

What Makes a Successful Online Learner?: Community College Students' Perceptions of Online Learning Challenges and Strategies

Xuehan Zhou (Corresponding Author)
School of Education
University of California, Irvine
3200 Education
Irvine, CA 92697-5500
Email: xuehanz1@uci.edu

Qiujie Li
NYU Steinhardt School of Culture, Education, and Human Development
New York University
82 Washington Square East, 7th Floor
New York, NY 10003-6674
Email: ql16@nyu.edu

Di Xu
School of Education
University of California, Irvine
3200 Education
Irvine, CA 92697-5500
Email: dix3@uci.edu

Brad Bostian
First Year Experience
Central Piedmont Community College
Central High 110A
PO Box 35009
Charlotte, NC 28235-5009
Email: brad.bostian@cpcc.edu

Acknowledgement: This paper is supported by the National Science Foundation through award #1750386 to University of California Irvine. The opinions expressed are those of the authors and do not represent views of the National Science Foundation.

ABSTRACT

An extensive theoretical and empirical literature stresses the challenges of online learning, especially among students enrolled in open-access institutions who often struggle more due to job and family commitments and a lack of self-regulated learning skills. As online expansion continues in higher education, understanding the specific challenges students encounter in online coursework, and learning strategies that can help them cope with these challenges, can provide valuable insights to be widely shared. Using open-ended survey data collected from 365 students at a state community college system, this study examined students' perceptions of challenges of online learning that may lead to undesirable learning outcomes and specific strategies they found effective in addressing these challenges. We combined structural topic modeling and human coding in analyzing student responses. Three sets of challenges—including insufficient time management skills, greater tendencies of multitasking and being distracted in an online learning environment, and ineffective interaction and frustrations with help-seeking—emerged from student responses. In response to these challenges, students reflected on ways to improve online learning experiences and outcomes, including improving time management skills, maintaining an organized and distraction-free study environment, proactively seeking help, and using study strategies to improve learning effectiveness.

Keywords: Online learning, community college, student perception

Introduction

Online learning, with the advantage of greater flexibility and accessibility, has become a common option for students in higher education. Based on data from the Department of Education's Integrated Postsecondary Education Data System (IPEDS), Xu and Xu (2020) calculated that the number of students who enrolled in at least one course through online learning increased by one million between 2012 and 2016, representing a 19% increase. Further, online enrollments have increased particularly quickly at non-selective/open-access institutions. During the academic year of 2016–17, almost 40 percent of the students enrolled at non-selective institutions attempted at least one online course, which is more than twice the rate at the most selective institutions (16 percent) (Xu & Xu, 2020).

In spite of the rapid growth of online learning, an extensive literature has found that semester-length online courses are often associated with lower course completion and performance than face-to-face courses, and such performance gaps are particularly pronounced at open access institutions (e.g., Bettinger et al., 2017; Hart et al., 2018; Johnson & Mejia, 2014; Kozakowski, 2019; Streich, 2014; Xu & Jaggars, 2011, 2013, 2014). Skeptics of online learning pointed out two major challenges associated with online learning. First, the physical separation between students and their instructors and peers imposes challenges for effective communication and developing a sense of community, which in turn may impair learning engagement (McInnerney & Roberts, 2004). In addition, online learning requires students to take greater responsibilities to plan, monitor, and adjust their learning process. Yet, many students may not be equipped with sufficient self-regulated learning skills and would need additional guidance and support to adapt to the online learning environment. A few studies took a step further to depict in detail the challenges of online learning from students' perspectives (e.g., Doherty, 2006;

Friedman, 2020; Morris et al., 2005). For example, Doherty (2006) used a survey to examine factors affecting retention in online courses and found that poor time management, especially procrastination and insufficient time commitment, is the primary reason that community college students fail or drop an online course.

In view of the performance decrements and challenges associated with online learning, a growing body of studies has attempted to identify effective learning strategies that students could use to improve their online learning effectiveness (e.g., Carson, 2011; Chang, 2010; Cho & Shen, 2013; Liao et al., 2014; Puzziferro, 2008). Most of these studies tapped into learning strategies that are already well defined in the broad teaching and learning literature, and collected information on students' usage of these strategies through closed-ended surveys. For example, Puzziferro (2008) measured learning strategies and study skills using a well-established scale - *Motivation Strategies for Learning Questionnaire (MSLQ)* and administered the survey among community college students enrolled in online courses. The author found that self-regulated learning (SRL) strategies such as effort regulation, time-management, and study environment management, are positively correlated with student course performance. While these studies provide important insights into possible ways to improve online learning outcomes, they offer limited space for students to reflect on their learning experiences and give more detailed and unrestrained responses with creativity and self-expression.

A small but growing number of studies have used open-ended surveys to elicit students' detailed use and diversified perceptions of online learning strategies (e.g., Beaudoin et al., 2009; ChanLin, 2012; Roulston et al., 2018; Song et al., 2004). For example, Beaudoin et al. (2009) collected open-ended survey data from 318 adult learners about their varied online learning activities and identified a number of items that are highly context-bound and not included in

typical surveys of online learning strategies, such as the ability to learn with limited support and relationship with online facilitators. In a similar vein, Roulston et al. (2018) interviewed 34 students who enrolled in a graduate certificate program about their ways of engaging with course content and interacting with instructors and peers in online courses. The respondents also described a number of original strategies that worked fairly effectively within the local context but are not covered in the current literature, such as attending small-group meetings outside of the class time.

While the studies mentioned above are primarily conducted in the four-year setting, their findings suggest that effective online learning strategies may be largely dependent on the specific institutional contexts. Accordingly, it is important to collect authentic information from local participants of online learning to distill learning strategies that are conducive to effective online learning locally. For example, since community colleges differ substantially from four-year institutions in terms of student population, teacher characteristics, and availability of academic resources (Adelman, 2005; Bailey et al., 2010; Ran & Xu, 2019), the specific challenges faced by students and the learning strategies that they find helpful may differ from those reported in other sectors. In view of the continued online expansion at community colleges, more research is in need to understand the specific challenges community college students face in online classes and strategies that prove to be useful in delivering better learning outcomes. Such lessons learned from existing online students could be used to inform institutional efforts in designing student supports and training at scale (Byrd & MacDonald, 2005; Schmid & Abell, 2003; Xu & Jaggars, 2014).

The Current Study

This study intended to collect information from students' perspectives regarding the challenges associated with online learning and strategies that are conducive to better online learning outcomes at community colleges. Through an open-ended survey, we elicited student responses to two main topics: the challenges of online courses and possible ways to improve online learning experiences. By combining machine learning algorithms with human-coding, we identified three main challenges of online learning, including insufficient time management skills, greater tendencies of multitasking and being distracted in an online learning environment, and ineffective interaction and frustrations with help-seeking. In response to these challenges, a handful of strategies emerged as particularly helpful to promote learning outcomes, including improving time management skills, maintaining an organized and distraction-free study environment, proactively seeking help, and using study strategies to improve learning effectiveness.

Method

Setting and participants

This study used survey data collected from the North Carolina Community College System (NCCCS) in the spring term of 2018-2019 academic year. NCCCS has 58 community colleges with nearly 300,000 students, making it the third largest community college system in the United States. With the joint effort of all the community colleges in the state, NCCCS has provided the students considerable distance learning opportunities. The percentage of students who had coursework exclusively in an online format increased from 14% to 22% through the 2012-2013 to the 2016-2017 academic year. Distance education enrollments are continuing to rise in recent years. However, similar to community colleges nationwide, NCCCS is also subject to performance gaps between face-to-face and online delivery. The administrative data indicate

that online student course passing rates consistently lag behind face-to-face course passing rates by about 11 percentage points, indicating the need to improve student learning in online courses.

To support student success in online courses, the NCCCS Excellence in Research and Analytics research team developed an open-ended survey to help identify areas for improvement and collect promising learning strategies in improving student online performance. Specifically, the survey included four questions that are directly related to online learning challenges and strategies. The detailed survey items and questions are presented in Table 1. The research team reached out to the official Distance Learning Administrator contacts for all the 58 community colleges in NCCCS. These contacts then distributed the survey among students who had taken an online course.

[Insert Table 1 here.]

Among the 58 community colleges, 18 colleges provided at least one student response, resulting in a total of 365 students in our analytical sample. Compared with the student population in the 58 community colleges, our sample tended to have higher proportions of female students, White students, African American students, but a lower proportion of Latinx students.¹ As our goal is to identify any challenges/strategies in online learning that can potentially impede/improve students' performance rather than exploring the most common challenges/experiences, a relatively small sample size is not a threat to this study.

Analytical approach

To identify the main themes in student open-ended text responses in an efficient and objective way, we started by using structural topic modeling (STM) to identify the main topics in student responses and develop a coding scheme based on the topics identified (Roberts et al.,

¹ Our sample, as compared with the whole population in the 58 community colleges, tended to have higher proportions of female students (78% vs. 60%), White students (58.8% vs. 57%), African American students (25.3% vs. 21%), and a lower proportion of Latinx students (6.3% vs. 12%).

2014). STM is a popular technique for automatic discovery of topics in a document corpus, which identifies the main topics based on the frequency of word co-occurrence in the open-ended responses. However, there are limitations with STM in analyzing short responses such as the data in our study (Qiang et al., 2017), as the data sparsity in short responses reduces the probability of word co-occurrence and makes it difficult to catch patterns that are not salient enough to be identified as a topic. Accordingly, we developed an initial coding scheme based on the key topics that were identified from STM and then introduced human coding to verify and refine the coding scheme. We describe the two-step analytical process in detail below.

Developing the Initial Coding Scheme Using STM approach. STM was applied to develop the initial coding scheme by identifying key topics from the student responses to each survey question. First, we used STM to identify groups of words that frequently occur together. Then, researchers interpreted the meaning of the groups of co-occurred words to determine the themes captured by these words. For example, a group of words that emerged might contain “time,” “procrastinate,” “schedule,” and “prevent.” This group of words could further be interpreted as a theme of “prevent procrastination and keep track of the time schedule.”

The identification of key themes for each survey question involved three core steps: First, we pre-processed the data by removing all punctuations and transforming words to lowercase in their root form. As the algorithm requires researchers to predetermine the number of topics to be identified from the responses, we then explored models with a wide range of numbers of topics (i.e., from 2 to 30 in this study). To determine the optimal number of topics, we first narrowed down to a smaller range of numbers of topics (e.g., from 2 to 8) that produced relatively better model fit measured by two commonly used indicators, including held-out likelihood and semantic coherence. Appendix A presents the model fit result for each survey question. Then,

two researchers made sense of the themes identified independently and then worked together to reconcile and determine the number of topics that produced the most meaningful results (e.g., four themes for effective strategies students have used in past online learning experiences). After determining the number of topics and the key words emerging from STM, researchers interpreted each collection of the words and established the key themes.²

Systematic Human Coding. In the process of systematic human coding, two researchers coded all the responses independently using the coding scheme generated based on the results from STM. During this process, the two researchers manually added new themes if the responses were not captured by the initial coding scheme. The researchers particularly looked for the uncaptured themes that were either frequently reported by participants or were identified as important by previous literature. This ensured that we did not miss information by setting too few themes arbitrarily. After each round of human coding, the two researchers compared their coding results and calculated the kappa value for each theme. If there existed any disagreements, the two researchers would discuss the coding results and refine the coding schemes until satisfactory levels of the kappa statistics (i.e., 0.7) were achieved (Landis & Koch, 1977; McHugh, 2012).³ Table 2 shows the kappa statistics, where more than two thirds of the themes have a kappa value higher than 0.8. The remaining disagreement was resolved by a third researcher.

[Insert Table 2 here.]

Results

² Please refer to Li et al. (2021) for more detailed description of the procedure involved in identifying key themes using the STM approach.

³ The kappa values can be interpreted as follows: values ≤ 0 as no agreement, 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement.

Table 3 shows the main themes identified from student responses to each of the four survey questions about online learning. More detailed example responses for each theme and its summary statistics, including the frequency a theme appeared among all the survey respondents, are presented in Appendix B. Although three distinct questions were included in the survey to elicit information on strategies to improve online learning experiences, it seems that there is substantial overlap in student responses to these questions. Accordingly, we explain the main themes identified from student responses to the two main topics explored in this study: (i) challenges associated with online learning, and (ii) specific strategies to improve the learning outcomes.

[Insert Table 3 here.]

Challenges of online learning that could result in undesirable performance

Three themes emerged from student responses to perceived challenges associated with online learning, including insufficient time management skills, greater tendencies of multitasking and distractions in an online learning environment, and ineffective interaction and frustrations with help-seeking.

Insufficient time management skills. More than half of the respondents reported that insufficient time management skills impeded their learning in online courses in three specific ways. First, approximately a quarter of the students indicated that with the flexible schedule, they often procrastinated in online courses and waited until the last minute to do the coursework, resulting in rushed assignment completion and lower grades. As one student noted, “one thing I do that would lead to a bad grade is procrastinating any work I have to do and wait until the last day to finish an assignment.” Relatedly, about 8% of the students mentioned that they often missed assignments or submitted them late due to losing track of the deadlines of the

assignments. For example, one student stated that the reason they got behind was that they did not “write down when the assignments are due” and “ended up turning them in late.” Finally, more than 13% of the students reported overloaded commitments, which is often due to failure to budget time wisely for the coursework. Students often underestimated the expected workload of online courses and found it difficult to balance the workload among coursework, full-time jobs, and family commitments once the course started, which could further cause anxiety. For example, one student pointed out explicitly, “I overloaded myself this semester working fulltime as well as being a fulltime student and full-time mom to a newborn baby. It gets stressful and causes you to do poorly on assignments.” Around 9% of the students pointed out several other time management related issues, including “not dedicating specific time to class.”

Greater tendencies of multitasking and being distracted in an online learning environment. Nearly 10% of the students reported that they had difficulties concentrating in an online learning environment and tended to get distracted by social media, TV, and the internet while working on coursework online. As one student mentioned, “I get easily distracted while trying to complete assignments. If I have the TV on while working on an assignment, I easily get drawn to the TV instead of the assignment.” Another student related, “Staying focused is my hardest task. When you are taking online classes, it is easy to lose focus on a subject you are working on.” In addition, students also mentioned that due to the flexible nature of online learning, they were often interrupted by random requests. As one student noted, “I am distracted by some normal homeownership requirements, such as laundry, shopping, mowing, trimming shrubs, and minor home repairs.”

Ineffective interaction and frustrations with help-seeking. Roughly 5% of the students complained about the lack of interactions with peers and instructors in online courses. As one

student shared, “I find my online class has little to no interaction with instructors or with classmates. Like we’re all just alone in the class and finding our own way.” For some students, this lack of effective communications and social interaction not only led to feelings of isolation, but also resulted in inadequate support from the course instructor and peers when they had questions, in some cases resulting in withdrawing from or failing the courses. For example, one student mentioned, “Sometimes not being able to know a peer in your class or often waiting several days for an email response can hinder learning.” The frustrations with isolation and insufficient support may negatively influence students’ motivation and result in early course withdrawal or poor performance.

Strategies to improve online learning experiences

Unsurprisingly, the responses to the survey questions that focused on ways to improve online learning experiences aligned closely with the challenges identified by the students. Specifically, students nominated four categories of strategies and three of them were used to offset the challenges described above.

Improving time management skills. The most commonly mentioned theme was improving time management skills. For example, close to half of the students stated that they would have been more successful in online courses if they had better time management skills, and nearly 73% of the students recommend other online course takers to improve their time management skills as an important way to improve online learning outcomes.

The respondents also recommended two specific ways to improve time management skills. The first one is to avoid procrastination by planning and working in advance. For example, one student noted that it was necessary to plan ahead with the assignments, avoid procrastination, and budget plenty of time to get the work done for any online course: “As soon

as you get an assignment, start working on a plan to get it completed. Anything can happen such as a power outage which can prevent you from getting work turned in on time.” Another student also described how she managed to complete assignments on time through careful time management. “I start my work early in the week. This helps me focus on what I’m doing and be able to finish work on time.” In addition, respondents highlighted the importance of *scheduling a certain time frame each week to learn*. For example, one student noted “I would allocate a set time each week to complete online assignments.”

In addition to the two strategies, more than 21% of the students echoed the need to find ways *to balance coursework and other things* in their responses. These students noted that they would achieve greater academic success if they had a more accurate understanding of the course load and planned their coursework and other commitments more wisely. For example, one student mentioned “I would’ve taken my current online class over the summer during which I had fewer job responsibilities. I could do better because I would’ve had more time to dedicate to the class.”

Maintaining a distraction-free and organized study environment. In view of the temptation of internet distractions and other disruptions, the survey respondents have emphasized the benefit of maintaining a distraction-free and organized environment dedicated to learning. For example, a handful of students in our sample tried to set up a quiet and organized environment (e.g., “a room with no TV and noises”) for studying and found that it was beneficial to their online learning experiences. One student mentioned “I focused all my attention on one assignment at a time and went into a quiet room so there were no distractions and so I can concentrate on my work.” In a similar vein, around 7% of the students mentioned that they could have gotten a higher grade if they had managed technological distractions more carefully.

Accordingly, they recommended that future online takers “keep the cell phone off and go in a room alone” to reduce the likelihood of straying away from learning. In addition to staying away from distractions, students also pointed out that it is critical to make sure that the learner has access to “supplies needed for studying in advance,” including “unlimited access to the Internet.”

Proactive help-seeking. Proactive help-seeking was also mentioned frequently across student responses. For instance, one student noted explicitly “I would not have a strong B average if I did not reach out for paid tutoring services.” In support of the importance of seeking help proactively, several students indicated that they would have been more successful if they had proactively reached out to the course instructor and peers. It seems that some students are more reluctant to reach out to the course instructor than to peers. Accordingly, they recommended “network[ing] with people who are either in the class now or have taken it before.”

Using study strategies for more effective learning. In addition to specific strategies to offset the challenges associated with online learning, close to half of the respondents highlighted the importance of using course learning materials in a more effective manner, and have also offered a number of specific ways to achieve this, including “printing out materials” for easier note taking, “highlighting key items in the textbook and take notes while reading,” “recording lectures,” “reading chapters and creating mind maps,” “using flashcards to help memorize,” and “taking advantage of the materials from other sources instead of relying solely on the textbook.”

Discussion and conclusion

Summary of key findings

In spite of its promise to expand access to higher education, online learning has been consistently associated with lower student achievement at community colleges. The present study examines open-ended responses collected from students in this particular setting regarding the challenges students face in online courses, and strategies they find helpful to offset these challenges. A combination of STM and human coding has identified a handful of themes which all seem to be related to the concept of self-regulated learning (SRL).

First, consistent with prior literature on the importance of *time management skills* as a key component of SRL in virtual learning environments (Broadbent & Poon, 2015; Liao et al., 2014; Puzziferro, 2008), students in our sample consistently pointed out that poor time management, especially procrastination, has adversely influenced their learning outcomes in an online course. This has been further complicated by the fact that a large proportion of community college students also need to balance their coursework with other commitments to work and family, making time management even more challenging in this particular setting. In response to these challenges, students have shared a number of time management strategies for effort regulation, such as to develop an overall schedule of all the commitments and have a detailed daily plan to keep track of their learning process and assignments. The strong emphasis on planning is in line with Inan et al.'s (2017) finding that planning is an important predictor of student success and satisfaction in an online course.

In addition, distractions from either the internet or the physical environment seem to be a critical obstacle to effective online learning. Compared with a face-to-face delivery format where students meet regularly at a fixed time in an instructor-supervised environment, the flexibility of

online learning and the role the internet plays during the learning process increases the probability of multitasking and distraction. Accordingly, *management of distracting cues and strategies to minimize potential interference*—such as placing the phone out of sight and logging out of the social media accounts during study hours—could support concentration and more effective learning outcomes. These results align with Puziferro’s (2008) findings that community college students with better environment management skills receive better learning outcomes. It is worth noting that the extent of distractions heavily depends on access to a quiet place to study.

A third challenge that emerged from students’ responses concerns the lack of interpersonal interaction in online courses, and the greater challenges of receiving support from instructors and peers. Due to the physical separation between instructors and students and the limited non-verbal cues during the teaching and learning process, it becomes more difficult for online instructors to identify struggling students and respond to students in a timely manner. Accordingly, *proactive help-seeking from the students*—such as reaching out to course instructors and peers more frequently, networking with class peers, and tapping into on campus resources—plays a more central role in a virtual learning space.

In addition to specific ways to address the challenges associated with time management, distractions, and a lack of interactions, students in our sample also identified a number of *cognitive strategies to optimize learning outcomes*, including printing out reading materials ahead of time for easier note taking, highlighting key information in the materials, creating a mind map, making flash cards, and taking notes using software such as Evernote, Microsoft OneNote, Google Keep, etc. Building from laboratory-based work that identifies learning strategies as a key component of SRL (Pintrich, 2004), a growing area of research in higher

education has focused on how strategies based on cognitive learning theories may enhance the learning outcomes (e.g., Carson, 2011; Chang, 2010; Cho & Shen, 2013; Puzziferro, 2008). The majority of these studies are conducted in a four-year or MOOC setting, and the results from our study add to these ongoing discussions through the perspectives of online students at two-year colleges. Future studies may wish to systematically collect information on community college students' practice of different learning strategies and relate them to course learning outcomes for evidence-based student support.

Implications for Policy and Practice

Our results also provide a number of implications for online course instruction and institutional support. First, responses from students in our sample indicate that due to different family environments and resources, there is likely substantial variability among community college students in their access to high-speed internet and a quiet space for learning. This implies that students from different backgrounds are positioned differently in their ability to tackle the challenges associated with online learning, and failure to recognize and reconcile these differences can result in exacerbated equity gaps among subgroups of students. This highlights the importance for online course instructors to take into account the constraints students might be subject to in designing an online course. For example, while synchronous interactions are often advocated as a way to better engage students during the learning process, it may impose greater challenges on students who do not have a quiet space for synchronous sessions. In the meantime, support from the institution by offering students quiet learning space on campus and by distributing technical devices to students with limited access to these resources, such as computers and broadband, can help offset some of these gaps.

Second, our results indicate that insufficient self-regulated learning skills pose a critical obstacle for effective learning among community college online learners. Yet, the fact that some students were able to develop these skills during the course of study and benefited from them suggests that workshops or orientations that are intentionally designed to scaffold these skills and are offered to students prior to online course enrollment may lead to fruitful results. To optimize the effectiveness of an orientation, it needs to be designed to reflect the challenges faced by students in a specific college and tailored to the local needs. For example, based on the challenges and strategies shared by students in the present study, an effective orientation offered to students at NCCCS colleges would need to review essential time-management tips, provide suggestions on how to set up a dedicated learning environment, and encourage students to build learning communities. In addition, it seems that a non-trivial proportion of students in our sample struggled with online learning due to underestimating the workload from online coursework and a failure to maintain a school-life balance later on. Considering the large proportion of community college students who need to balance their family and work commitments with schoolwork, it would be instrumental for online orientations to also explicate the typical expectations and workload of online courses and help students to make an informed plan ahead of time.

In addition to helping students develop skills that would enable them to optimize learning outcomes in the face of many challenges, the effectiveness of online learning also depends on how an online course is designed and taught. For example, in order to keep the students from procrastinating, instructors may consider dividing large assignments into smaller tasks and systematically space out the due dates throughout the term to help students regulate their efforts. Similarly, our findings suggest that many students are reluctant to reach out to their instructors

and peers for help. Accordingly, intentionally designed opportunities and prompts on help-seeking—such as office hours, proactive outreach to students, collaborative learning opportunities—may foster students’ help-seeking activities in the virtual space. To reduce students’ perceived threat of help-seeking, it is also important for instructors to identify ways to explicitly demonstrate an openness to communication, project a supportive instructional style, and encourage student help-seeking. To help instructors better understand the importance of supporting and connecting with students, and equip instructors with the skills necessary to implement them effectively, colleges will need to provide professional training opportunities and accompanying support to online instructors. Specifically, in addition to training on the basic skills of online teaching, such as the use of technologies and the layout of the course website, the programs should take account of preparing teachers for student-centered teaching approaches and interpersonal interaction skills to scaffold self-regulated learning and encourage communication.

Future Research Directions and Conclusion

This study examined student perceptions of online learning at community colleges to identify challenges students have encountered, as well as strategies that are promising in offsetting these challenges. Although our study reflects data from only 365 students and used a convenience sampling scheme, it adds to the existing literature by collecting information on students’ online learning experiences at community colleges. Findings from this study can be used to guide the development of online learning orientation and professional development activities to prepare students and instructors at community colleges for more effective online learning and teaching. The open-ended responses may also guide subsequent research efforts in developing close-ended surveys, which can be used to collect students’ perceptions of online

learning and commonly used strategies at a larger scale. Finally, although our study identified several promising online learning strategies from students' perspectives, more research is needed to validate their benefits in terms of student achievement outcomes. Accordingly, future studies that empirically examine the causal impact of interventions on online learning strategies through randomized control trials will lay a critical foundation toward improving online learning outcomes at community colleges.

References

- Adelman, C. (2005). Moving into Town--and Moving On: The Community college in the lives of traditional-age students. *US Department of Education*. Retrieved from <https://eric.ed.gov/?id=ED496111>
- Bailey, T., Jeong, D. W., & Cho, S. W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review, 29*(2), 255-270. <https://doi.org/10.1016/j.econedurev.2009.09.002>
- Beaudoin, M., Kurtz, G., & Eden, S. (2009). Experiences and opinions of e-learners: What works, what are the challenges, and what competencies ensure successful online learning. *Interdisciplinary Journal of E-Learning and Learning Objects, 5*(1), 275-289. Retrieved from <https://www.learntechlib.org/p/44836/>.
- Bettinger, E. P., Fox, L., Loeb, S., & Taylor, E. S. (2017). Virtual classrooms: How online college courses affect student success. *American Economic Review, 107*(9), 2855-75. <https://doi.org/10.1257/aer.20151193>
- Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education, 27*, 1-13. <https://doi.org/10.1016/j.iheduc.2015.04.007>
- Byrd, K. L., & MacDonald, G. (2005). Defining college readiness from the inside out: First-generation college student perspectives. *Community college review, 33*(1), 22-37. <https://doi.org/10.1177/009155210503300102>
- Carson, A. D. (2011). Predicting student success from the LASSI for learning online (LLO). *Journal of Educational Computing Research, 45*(4), 399-414. <https://doi.org/10.2190/EC.45.4.b>

- Chang, M. M. (2010). Effects of self-monitoring on web-based language learner's performance and motivation. *Calico Journal*, 27(2), 298. Retrieved from https://www.jstor.org/stable/calicojournal.27.2.298?seq=1&cid=pdf-reference#references_tab_contents
- ChanLin, L. J. (2012). Learning strategies in web-supported collaborative project. *Innovations in Education and Teaching International*, 49(3), 319-331. <https://doi.org/10.1080/14703297.2012.703016>
- Cho, M. H., & Shen, D. (2013). Self-regulation in online learning. *Distance education*, 34(3), 290-301. <https://doi.org/10.1080/01587919.2013.835770>
- Doherty, W. (2006). An analysis of multiple factors affecting retention in web-based community college courses. *The Internet and Higher Education*, 9(4), 245-255. <https://doi.org/10.1016/j.iheduc.2006.08.004>
- Friedman, J. (2020). Tackle Challenges of Online Classes Due to COVID-19. U.S. News. Retrieved from <https://www.usnews.com/education/best-colleges/articles/how-to-overcome-challenges-of-online-classes-due-to-coronavirus>
- Hart, C. M. D., Friedmann, E., & Hill, M. (2018). Online course-taking and student outcomes in California community colleges. *Education Finance and Policy*, 13(1), 42-71. https://doi.org/10.1162/edfp_a_00218
- Inan, F., Yukselturk, E., Kurucay, M., & Flores, R. (2017). The impact of self-regulation strategies on student success and satisfaction in an online course. *International Journal on E-learning*, 16(1), 23-32. Retrieved from <https://www.learntechlib.org/primary/p/147296/>.

Johnson, H. P., & Mejia, M. C. (2014). *Online learning and student outcomes in California's community colleges*. Public Policy Institute. Retrieved from

<https://www.luminafoundation.org/wp-content/uploads/2017/08/r-514hjr.pdf>

Kozakowski, W. (2019). Moving the classroom to the computer lab: Can online learning with in-person support improve outcomes in community colleges? *Economics of Education Review*, 70, 159–172. <https://doi.org/10.1016/j.econedurev.2019.03.004>

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159. <https://doi.org/10.2307/2529310>.

Liao, H. A., Edlin, M., & Ferdenzi, A. C. (2014). Persistence at an urban community college: The implications of self-efficacy and motivation. *Community College Journal of Research and Practice*, 38(7), 595-611. <https://doi.org/10.1080/10668926.2012.676499>

McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia medica*, 22(3), 276-282. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3900052/>

McInnerney, J. M., & Roberts, T. S. (2004). Online learning: Social interaction and the creation of a sense of community. *Journal of Educational Technology & Society*, 7(3), 73-81. Retrieved from <https://www.learntechlib.org/p/75444/>

Morris, L. V., Finnegan, C., & Wu, S. S. (2005). Tracking student behavior, persistence, and achievement in online courses. *The Internet and Higher Education*, 8(3), 221-231. <https://doi.org/10.1016/j.iheduc.2005.06.009>

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational psychology review*, 16(4), 385-407. <https://doi.org/10.1007/s10648-004-0006-x>

- Puzziferro, M. (2008). Online Technologies Self-Efficacy and Self-Regulated Learning as Predictors of Final Grade and Satisfaction in College-Level Online Courses. *American Journal of Distance Education, 22*(2), 72-89.
<https://doi.org/10.1080/08923640802039024>
- Qiang, J., Chen, P., Wang, T., & Wu, X. (2017, May). Topic modeling over short texts by incorporating word embeddings. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining* (pp. 363-374). Springer, Cham. Retrieved from
https://link.springer.com/chapter/10.1007/978-3-319-57529-2_29
- Ran, F. X., & Xu, D. (2019). Does contractual form matter? The impact of different types of non-tenure-track faculty on college students' academic outcomes. *Journal of Human Resources, 54*(4), 1081-1120. <https://doi.org/10.3368/jhr.54.4.0117.8505R>
- Roberts, M. E., Stewart, B. M., Tingley, D., Lucas, C., Leder-Luis, J., Gadarian, S. K., ... & Rand, D. G. (2014). Structural topic models for open-ended survey responses. *American Journal of Political Science, 58*(4), 1064-1082. <https://doi.org/10.1111/ajps.12103>
- Roulston, K., Pope, E., Paulus, T., & deMarrais, K. (2018). Students' perceptions of learning about qualitative inquiry in online contexts. *American Journal of Distance Education, 32*(3), 190-201. <https://doi.org/10.1080/08923647.2018.1475921>
- Schmid, C., & Abell, P. (2003). Demographic risk factors, study patterns, and campus involvement as related to student success among Guilford Technical Community College students. *Community College Review, 31*(1), 1-16.
<https://doi.org/10.1177/009155210303100101>

- Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The internet and higher education*, 7(1), 59-70. <https://doi.org/10.1016/j.iheduc.2003.11.003>
- Streich, F. E. (2014). *Online education in community colleges: Access, school success, and labor-market outcomes* (Doctoral dissertation). Retrieved from <http://hdl.handle.net/2027.42/108944>
- Xu, D., & Jaggars, S. S. (2011). The effectiveness of distance education across Virginia's community colleges: Evidence from introductory college-level math and English courses. *Educational Evaluation and Policy Analysis*, 33(3), 360-377. <https://doi.org/10.3102/0162373711413814>
- Xu, D., & Jaggars, S. S. (2013). The impact of online learning on students' course outcomes: Evidence from a large community and technical college system. *Economics of Education Review*, 37, 46–57. <https://doi.org/10.1016/j.econedurev.2013.08.001>
- Xu, D., & Jaggars, S. S. (2014). Performance gaps between online and face-to-face courses: differences across types of students and academic subject areas. *The Journal of Higher Education*, 85(5), 633–659. <https://doi.org/10.1080/00221546.2014.11777343>
- Xu, D., & Xu, Y. (2020). The ambivalence about distance learning in higher education: Challenges, opportunities, and policy implications. *Higher Education: Handbook of Theory and Research: Volume 35*, 351-401.

Table 1 The four survey questions that are related to online learning challenges and strategies

Survey question asked	
Challenges associated with Online Learning	
Challenges students have encountered in past online learning experiences	Please describe one or two things that you do or don't do in your life or in online courses that impede your learning, cause you to withdraw, or cause you to get a bad grade (less than a C) in online courses.
Strategies to Improve Online Learning Experiences	
Effective strategies students have used in past online learning experiences	Please describe one or two things you do for yourself in online courses that really help you learn, complete the courses, and get a good grade. How do you know they help you?
Strategies students proposed to improve online learning experiences	If you could change one or two things about your own situation that would help you to be more successful in online courses than you are now, what would those changes be? What would a more successful "you" in online courses look like?
Strategies students suggested using in online learning	If a friend were asked your advice about how to be successful in online classes, what would you say?

Table 2 Kappa statistics for all the codes

		Coding themes	Kappa values
Challenges students have encountered in past online learning experiences	Insufficient time management skills	Procrastination	0.87
		Do not have a schedule for coursework	0.79
		Fail to balance coursework and other things	0.81
		Other time management issues	0.82
		Greater tendencies of multitasking and being distracted in an online learning environment	0.81
		Ineffective interaction and frustrations with help-seeking	0.86
Effective strategies students have used in past online learning experiences	Improve time management skills	Schedule a certain time frame for homework	0.91
		Prevent procrastination	0.72
		Other time management strategies	0.86
	Use study strategies for more effective learning	Take notes and highlight important course content	0.82
		Other ways of using materials	0.77
		Proactive help-seeking	0.84
	Maintain a distraction-free and organized study environment		Avoid distractions in the learning environment
		Have learning supplies handy	0.74

Table 2 Kappa statistics for all the codes (continued)

	Coding themes		Kappa values
Strategies students proposed to improve online learning experiences	Improve time management skills	Schedule a certain time frame for homework	0.85
		Prevent procrastination	0.88
		Balance coursework and other things	0.84
		Other time management strategies	0.70
	Proactive help-seeking		0.82
	Maintain a distraction-free and organized study environment		0.81
Strategies students suggested using in online learning	Improve time management skills	Schedule a certain time frame for homework	0.79
		Prevent procrastination	0.87
		Other time management strategies	0.82
	Use study strategies for more effective learning	Take notes and highlight important course content	0.82
		Other ways of using course material	0.84
	Proactive help-seeking		0.75

Table 3 Themes emerging from each survey question

	Time management skills	Distraction-free study environment	Help seeking	Study strategies for effective learning
Challenges students have encountered in past online learning experiences	√	√	√	
Effective strategies students have used in past online learning experiences	√	√	√	√
Strategies students proposed to improve online learning experiences	√	√	√	
Strategies students suggested using in online learning	√		√	√

Appendix A

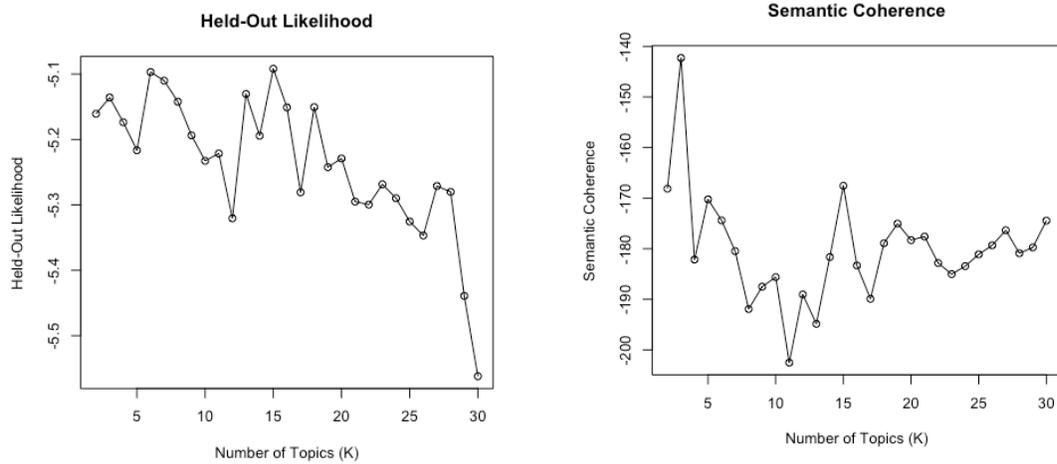
The model fit result for each survey question is presented below.

Challenges students have encountered in past online learning experiences. Results of model fit for students' perceptions on challenges students have encountered in past online learning experiences are shown in Appendix Figure 1. As the number of topics increases from 2 to 30, the held-out likelihood fluctuates within a small range and the semantic coherence first increases from around -170 to -140 and then decreases to -185 sharply. Above $K=4$, the held-out likelihood keeps decreasing gradually. Therefore, this study narrowed down the solutions to numbers of topics equal 2 to 5. By coding the responses independently, the two researchers both agreed that three topics were most interpretable.

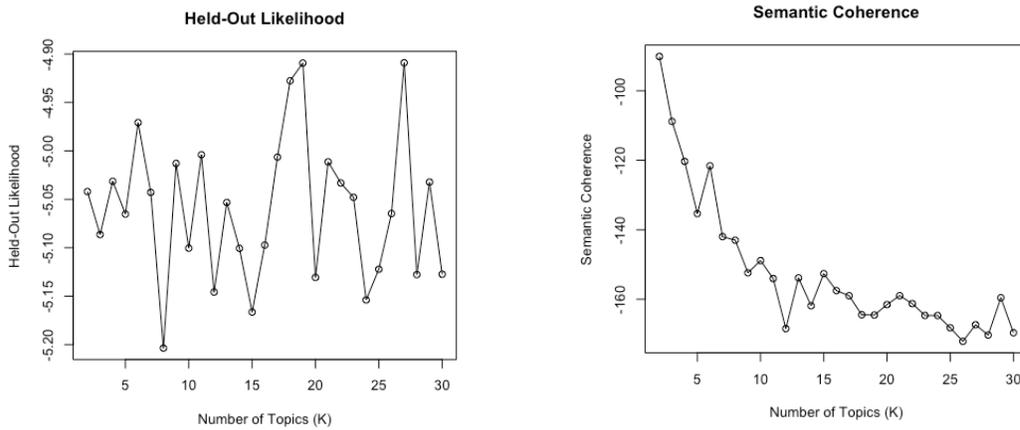
Effective strategies students have used in past online learning experiences. Results of model fit for students' perceptions on effective strategies they have used in past online learning experiences are shown in Appendix Figure 2. As the number of topics increases from 2 to 30, the held-out likelihood fluctuates within a small range and the semantic coherence first decreases from around -80 to -135 and then keeps decreasing gradually. Therefore, this study narrowed down the solutions to numbers of topics equal 2 to 5, which yielded a relatively similar and better model fit. The two researchers agreed on four topics after human coding.

Strategies students proposed to improve online learning experiences. Results of the model fit for students' perceptions on strategies students proposed to improve online learning experiences are shown in Appendix Figure 3. As the number of topics increases from 2 to 30, the held-out likelihood fluctuates within a small range and the semantic coherence first decreases from around -100 to -150 and then keeps decreasing gradually (Figure 4). Therefore, this study narrowed down the solutions to numbers of topics equal 2 to 5. The two researchers coded the responses independently and agreed that four topics were most interpretable.

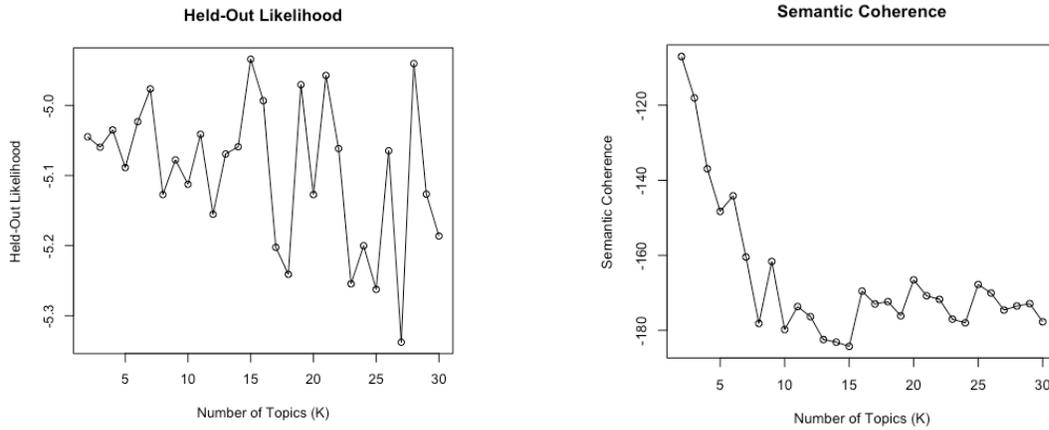
Strategies students suggested using in online learning. Results of the model fit for students' perceptions on strategies students suggested using in online learning are shown in Appendix Figure 4. As the number of topics increases from 2 to 30, the held-out likelihood fluctuates within a small range and the semantic coherence first decreases from around -110 to -170 and then keeps fluctuating (Figure 3). Therefore, this study narrowed down the solutions to numbers of topics equal 2 to 6. After human coding the responses, the two researchers agreed on three topics.



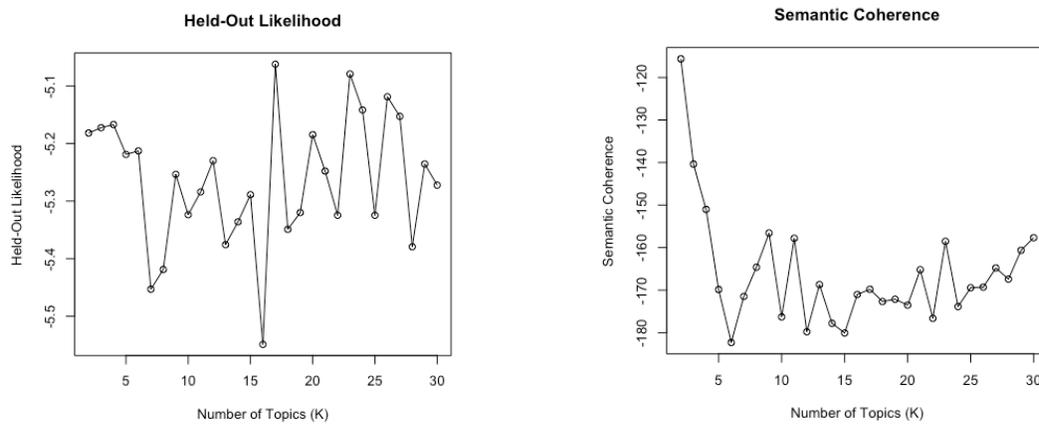
Appendix Figure 1. Model fit for challenges students have encountered in past online learning experiences.



Appendix Figure 2. Model fit for effective strategies students have used in past online learning experiences.



Appendix Figure 3. Model fit for strategies students proposed to improve online learning experiences.



Appendix Figure 4. Model fit for strategies students suggested using in online learning.

Appendix B

Appendix Table 1 Challenges students have encountered in past online learning experiences

Themes	Sub-themes	Definition	Sample Responses	Frequency
Insufficient time management skills (53.42%)	Procrastination	Students often procrastinate and wait until the last minute to do the coursework.	<ul style="list-style-type: none"> One thing I do that would lead to a bad grade is procrastinating any work I have to do and wait until the last day to finish an assignment. 	25.47%
	Not have a schedule for coursework	Students fail to keep track of the due dates of the assignments	<ul style="list-style-type: none"> I do not write down when the assignments are due. I forget and end up turning them in late. I can sometimes procrastinate too much and forget to do an assignment or not have enough time. 	7.76%
	Fail to balance coursework and other things	Students have difficulties in balance coursework and other things.	<ul style="list-style-type: none"> I work on a farm 24/7, the animals are number one priority, everything else comes after their care. I overloaded myself this semester working fulltime as well as being a fulltime student and full-time mom to a newborn baby. I would not recommend anyone taking on more than what they can handle. It gets stressful and causes you to do poorly on assignments. 	13.04%
	Other time management issues	Students have other time management issues that impede students' learning.	<ul style="list-style-type: none"> Not planning out my time wisely. I overwhelmed myself by doing too many assignments on any particular day. Do not dedicate specific time to that class to get work done. 	7.14%

Appendix Table 1 Challenges students have encountered in past online learning experiences (continued)

Themes	Sub-themes	Definition	Sample Responses	Frequency
Greater tendencies of multitasking and being distracted in an online learning environment (9.29%)		Students have difficulties in concentrating and keeping from distractions.	<ul style="list-style-type: none"> I get easily distracted while trying to complete assignments. If I have the TV on while working on an assignment, I easily get drawn to the TV instead of the assignment. Staying focused is my hardest task. When you are taking online classes, it is easy to lose focus on a subject you are working on. 	9.63%
Ineffective interaction and frustrations with help-seeking (4.95%)		Students have difficulties in seeking help from instructors, peers, and others.	<ul style="list-style-type: none"> Sometimes not being able to know a peer in your class or often waiting several days for an email response can hinder learning. I find my online class has little to no interaction with instructors or with classmates. Like we are all just alone in the class and finding our own way. 	5.28%

Appendix Table 2 Effective strategies students have used in past online learning experiences

Themes	Sub-themes	Definition	Sample Responses	Frequency
Improving time management skills (52.91%)	Schedule a certain time frame for homework	Students create an appropriate schedule to keep track of the due dates of the assignments and set aside time to do coursework.	<ul style="list-style-type: none"> I always try to keep a good schedule to be sure I get everything done on time. I know this helps me because I did not do this the first part of class and wasn't doing well but when I started doing it class was easier. I take a day for each course to do work, study, and read. I also keep a planner and write down when assignments are due. I know that these two things help me because I maintain as in my online courses. 	27.91%
	Prevent procrastination	Students avoid procrastinating and waiting until the last minute to do coursework.	<ul style="list-style-type: none"> I start my work early in the week. This helps me focus on what I am doing and be able to finish work on time. Start looking at the assignments early. I know they help because I not rushed and can take the time to do a good job, review then submit. 	15.99%
	Other time management strategies	Other strategies that can help students manage their time.	<ul style="list-style-type: none"> I pace myself and allow for ample time to get required work completed. Work in increments and use time management. Get organized and practice time management skills. 	9.01%

Appendix Table 2 Effective strategies students have used in past online learning experiences
(continued)

Themes	Sub-themes	Definition	Sample Responses	Frequency
Use study strategies for more effective learning (39.83%)	Take notes and highlight important course content	Students take notes and highlight important course content to process the content covered in the materials.	<ul style="list-style-type: none"> • Print out material. So, I can highlight and make notes. I know it helps because it is often easier for me to remember the content that I print out. • I highlight key items in the textbook and take notes while reading. 	13.95%
	Other ways of using course material	Students take advantage of other ways of using course material to facilitate study.	<ul style="list-style-type: none"> • I take advantage of as many offered resources as I can, including recorded lectures. • I make sure I read my chapters and then I like to do all my mind map and it helps me learn the material. • I make flash cards and have an alarm set for when I should study or take tests. 	25.87%
Proactive help-seeking (10.47%)		Students proactively reach out to peers, instructors, and tutors if they have questions.	<ul style="list-style-type: none"> • Ask questions, get involved with other online students, and get feedback. • I would not have a strong B average if I did not reach out for paid tutoring services. 	10.47%
Maintain a distraction-free and organized study environment (4.07%)	Avoid distraction in the learning environment	Students avoid distractions in the learning environment and concentrate on their work.	<ul style="list-style-type: none"> • I focus all my attention on one assignment at a time and go into a quiet room so there are no distractions and so I can concentrate on my work. • I also isolate myself at home versus being around things that distract me. 	1.74%
	Have learning supplies handy	Students have supplies needed for studying.	<ul style="list-style-type: none"> • I do all of this at home with unlimited access to the internet and my computer. • I have an area set aside for study and all supplies needed readily available. 	2.33%

Appendix Table 3 Strategies students proposed to improve online learning experiences

Themes	Sub-themes	Definition	Sample Responses	Frequency
Improve time management skills (43.34%)	Schedule a certain time frame for homework	Students create an appropriate schedule to keep track of the due dates of the assignments and set aside time to do coursework.	<ul style="list-style-type: none"> I would allocate a set time each week to complete online assignments while checking on Moodle for updates/changes every day. Just be more aware of due dates and to previously check assignments. 	5.26%
	Prevent procrastination	Students avoid procrastinating and waiting until the last minute to do coursework.	<ul style="list-style-type: none"> Procrastination is a struggle when taking an online course because you always have access to the material. I would be less procrastinating and have a more school-work schedule for being a stay-at-home mom/student. 	16.41%
	Balance coursework and other things	Students can make a balance between coursework and other things.	<ul style="list-style-type: none"> I would have taken my current online class, BIO 112 fast track, over the summer instead of this semester. I think I could do better because I would have had more time to dedicate to the class. Work 60 hours instead of 75 plus hours. I would have a deeper understanding of what I learned instead of aiming for the test. 	21.67%
	Other time management strategies	Other strategies that can help students manage their time.	<ul style="list-style-type: none"> Being highly organized and spending time wisely. I need to not be so busy; I need to take a little break from everything I am involved in. I think it will help me focus and really motivate me to spend my time wisely. More time to dedicate towards schoolwork. 	15.48%

Appendix Table 3 Strategies students proposed to improve online learning experiences

Themes	Sub-themes	Definition	Sample Responses	Frequency
Proactive help-seeking (2.79%)		Students proactively reach out to peers, instructors, and tutors if they have questions and concerns.	<ul style="list-style-type: none"> I would use the instructor's email and course message center to communicate any questions or concerns about course work. I would also use the same to communicate with fellow classmates to stay on top of what is expected and ideas to help make the course fun and successful. I would like public forums where we can gain help from other students...maybe some other students understand the concept better than me and can explain it better than the book does. Sometimes it gets bothersome to always write emails to the teacher when you have a question. 	2.79%
Maintain a distraction-free and organized study environment (6.81%)		Students avoid distractions in the learning environment and concentrate on their work.	<ul style="list-style-type: none"> I would just be sure to separate myself from distractions. Keep my cell phone off and go in a room alone with no TV or anything else to keep me away from my work. Being able to work in quiet would obviously help. Oftentimes I find myself trying to block out external noise with music. 	6.81%

Appendix Table 4 Strategies students suggested using in online learning

Themes	Sub-themes	Definition	Sample Responses	Frequency
Improve time management skills (73.24%)	Schedule a certain time frame for homework	Students create an appropriate schedule to keep track of the due dates of the assignments and set aside time to do coursework.	<ul style="list-style-type: none"> I would say to be aware of all your work and deadlines and to set aside time daily to work on your assignments. Routines are always a good thing. I would also tell them to make sure that they keep track of assignments. 	30.00%
	Prevent procrastination	Students avoid procrastinating and waiting until the last minute to do coursework.	<ul style="list-style-type: none"> Do not wait until the last minute to complete assignments. As soon as you get an assignment, start working on a plan to get it completed. Anything can happen such as a power outage which can prevent you from getting work turned in on time. Finish homework assignments early because you can easily forget and nobody is going to remind you about it, and do not procrastinate on anything. 	32.06%
	Other time management strategies	Other strategies that can help students manage their time.	<ul style="list-style-type: none"> I would tell them to make sure they delegate a good amount of time to online classes. Prioritize your assignments by importance and deadline because more work is required in online courses. 	11.18%

Appendix Table 4 Strategies students suggested using in online learning

Themes	Sub-themes	Definition	Sample Responses	Frequency
Use study strategies for more effective learning (15.88%)	Take notes and highlight important course content	Students take notes and highlight important course content to process the content covered in the materials.	<ul style="list-style-type: none"> • Read the material and take notes. It is simple if you do those two things. • Write down everything the teacher says in his/her videos. 	5.00%
	Other ways of using course material	Students take advantage of other ways of using course material to facilitate study.	<ul style="list-style-type: none"> • Reading syllabus before class begins, having course text before semester begins, having all the tools needed for that particular subject before classes begin. • Do not rely solely on the textbook for information, some don't have much in the way of practice problems. Instead use online sources such as YouTube to supplement the more difficult problems. 	10.88%
Proactive help-seeking (11.18%)		Students proactively reach out to peers, instructors, and tutors if they have questions and concerns.	<ul style="list-style-type: none"> • Network with people who are either in the class now or have taken it before. Do not be afraid to ask for help. • Ask questions when you don't understand something. Stay in close contact with teachers. 	11.18%