-face meetings are important for students to feel satisfied as students tend to think the instructors are less supportive and feel less satisfied when there

are no face-to-face interactions (Paul & Jefferson, 2019). Quality of synchronous meetings is essential considering that student learning satisfaction is negatively affected by the low quality of synchronous online meetings (Fatani, 2020).

Students also like the asynchronous part of online learning (Chung, Subramaniam & Dass, 2020; Dinh & Nguyen, 2020; Gillis & Krull, 2020; Ramo, Lin, Hald & Huang-Saad, 2020; Nugroho, Basari, Suryaningtyas, and Cahyono, 2020). Specifically, students like the easy access to the learning materials and videos online. In fact, students are not as satisfied if there are only online synchronous video conferences (Nugroho, Basari, Suryaningtyas, and Cahyono, 2020). College students show a negative attitude towards Zoom meetings (Serhan, 2020) due to the student perception that they do not learn well, and the learning materials are missing. Student online learning satisfaction is negatively affected by the absence of certain content (Garris & Fleck, 2020), difficulties in understanding learning materials (Chung et al., 2020), and difficulties in technology, such as internet connection, sound quality (Chung et al., 2020; Dinh & Nguyen, 2020), devices (Hussein, Daoud, Alrabaiah, & Badawi, 2020) or supportive software (Chung et a., 2020).

Examples of Online Courses Integrating Synchronous and Asynchronous Components

Amir, Tanti, Maharani, Wimardhani, Julia, Sulijaya, & Puspitawati (2020) described how the face-to-face courses weres quickly transitioned to online during the COVID-19 pandemic with the course content and structure remaining the same. The asynchronous component includes the syllabus and course materials posted online. The asynchronous part was the same before the courses were moved to online during COVID-19. The group discussions in the face-to-face classrooms, which implemented the collaborative learning, and question-based and problem-based learning, and the lectures for clarification in the face-to-face classrooms, were moved to online synchronous meetings,using the software, such as Microsoft Teams, Google Meets,   or Zoom. . Videos and online presentations were used for hands-on practices and training skills. Most students agreed that they had more time for studying learning materials before participating in the class discussions and more time to review the learning materials in the online courses. About   a little more than half of the students (55.81%)) disagreed that they liked online courses more than face-to-face courses.A little more than half of the students (59.80%)

disagreed that the communication was easier in online learning. More than half students (61.79%) indicated that they were motivated to study the learning materials before class discussions by the online learning.

In the study by Ramo, Lin, Hald, & Huang-Saad (2020), the biomechanics course was re-designed into 3 online sections to meet the faculty's need to move to another country. The 1st section of the course was delivered in a combination of synchronous format and asynchronous format. The 2nd section of the course was delivered in a single synchronous format. The 3rd section of the course was delivered in sole asynchronous format. Students' answers to the survey items showed that most students liked the online instruction that had both synchronous and asynchronous format. A small number of students liked the sole synchronous instruction.

In the study by Chung, Subramaniam and Dass (2020), both synchronous and asynchronous components were included in the online course. Besides the synchronous video conferences, which allowed for immediate questioning and feedback, students had access to the asynchronous   online learning materials, such as PowerPoint slides with voice-over and YouTube videos. Students liked the asynchronous part more than other methods. As Chung et al. (2020, p. 53) point out,

> This could probably be that this method gives them time to listen to the lecture before their classes. Besides, for students who face internet connectivity issues, when their lectures are pre-recorded, it helps them to prepare before attending class just in case the connectivity drops while the lesson is on. This method also enables students to replay the recorded lectures again and again to gain better understanding of the content. This could also help them better prepare for quizzes, tests and final assessments.

The association between the availability of video recordings and student satisfaction was shown in the study that investigated online learning satisfaction of the undergraduate computer and software engineering students (Girary,2021). While the students rated their overall satisfaction with e-learning below the mid-point on a 5-point Likert scale, a large portion of the students liked to use the video recordings of lectures and had a high positive opinion towards the video recordings of the lectures,suggesting that the video recordings of lectures supported a satisfying online learning experience.   In addition to lecture courses, many classes, particularly those in the STEM and technical fields, have a laboratory component in which students participate in hands-on learning

and experimentation. Prior research has shown that the quality of lab equipment, clarity of laboratory activities, are among the most critical factors in student satisfaction (Nikolic, Vial, Ros, & Stirling, 2015). Orlowski, Mejia, Back, and Fridrich (2021) investigated undergraduate student satisfaction with culinary and beverage labs in a university hospitality program. In terms of asynchronous part of learning, besides online assessments and discussions, the virtual lab portion contained PowerPoint lectures with voice-overs as well as cooking demonstrations and a virtual tasting where the instructors described the sensory components of alcoholic beverages along with recommendations, both of which were video-recorded .The synchronou Zoom meeting was optional and basically for greeting each other. Students were satisfied with the online course, thinking the asynchronous lab learning videos, which allowed for multiple access and flexibility in learning, were useful and enjoyable, although they considered it better to have tactile experience in social context. **Suggestions for Online Course Design**

It contributes to online learning satisfaction to include both synchronous and asynchronous components in online courses based on the literature (e.g., Amir et al., 2020; Baker & Cavin ato, 2020; Chung, Subramaniam, & Dass, 2020; Dickinson & Gronseth, 2020; Fatani, 2020; Gills & Krull, 2020; Girary, 2021; Jamieson, 2020; Tratnik, Urh, & Jereb, 2019; Yen, Lo, Lee, & Enriquez, 2018). For example, Dickinson and Gronseth (2020) discussed challenges to student learning in the absence of in-person experiences in operating rooms and face-to-face meetings in surgical operation courses. They considered asynchronous learning with pictures, images, recordings, and videos, as well as synchronous meetings, helpful in terms of maintaining social connections when learning surgical skills in online courses. We propose further ideas that emphasize connections and mutual facilitations of synchronous and asynchronous components, which can be applied in online course design to support satisfying learning.

1) Using asynchronous communications to prepare for synchronous communications

2) Connecting   synchronous learning activities and asynchronous learning activities

3) Using synchronous meetings to motivate and pace asynchronous learning 4) Providing matched asynchronous learning activities for students who cannot attend a synchronous meeting

5) Making the video-records of the synchronous meetings another source ofasynchronous learning materials

6) Offering additional synchronous meetings to help students who have difficulties in learning asynchronous materials

7) Providing synchronous meetings for addressing questions related to asynchronous learning materials

8)Using student performances on asynchronous learning activities to informthe learning in the synchronous meetings

9) Using asynchronous discussions to support the interactions in synchronous meetings

Conclusion

This review focuses on the literature about the elements of nline course designs in terms of how the elements of the online course designs affect student online learning satisfaction during the COVID-19 pandemic, when face-to-face courses are quickly moved to online (e.g., (e.g., Amir, Tanti, Maharani, Wimardhani, Julia, Sulijaya, & Puspitawati, 2020; Baber, 2020; Basuony, EmadEldeen, Farghaly, El-Bassiouny, & Mohamed, 2020; Chung, Subramaniam, & Dass, 2020; Demuyakor, 2020; Nambiar, 2020; Fatani, 2020; Ramo et al., 2020). Students are more satisfied with online courses, which include both asynchronous and synchronous components for the following two broad reasons.

Firstly, the asynchronous component of learning includes reading materials, instructor's lectures in Power-Point slides, videos, recorded synchronous meetings, and other online links. Students can review the learning materials as much as they need. Students like the flexibility of viewing asynchronous materials (Baker & Cavinto, 2020; Jamieson, 2020) and participating in asynchronous discussions (Dickinson & Gronseth, 2020). The quality of the asynchronous component is important. The learning materials should be carefully selected to increase comprehension and decrease student frustration as difficulty in learning materials has a negative effect on student online learning satisfaction (Chung et al., 2020). It is also important to make the access to online learning materials easy (Chung et al., 2020). Furthermore, it supports learning satisfaction to add pictures, images, recorded synchronous meetings and/or videos to asynchronous learning activities (Dickinson & & Gronseth, 2020).

Secondly, synchronous meetings, such as those through Zoom, where instructors facilitate discussions, ask questions, give students feedback in real-time, are important for students to feel satisfied as they

increase cognitive presence (Wart, Ni, Ready, Shayo, & Court, 2020). The synchronous meetings also allow for instructor facilitation of peer collaborations in groups. They add to the social presence, which is also important for students to feel satisfied in online learning (Wart, Ni, Ready, Shayo, & Court, 2020). However, quality of synchronous meetings is essential (e.g., Fatani, 2020).

Research shows that it supports student online learning satisfaction to include both asynchronous and synchronous components , (e.g., Amir et al., 2020; Dickinson & Gronseth, 2020). Based on the studies reviewed, ideas that emphasize the connections of asynchronous online learning and synchronous online learning are further proposed in this study for designing online courses to support online learning. Students differ in various ways, and student individual differences affect online learning (Kauffman, 2015). In spite of the student individual differences, instructors can actively support student learning satisfaction through modifying elements in online courses.

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