Designing Online Discussion for HyFlex Learning

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Abstract: There are pedagogical challenges for the ideal balance of online community building and interaction among students and instructors for HyFlex learning. One of the challenges focuses on how instructors can effectively select and design an online discussion modality to promote positive, vigorous, and encouraging online asynchronous discussion to engage students. This research study adopted an exploratory mixed method approach designed to investigate student's satisfaction level and academic performance with different interface design platforms for online discussion in HyFlex delivery modality education courses. Study results indicated that different interface design for online discussion platforms had a significant impact on students' academic achievement for online discussion assessment although there is no significant impact on students' overall satisfactory levels toward the courses. Implications from the results suggest a need to design and integrate effective online discussion platform to engage students and promote social learning in HyFlex learning environments.

Keywords: *Digital learning tools, HyFlex learning, interface design, online discussion.*

Introduction

Since March 2020, all schools, colleges, and universities in the United States (U.S.) have been facing the challenge of maintaining the continuity of learning as well as instruction and of providing for the public health and safety of students, faculty, and staff alike. Thus, an unprecedented step to migrate all courses online in response to the global pandemic has been taken. To conduct schools remotely is apparently a simple, immediate, and safe solution (Consortium for School Networking, 2020). According to Technavio (2018), prior to the paradigm shift of the teaching modality, the eLearning market in the U.S. will have grown to $6.22 U.S. billion between 2017 and 2022. In addition, graduate students' favor on online instruction had also been reported. Duffin (2019) reported that a survey showed 52% of the graduate students in the U.S. found their online education to provide a better learning experience than their face-to-face instruction.

With the release of the vaccine in December 2020 in the U.S., more and more educational institutions are offering instruction in a HyFlex mode. The HyFlex online instruction blends a hybrid format of synchronous online student in-person attendance as well as face-to-face student attendance and allows students to have the flexibility to choose when and how they attend in a single course (Abdelmalak & Parra, 2016). No matter if it is amidst or after the global pandemic, one can be sure that the demand of online instruction moves on. Thus, it is more important than ever that instructors need to make prudent selection about effective pedagogical design and educational institutions also need to provide judicious choices about course delivery methodology.

There are several challenges that need to be addressed for the ideal balance of online community building and interaction among students in HyFlex learning environments. One of the pedagogical challenges focuses on how instructors can effectively scaffold and select an online discussion modality to promote positive, vigorous, and encouraging online asynchronous discussion to engage students. The findings from this study will help online educators to better select an effective online asynchronous discussion tool to facilitate students' learning. In addition, the findings also provide educational institutions with research confirmed data and evidence to choose the integration of an online asynchronous discussion tool wisely.

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This research study follows the best practice of online pedagogy that the more direct involvement students have in a course with online components, the more dedicated and productive they will be (Dimeo, 2017). It aims to examine and compare student performances and perceptions on two different interface designs for online asynchronous discussion in Hyflex learning environments.

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Literature Review

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The following review of literature will focus on defining and examining various interface design strategies for online discussion in HyFlex learning environments. Theoretical framework regarding student's learning with online discussion will be first reviewed and justified. Then, Hyflex learning environments will be defined. Lastly, various interface design strategies for online discussion will be summarized and reviewed.

Theoretical Framework

This research utilizes the community of inquiry (COI) model developed by Garrison et al. (2000) as a framework to explain how learning experiences can be impacted by social, teaching, and cognitive presence in a HyFlex online learning environment. Several researchers had recognized the COI as an essential theoretical framework to study online and blended instruction (Boston et al., 2009; Swan & Ice, 2010). The COI model identified that social presence, teaching presence and cognitive presence are the three types of presence that are imperative for online students to have a positive learning experience (Garrison et al., 2000).

Based on COI, social presence refers to instructors' and students' ability to project their authentic selves into the online community. Teaching presence typically refers to the responsibility of the instructors. It includes designing the educational experience and facilitating the educational experience. Cognitive presence means instructors' and students' ability "to construct meaning through sustained communication" (Garrison et al., 2000, p. 89).

This study focused on HyFlex learning environments where students can choose their preferred course delivery mode. The rationale for focusing on HyFlex learning is that when a student is offered the option to choose their preferred course delivery method, their social presence can be authentically presented. Furthermore, when instructors can effectively utilize digital discussion tools to scaffold online discussion, students' presence and interaction can be facilitated. The theoretical framework and connection of COI components, online discussion activity and learning environment are shown in Figure 1.
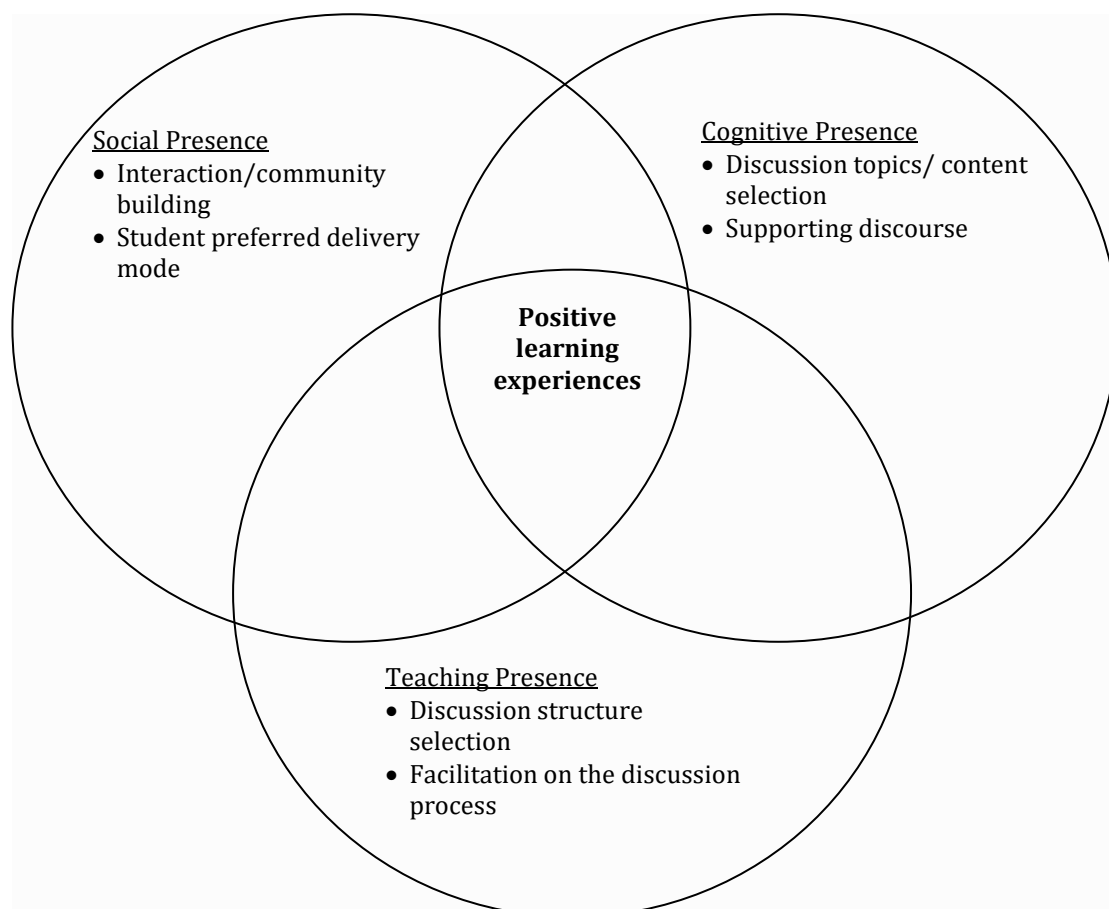

Figure 1. Theoretical Framework: COI Components and Their Connection with Online Learning

Note: Adapted from Garrison et al. (2000).

HyFlex Learning Environments

The word, HyFlex, is a compound word consisting of **Hy**brid and **Flex**ible. It is a course delivery method that includes a blending of online and face-to-face delivery modes in a flexible course structure where students can select when and how they attend the course (Abdelmalak & Parra, 2016). Due to the pandemic, HyFlex instruction is gaining popularity as a course delivery modality. In this study, the researcher applies a HyFlex course designing method to deliver courses where students can complete the course in various formats including synchronously face-to-face, synchronously online, or asynchronously online in a single course. As HyFlex teaching and learning will get more and more popular, it is essential for researchers to investigate the best practices of the course delivery method. With such importance, the researcher chose to investigate one of the essential instructional components, online discussion, for this study.

Interface Design for Online Asynchronous Discussion

Interface Design which refers to the design of user interface for machines and software is an essential part of any digital learning application. Online discussion is an important learning activity within online learning. Accordingly, the interface design features for online discussion are a significant factor in enhancing online learning efficiency. Online asynchronous discussion means that each student can access, participate, and post their discussion, reflection, and comments at their own convenient time. In the current eLearning world, there are a variety of online asynchronous discussion application or tools available. Although these tools are with a common goal to facilitate student's discussion for building online community engagement, they are designed with different interface design platforms. Literature review suggests two main interface design platforms: text-based discussion and non-text-based discussions (Clark et al., 2015; Ming & Baumer, 2011). As technology is evolving, new interface design platforms for online discussion are emerging. Based on the presentation techniques of instructor's prompts and student's postings, the researcher categories the interface design platform features into hierarchy, scrolling, and parallel styles. Definitions are provided as follows. A table is made to illustrate various interface design platforms for online discussion (See Table 1).

1. Text-based online discussion: It refers to the traditional online discussion forum in which communication including instructor's prompts, questions, students' answers, discussion, and feedback is delivered mainly via text.

2. Non-text based online discussion: Online discussion mainly occurs with multiple media formats which includes the use of images, audios, videos, or PowerPoint presentation.

3. Hierarchy style: Hierarchy style refers to online discussion which is scaffolded in a hierarchical format. With this format, instructor's prompts and questions for online discussion activity and students' postings are displayed on different web pages. Students view and read instructor's prompts first on one web page and then make their posts, comments, or reply on another web page.

4. Scrolling style: Scrolling style refers to online discussion contents which are scaffolded in a scrolling format on a single long web page. Instructors' prompts are represented together with students' discussion. However, students must scroll down the web page in order to read specific classmate's posts, replies or comments. That is, students can view or read the instructor's prompts, their peer student's posts and discussion, and make replies on the same web page.

5. Parallel style: Parallel style refers to online discussion which is scaffolded in a parallel format. Instructors' prompts and students' discussion contents are displayed parallelly on a single web page. Students might have to scroll down the partial window of the web page to read other classmate's discussions and make replies, yet they can always view the instructor's prompts or questions on another partial window of the same web page.

Table 1. Interface Design Platforms for Online Discussion

	Hierarchy	**Scrolling**	**Parallel**
Text-based discussion	Blackboard Discussion Board Piazza	blog Google chat Slack Discord	Padlet Linoit Dotstorming
Non-text-based discussion	Jamboard	Facebook Twitter	Flipgrid VoiceThread GoReact

A review of literature suggests that non-text based online communication is useful for students to facilitate social learning, social presence, and for creating classroom community (Ching & Hsu, 2013; Delmas, 2017; Fox, 2017; Green & Green, 2018; Kirby & Hulan, 2016; Stoszkowski, 2018). As different tools allow instructors to scaffold their prompts differently, investigating students' performance and perception of using different interface design platforms for online

discussion has become essential. As such, the researcher proposes to investigate and compare students' perception on the use of two different non-text-based discussion tools with one in scrolling style and the other one in parallel style. The following two research questions will be investigated.

1. What are the differences between two groups of graduate students' academic performance with different user interface design platforms for non-text based online discussion in Hyflex learning environments?

2. How do education graduate students perceive on using non-text based online discussion tools?

The purpose of this research is to examine the effects of two online asynchronous discussion tools with different interface designs on students' learning. With such purpose, a parallel non-text based online discussion tool, GoReact, and a scrolling non-text based online discussion tool, Facebook, were chosen as the virtual asynchronous discussion tools to investigate and compare.

Methodology

This research study adopts an exploratory mixed method approach designed to investigate student's performance with two different interface design features for online discussion in an education course with HyFlex delivery modality. Both qualitative and quantitative data were collected via a course survey and student's discussion posts. The course survey consists of both 4-point Likert-style questions and open-ended questions. Qualitative data is collected from students' answers to the open-ended questions in the survey. Quantitative data consists of students' numerical response from the course survey as well as the average word counts of students' postings.

Participants

Participants in this study were enrolled in four adult graduate courses from a medium size state university located in northern California. Graduate students were registered on four different sections of the same course which is about web design offered by the college of education. The course in this study implemented HyFlex principles to expand learning opportunities for students. The total number of the students enrolled in the four sections of the same course was 85. Total number of participants who completed the course survey was 63. The total number of students who completed the bi-weekly online asynchronous discussion was 74 ($n = 74$).

Data Collection Procedure

Students registered in the four sections of the same course were required to participate in structured online class discussions with two sections offered in Fall 2019 using Facebook as a discussion platform while the other two sections offered in Fall 2020 using GoReact. The discussed topic, prompts, and questions were the same for all the four sections of the course which were taught by the same instructor. To standardize grading and feedback, students were given the discussion rubric including an explanation of established criteria and specific examples of designated performance levels. The same rubric was applied for the four sections of courses. Table 2 displays the number of student respondents who completed the survey, number of participants completing the online discussion activities, average weekly word counts of students' postings, and the online discussion tools used in each section of the course.

Table 2. Number of Student Responses Per Section of the Course

Class	Scaffolding style	Online Discussion Tools	Number of students enrolled in the course	Number of students completed the online discussion	Task completion rate	Average word counts of students' postings
Section 1, Fall 2019	Scrolling	Facebook	26	23	88%	398.35
Section 2, Fall 2019	Scrolling	Facebook	24	18	75%	390.89
Section 1, Fall 2020	Parallel	GoReact	19	19	100%	284.16
Section 2, Fall 2020	Parallel	GoReact	16	14	.87.5%	375.5

The instrument which was a university credentialed survey was administered via Blackboard, an online learning management system (LMS) used for all the courses at the university. Participation for the survey was voluntary. Participants received an email invitation including a link to the survey from the LMS, informing them that they could take the survey and had one week to complete the survey. Then, participants received two friendly reminders from the instructor to complete the survey on the third and sixth days respectively. The survey data were collected anonymously, no names or other identifying information was collected, yet students' online discussion postings were collected with names.

The questionnaire which surveyed students' learning experiences includes 15 closed-ended, Likert-style questions and two open-ended questions. The quantitative questions focused on the student's perceptions of course organization, instructor enthusiasm, instructor knowledge, the use of the online discussion tool and instructional delivery mode (see Table 3). For the closed-ended questions, the instrument used a four-point Likert-type scale (1 = disagree, 4 = agree). The two open ended qualitative questions were (1) what aspects of the course contributed to your learning? (2) what suggestions do you have for the instructor about how to provide a better learning experience for a student like yourself? The credentialed survey had been tested by the University to be reliable and valid before released for students to use. The validity and reliability of the qualitative data had also been ensured by member checking with ten selected participants.

Findings

Results were analyzed from two perspectives: quantitative data and qualitative data. Quantitative data included students' satisfaction levels and the average weekly word counts of their online discussion postings. Of the 85 students enrolled in the four sections of one single class over a two-year time span, 63 voluntarily responded to the questionnaire which resulted in a 74% response rate. The mean scores for each question were recorded and shown in Table 2 revealed that student perceptions for all 15 questions were, on average, 3.57 or higher on the four-point Likert-style scale with 4 being agree and 1 being disagree. Instructor's helpful assistance, enthusiasm, feedback, and support were the four items that scored among the top with an average of 3.73 or above. Understanding the assignment requirements and grading were the second highest item with the online discussion tool scoring the lowest at 3.57. The Facebook course Section II had the highest satisfaction level with an average of 3.85 while the lowest average student satisfaction level was on the Facebook Section 1 course.

Table 3. Participants' Average Response to the Questionnaire

Courses	Section 1, Fall 2019	Section 2, Fall 2019	Section 1, Fall 2020	Section 2, Fall 2020	
Questions	Average response	Average response	Average response	Average response	Average
1) I understood what I was expected to learn in this course.	3.3	3.88	3.5	4	3.67
2) I understood the requirements and grading system.	3.6	3.88	3.6	4	3.77
3) The course assignments helped me to learn.	3.5	3.88	3.6	4	3.745
4) The reading and support materials contributed to my learning.	3.4	3.75	3.5	4	3.6625
5) To me, the course content seemed well organized.	3.5	3.88	3.5	3.75	3.6575
6) I had the opportunity to apply my learning through activities and assignments.	3.5	3.88	3.5	3.75	3.6575
7) I felt that the instructor provided feedback that supported my learning.	3.6	3.88	3.7	3.75	3.7325
8) My learning was supported through opportunities to interact with other students.	3.5	3.88	3.7	3.67	3.6875
9) I was engaged in learning as a result of the teaching methods used.	3.5	3.88	3.6	3.75	3.6825
10) I felt encouraged to participate in open-minded inquiry and discussion.	3.33	3.88	3.7	3.75	3.665
11) The online discussion tool that the instructor applied contributed to my learning.	3.3	3.63	3.6	3.75	3.57
12) In my experience, the instructor expressed an interest in students' learning.	3.6	3.88	3.7	3.75	3.7325
13) This course was a valuable learning experience for me.	3.5	3.75	3.6	3.75	3.65
14) I felt welcome to seek help and advice from the instructor.	3.44	3.88	3.67	4	3.7475
15) The help I received from the instructor was useful to my learning.	3.67	3.88	3.7	4	3.8125
Average	3.48	3.85	3.61	3.84	3.7

The average word counts for students' online discussion postings including students' answers to the instructor's prompts and students' responses to their peers' posts were calculated. In terms of students' answers to the instructor's

prompts and questions, the two course sections with the integration of Facebook had the highest average word counts of 398.35 and the 2nd highest average word counts of 390.89. The average word counts of students' postings in both course sections with GoReact were less with 375.5 and 284.16 respectively (See Table 2).

Regarding the online discussion task completion rate, the results were mixed. The highest task completion rate went with the first section of GoReact class, yet the lowest completion rate occurred in the 2nd section of Facebook class. Overall speaking, the GoReact course sections had a higher online discussion completion rate than Facebook (See Table 2).

With the two different tools for online discussion, quantitative data from the average word counts of students' posting was also analyzed with T-Test, Two-Sample Assuming Equal Variances (Table 4). Alpha was set at 0.05 level ($\alpha = 0.05$). The test results revealed that the p value was less than the critical value, $p \leq \alpha$. The results rejected the null hypothesis (H_0: $\mu_1 = \mu_2$) of the statistical test. In other words, it established that the two groups were different.

Table 4. t-Test results (two sample assuming equal variance)

	Facebook	GoReact
Mean	395,073	322,909
Variance	17,435,069	28,809,835
Observations	41	33
Pooled variance	22,490,521	
df	72	
t Stat	2,057	
P(T<t) two-tail	0.043	
t Critical two-tail	1.993	

Qualitative data about the course aspects were obtained from students' responses to the two open-ended questions in the survey. Emerged themes were qualitatively coded for each question. The researchers noticed three emerging themes regarding activities, curriculum, and the discussion tool of the course. Examples of the three themes revealed in student's responses to the two open-ended questions include:

- All the material provided in the course contributed to my learning.
- I have learned so much and it has built my professional portfolio tremendously. I am forever grateful.
- The class was fun and engaging and the assignments were useful for my own teaching. I plan to use the skills that I have learned to create interactive designs for future projects related to my students.
- The character limit on GoReact comments cut my post. I have to make two or more posts to complete my answers to the instructor's questions.
- It was not like any other ordinary online class I have to take. I liked how I was able to use GoReact as a discussion tool to interact with my classmates.
- I liked the Facebook online discussions rather than on a written discussion board like many of my other courses. This made the course more interesting.
- I would definitely adapt the curriculum to acknowledge that students are mostly first year teachers who are trying to do distance learning so introducing us to educational technologies that could help make our workday easier would be very relevant right now during covid-19.

Discussion

The interface design for the two online discussion tools investigated in the study are different, yet they both share some similarity. GoReact offers a parallel style where the instructor's prompts and questions are always displayed together with students' postings. In addition, student's postings are time coded. All students' discussion and feedback are automatically attached to a video time code. Facebook offers a scrolling scaffolding method where instructor's prompts and questions are presented first and then students' postings follow sequentially after. For both tools, when students' postings are getting more and more, a scrolling feature will appear for users to scroll through past conversations and threads.

The unique features of the parallel style presented by GoReact include that students can review the instructor's prompts constantly while they post and students can specifically select a time point in the instructor's prompts to answer. Although the features sound attractive for online discussion, the word count average of student's posts in this study revealed contradictory results. In fact, the Facebook sections had higher word counts than GoReact sections. An analysis of the T-Test also reflected that there was indeed a significant difference between the use of these two different tools. Students tended to answer the instructor's prompts more when online discussion was carried out in Facebook groups. The finding corresponded to the study results by Hou et al. (2015). They found that Facebook was better for facilitating students' social interaction than a text-based online discussion forum. Thus, they recommended

that integrating Facebook for online discussion required instructor's sufficient guidance to promote students' meaningful online discussion.

Regarding the online discussion task completion rate, the results were mixed. The highest task completion rate occurred at the first section of GoReact class, and the second highest completion rate was on the first section of the Facebook class. This could be attributed to the integration of the tools in Blackboard. As the university supported having GoReact embedded in Blackboard, students could join the online discussion easily without any additional effort. When using Facebook, students had to open another browser to log into Facebook and joined the class group to post. A few students expressed their reluctance to create a new Facebook account due to the social media feature with heavy advertisements on Facebook.

An analysis from the course survey results indicated that student satisfaction levels toward the four sections of the course were generally high. The high satisfaction levels could be attributed to the instructor's organized contents, clear assignment requirements, helpful feedback, support, and the dedication to choose an effective online discussion tool to scaffold meaningful and vigorous interaction among students.

Conclusion

Hyflex instruction, with a higher degree of flexibility and convenience than traditional face-to-face instruction, has been very attractive to students in higher educational settings. How to promote vigorous and positive interaction via online discussion remains as one of the major aspects for online teaching and learning. Quality interaction and students' satisfaction levels are critical for student retention (Yang et al., 2017). Schraw et al. (2001) reported that instructors' meaningful choices of delivery modes that were related to class contents and learning activities were conducive to engaging and increasing student interests and satisfaction with the course. As an online instructor, it is extremely essential more than ever to choose appropriate digital learning tools with effective interface design to promote online discussion and interaction.

Recommendations

As presented and discussed in the literature review, there are six interface design styles for online discussion tools. This study focuses on investigating and comparing the use of Facebook and GoReact which contribute to learning within a HyFlex mode of instruction. It is suggested that further prompt research on new emerging online discussion scaffolding strategies also deserve future exploration and investigation as HyFlex courses are becoming more and more prevalent due to the pandemic.

Limitations

As a mixed-method research design, the study has two substantial limitations. The first limitation is the sample size and selection. The sample for this study was limited to one public institution and one major, educational technology graduate students. It is recommended to have a more diverse institutional perspective including both public and private institutions to better represent higher education institutions across the nation. For future research, non-education major courses could be utilized as a comparative sample. Although generalizability should not be expected or assumed with the results of this research, the results do align with the utilization of the two online discussion tools, Facebook and GoReact, and further their pedological research in such an unprecedented era. The second limitation of this study is regarding the self-reporting data collection method. It is assumed that every participant was honest in response to the survey.

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References

Abdelmalak, M. M. M., & Parra, J. L. (2016). Expanding learning opportunities for graduate students with HyFlex course design. *International Journal of Online Pedagogy and Course Design, 6*(4), 19-37. https://doi.org/10.4018/IJOPCD.2016100102

Boston, W., Diaz, S. R., Gibson, A. M., Ice, P., Richardson, J., & Swan, K. (2009). An exploration of the relationship between indicators of the community of inquiry framework and retention in online programs. *Journal of Asynchronous Learning Networks, 13*(3), 67-83. https://bit.ly/3uTHaRd

Ching, Y., & Hsu, Y. (2013). Collaborative learning using VoiceThread in an online graduate course, *Knowledge Management and Elearning: An International Journal, 5*(3), 298–314. https://doi.org/10.34105/j.kmel.2013.05.021

Clark, C., Strudler, N., & Grove, K. (2015). Comparing asynchronous and synchronous video versus text-based discussions in an online teacher education course. *Online learning, 19*(3), 48-60. https://doi.org/10.24059/olj.v19i3.668

Consortium for School Networking. (2020). *COVID-19 response: Preparing to take school online*. https://bit.ly/36dwLpk

Delmas, P. (2017). Using VoiceThread to create community in online learning, *TechTrends*, 61, 595-602. https://doi.org/10.1007/s11528-017-0195-z

Dimeo, J. (2017). *Peer advice for instructors teaching online for the first time.* Inside Higher Education. https://bit.ly/3rPHPkW

Duffin, E. (2019). *Share of students studying online in the U.S. by gender and education level 2019.* Statista. https://bit.ly/36eAraj

Fox, O. H. (2017). Using VoiceThread to promote collaborative learning in on-line clinical nurse leader courses, *Journal of Professional Nursing, 33*(1), 20-26. https://doi.org/10.1016/j.profnurs.2016.08.009

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2-3), 87-105. https://doi.org/10.1016/S1096-7516(00)00016-6

Green, T., & Green, J. (2018). Flipgrid: Adding voice and video to online discussions. *TechTrends*, *62*(1), 128–130. https://doi.org/10.1007/s11528-017-0241-x

Hou, H., Wang, S., Lin, P., & Chang, K. (2015). Exploring the learner's knowledge construction and cognitive patterns of different asynchronous platforms: comparison of an online discussion forum and Facebook. *Innovations in Education and Teaching International, 52*(6), 610-620. https://doi.org/10.1080/14703297.2013.847381

Kirby, E. G., & Hulan, N. (2016). Student perceptions of self and community within an online environment: The use of VoiceThread to foster community. *Journal of Teaching and Learning with Technology*, *5*(1), 87-99. https://doi.org/10.14434/jotlt.v5n1.19411

Ming, N., & Baumer, E. (2011). Using text mining to characterize online discussion facilitation. *Journal of Asynchronous Learning Networks, 15*(2), 71-109. https://doi.org/10.24059/olj.v15i2.189

Schraw, G., Flowerday, T., & Lehman, S. (2001). Increasing Situational Interest in the Classroom. *Educational Psychology Review, 13*(3), 211-224. https://doi.org/10.1023/A:1016619705184

Stoszkowski, J. R. (2018). Using Flipgrid to develop social learning. *Compass: Journal of Learning and Teaching*, *11*(2), 1-4. https://doi.org/10.21100/compass.v11i2.786

Swan, K., & Ice, P. (2010). The community of inquiry framework ten years later: Introduction to the special issue. *The Internet and Higher Education, 13*(1-2), 1-4. https://doi.org/10.1016/j.iheduc.2009.11.003

Technavio. (2018). *E-learning Market in the US 2018-2022*. https://bit.ly/3Jul8J4

Yang, D., Baldwin, S., & Snelson, C. (2017). Persistence factors revealed: Students' reflections on completing a fully online program. *Distance Education*, *38*(1), 23-36. https://doi.org/10.1080/01587919.2017.1299561