The Use of the Flipped Classroom Model in Online Teaching: Teachers' Perspectives

Patricia D. Simon and Rene M. Nob

The COVID-19 pandemic forced a shift to online learning, leading to increased interest in innovative instructional approaches such as the flipped classroom. This study explores teachers' perceptions of the flipped classroom in the context of online learning during the pandemic. A survey was conducted to 41 teachers and their responses were analyzed using content analysis. Findings indicate that teachers generally view the flipped classroom approach positively. They appreciate its flexibility and convenience, allowing students to access lectures before class and engage in active learning during synchronous sessions. Teachers believe this promotes study habits and metacognition. The flipped classroom also saves time for interactive and application-focused activities. However, teachers acknowledge potential challenges. Some students may prefer traditional lectures, and limited resources like weak internet connectivity can impede participation. To address these challenges, teachers emphasize the importance of thoughtful preparations and appropriate follow-up assessments. Teachers perceive the flipped classroom as beneficial for self-regulated learners with access to necessary resources. This study provides valuable insights into teachers' perceptions of the flipped classroom in online learning during the COVID-19 pandemic. The findings inform educators seeking to optimize their instructional strategies in remote learning environments, highlighting both the benefits and challenges associated with the flipped classroom model.

Keyword: Flipped classroom, pandemic, online learning, teachers' perspectives

The impact of the COVID-19 pandemic was ubiquitous. From March 2020 through 2021, several waves of the pandemic strained hospitals' capacity, facilities, and personnel, due to the enormous volume of COVID-19 patients (Leite et al. 248). Governments mandated the use of face masks, physical distancing, and lockdowns as strategies to mitigate the transmission of the virus (Krishnamachari et al. 1036). These lockdowns and stay-at-home orders had a debilitating economic impact (Yu et al. 9) and also resulted in higher stress, anxiety, and depression levels among individuals (Shaikh 7).

Aside from COVID-19's impact on healthcare, the economy, and mental health, another sector of society that was heavily affected is education. Governments ordered schools to close their campuses as part of the stringent measures to slow down the spread of the virus. (Krishnamachari et al.1037). In the Philippines, classes at all levels were suspended by March 2020 and at the time of writing this paper, the resumption of face-to-face learning in the Philippines is yet to be fully implemented, as many schools are still cautious about the potential surge in infections.

Because it is important for education to continue despite the pandemic, the mode of learning transitioned from face-to-face to remote or online learning (Thorn and Vincent-Lancrin 386). Technological advances allowed schools to conduct online classes using video conferencing platforms, educational apps, and social media (Xie et al. 176). Despite dealing with several stressors such as social isolation, increased workload, students' concerns, and everyday family needs, teachers also needed to innovate in delivering their lessons (Baker et al. 500). They managed both giving synchronous lectures and asynchronous activities (Brady and Pradhan 233). Some developed their own YouTube channels that students can access anytime they need (Irawan et al. 2470), while some teachers flipped their classrooms (Tang et al. 80).

Flipped classroom strategies have been around for some time, but their viability became more evident during the COVID-19 pandemic because of the rapid transition to online teaching modalities. Hence, this study aims to examine teachers' perceptions about the flipped classroom and to further understand under what conditions such a strategy would be most beneficial to teachers and students.

Flipped Classroom: What is It and How is It Applied?

As the circumstances forced teachers to devise ways to continuously deliver lessons, the flipped classroom is one of the innovations that could prove very useful in a pandemic. A flipped classroom pedagogy involves inverting a course so that lectures are viewed outside of class and class time is devoted to active learning through activities such as demonstrations and group work (Hussey et al., A Primer 169). In a fully-flipped classroom, the work traditionally completed in class (e.g., lectures) is done outside of class. Students accomplish assignments or what is referred to as "homeworks" during class time, and teachers would be hands-on, guiding the students with their tasks. It is said that the practice had existed for several years already before it had a label (Hansen 41). The rise of the flipped classroom in 2007 was reflective of the technological advancement happening around that time (Albert and Beatty 419). With the increase of available Information and Communication Technology (ICT) that allowed for easier prerecording of learning content, online lectures were made available for students who struggled with lessons and who needed more time to review the material in the comfort of their homes. For instance, students who were absent due to illness were given a chance to catch up.

How Do Teachers Flip?

While the approach has been around prior to the COVID-19 pandemic, teachers can apply the principles behind the flipped classroom model as we navigate our way into the new norm in the area of delivering lessons. The essence of a flipped classroom is to go beyond the traditional, lecture-based classroom instruction and use prerecorded videos and assign reading materials before class (Tucker 82). Thus, the success of a flipped classroom design lies in the teacher's ability to choose and adequately prepare suitable materials for the course. Flipped classroom requires a teacher to be creative and thoughtful in developing active learning opportunities. Teachers need to determine what material could be assigned asynchronously for students to access anytime and what material to cover in synchronous online classes. The option for asynchronous lessons proved valuable during the COVID-19 pandemic due to the increased absenteeism caused by illness and other pandemic-related stressors (Simon 1) and unavoidable problems with internet connectivity in a low-income country such as the Philippines.

Some ways lessons are presented in an online flipped course are through slide presentations with voice-over, prerecorded lecture videos, podcasts, and preexisting online lectures prepared or curated by instructors. On the other hand, synchronous class meetings can involve discussions, project-based learning, problem-based learning, or group activities.

Advantages and Disadvantages of the Flipped Classroom

One of the advantages of a flipped classroom is that it has been proven effective in increasing student engagement and motivation (Aji and Khan, The Impact of Active Learning 205). In a quasi-experiment comparing groups of students who were taught using the traditional lecture approach and students who were enrolled in sections that used the flipped approach, the latter demonstrated better learning strategies and more positive attitudes to learning (Aji and Khan, Flipped Classroom 8). The flipped classroom was also better at increasing Filipino students' motivation and task performance relative to the traditional lecture class (Labrador 2). Furthermore, the traditional lecture approach in the undergraduate classroom is deemed incomplete and ineffective not only in engaging the students and keeping their motivation but

also in aiding the learning process (Aji and Khan, Impact of Active Learning 207). Research suggests active learning techniques in a flipped classroom help students achieve targeted learning outcomes (Albert and Beatty 422; Aji and Khan, Impact of Active Learning 208).

A flipped course provides the teacher with a unique opportunity to incorporate more hands-on experiences in the class. This is a creative way of solving the problem of time constraints often experienced in the traditional classroom setup. There is also evidence that students prefer hands-on classroom activities over lectures (Pierce and Fox 4). In a flipped classroom, more time could be allotted for teacher-student interaction (Pierce and Fox 4). Having the professor available to address queries is something that students appreciate (Cummins-Sebree and White 57). A flipped course is also believed to promote the connection between content and real-world applications. It enables self-paced learning as students can re-watch, pause, or review prerecorded lectures (Cummins-Sebree and White 57). Other positive outcomes associated with a flipped course include increased student retention, perceptions of support, involvement, and, at times, academic performance (Chi and Wylie 234; Detlor et al. 156). For instance, two studies that examined the course design in a psychology statistics course found that students in the flipped class performed better academically than students in the traditional class (Hussey et al., Promoting Active Learning 24; Wilson 197). There is also strong evidence of students' preference for a flipped course design regardless of actual learning outcomes (Cummins-Sebree and White 57; Pierce and Fox 3; Wilson 197).

However, there are some caveats to successfully implementing a flipped course. One thing that must be noted is that not all in-person activities will be transferrable to the virtual mode, such as role-playing (unless it is prerecorded). Activities such as live role-playing and laboratory work were restricted during the pandemic due to the need for social distancing and the lack of availability of laboratory materials at home. Heavy and time-intensive preparation is also required from the teachers, as the flipped classroom is developed, for the most part, prior to the start of the course (Heiss and Oxley 1247). The flipped approach could also encounter resistance from teachers who are very traditional and who are uncomfortable learning new technology.

Additionally, since the model is student-centered and promotes active learning, it requires students to be more accountable for their learning, which some students are unwilling to do (Tanner and Scott 235). Clear expectations should be set at the beginning of a flipped course to encourage students to come to class prepared and to have the foundational knowledge that would enable them to participate in in-class activities. There must also be a way to track and assess students' progress and participation in the course using clear learning outcomes (Öncel and Kara 213). Finally, the difficulty in establishing a sense of community in an online set-up must be noted, so how to build positive connections among students in a flipped online course can be another thing to consider.

As a teaching strategy increasingly gaining attention, it is essential to study the factors that facilitate and the challenges encountered in implementing a flipped course, specifically in an online learning environment. Much research has focused on studying the impact of the flipped classroom on student engagement from students' perspectives (Aji and Khan, Flipped Classroom 8; Limniou et al. 811; Öncel and Kara 219). Furthermore, the findings of empirical studies are inconsistent with regard to the flipped classroom model's effect on academic performance or learning outcomes in general. Others say that its only effect is on student engagement and that no significant differences in performance can be found between flipped and traditional courses (Smallhorn 51). Thus, this paper aims to present educators' perspectives on how applicable the flipped classroom model is in the context of online learning during the pandemic and the experiences of some teachers who, more or less, apply some of the principles of the flipped classroom model in their classes.

Method: Participants and Procedure

An online survey was conducted between the second and third week of December 2021, with the COVID-19 pandemic still ongoing. The survey was administered to inform the presentation of the primary author as one of the requirements of the Academic Leadership Development Program they are attending at that time. The survey link was sent using email notices and social media chats stating that the survey is intended for teachers (regardless of course and year level taught). Recruited participants are Filipinos and currently teaching during the time of data collection. It was not required that teachers had prior experience with flipped courses in order to participate. A definition of the flipped classroom model was provided at the beginning of the survey for those who have never heard of the approach. Forty-one responses from teachers were gathered. Data on gender and age were not collected.

Responses could be considered as archival data since they were collected for a purpose other than research. As mentioned, the data were collected as part of the requirements in an Academic Leadership Development Program. Participants responded to the online survey about current practices in online teaching voluntarily, having been informed of the primary purpose of data gathering. Participants answered the survey after having been informed that their insights will be valuable in the sharing of how online learning was conducted during the pandemic.

Findings

This study aims to examine teachers' perceptions of the flipped classroom as a strategy, regardless of whether they have used it or not. Based on the content analysis of their responses, we present our major findings below in terms of themes and sub-themes.

Flipped Classroom Benefits

Teachers have a generally positive attitude towards flipped classrooms. Even teachers who, presumably, have not used it as a strategy, found flipped classroom interesting and were willing to explore it; as expressed by participant 24, "*I think it's an interesting approach.*" The flipped classroom strategy, from the perspectives of teachers, affords them and their students flexibility and convenience, and encourages engagement through allowing students to express their agency leading to improved academic skills.

Flexibility and Convenience

Some teachers think of the flipped classroom as flexible and convenient for both students and teachers. A commonly mentioned benefit of a flipped classroom is that students gain early access to the learning materials, as expressed participant 40, "*being able to access the lessons beforehand at home will help the student to be ready for the synchronous sessions.*" The model affords flexibility to students by allowing them to study and learn the materials at their own pace. Assuming that students do so, the flipped classroom model is perceived as efficient because it saves time during synchronous sessions. Participant 7 shared, *"this is a good model as it saves time in actual classroom interaction in explaining the concepts–they come to class already armed with the knowledge and concepts based on asynchronous activities and should be ready to see its application."* Furthermore, Participant 41 said, "*Flipped classroom is effective because we've tried it out in our lesson, and the smooth flow of discussion is very evident.*"

Encourages Student Engagement

The early access to course materials allows students to engage in independent learning, allowing them to self-direct in navigating through the resources, as expressed by participant 30, "*the learner utilize it and learn on their own by playing it again or by reading it again and*

or manipulating it again." The excerpt suggests that the flipped classroom model gives an opportunity for students to exercise their agency, creativity, and strategy in learning the lessons. Teachers believe that this degree of autonomous engagement can foster study habits, and consequently, better academic skills. According to participant 38, "*This reverse approach will allow students to rethink their study habits, research skills, and reading comprehension skills.*" Furthermore, as students develop good study habits and skills, so will their self-efficacy increase.

Caveats in the Implementation of the Flipped Classroom

However, teachers are aware that not all students are bound to recognize and take advantage of the opportunities afforded by the flipped classroom model. Some of the limitations in the implementation of the approach include students' lack of appreciation for the method, existing socio-economic inequalities, and the huge amount of effort required from teachers and students to make it work.

Lack of Appreciation for the Flipped Classroom Model of Some Students

According to participant 32, "*we cannot avoid that there are really students who prefer being spoon-fed.*" Teachers perceive that some students prefer synchronous lectures because they do not want to study in advance and would like to receive immediate answers to their queries, which typically happens in a classroom lecture. This was noted by participant 39, "*students prefer to have it discussed in synchronous set up so they can ask anytime and expect answers right away.*"

Poses Disadvantage to Students who Lack Resources

Even if students are amenable to the flipped classroom model, some of them might not be able to participate. Teachers recognize that some students might not have the necessary resources to benefit from a flipped classroom. For example, some students have weak internet connections that could prevent them from accessing lecture materials or watching assigned videos. This concern was expressed by participant 40, "*those who have poor access to the lessons due to weak internet signals could be a bit behind.*" While most students enrolled in exclusive and private schools will not encounter this problem as much, the more disadvantaged students from lower socio-economic classes could find it challenging to keep up with the lessons that are delivered online.

Potentially Taxing

Although there are many benefits to implementing the flipped classroom model, it is also perceived as potentially taxing to both teachers and students. Teachers are expected to exert more effort in preparing for asynchronous lessons and assessments. Participant 18 noted, "*Implementation of FCM is okay as long as it is supported by solid asynchronous preparation.*" Participant 14 also expressed favor toward the approach, provided that asynchronous lessons are followed-up with good assessments, "*I am in favor, but would require follow-through, such as quizzes about lecture inputs, to ensure that students actually watch recorded lectures.*" Thus, the additional attention to detail in planning the content of the lesson and the preparing corresponding assessment will mean more workload for faculty members, at least in the early phase of implementation.

As for students, if all teachers use the flipped classroom model, teachers think that it is also likely that students will find studying all course materials cumbersome as pointed out by participant 24, "*undergraduate students have a lot of other subjects to tackle and might not have the time to do the required tasks prior to the class hours.*"

Ideal Set-up for a Flipped Classroom

Considering the above, teachers think that implementing the flipped classroom model in the online set-up will be ideal under specific conditions. Some of the factors that can potentially contribute to the success of flipped classroom include students' high levels of self-regulation, access to resources, ideal class size, and thorough planning and preparation on the part of teachers.

Self-Regulating Students, Access to Resources and Small Class Size

Students who are more self-regulating in their learning process and have the necessary resources are more likely to benefit from the flipped classroom model. According to participant 32, "*it can be effective for self-regulated learners.*" Self-regulated learners are students who exercise a sense of agency and control over how they learn. A past study pointed out that one of the benefits of the flipped classroom approach is that it gives room for self-paced learning since students can re-watch, pause or review prerecorded lectures (Cummins-Sebree and White 51). Participant 24 also suggests that flipped classroom "*might be more applicable for graduate students.*" There seems to be an expectation that adult learners in graduate school are more self-regulating; hence they are also expected to respond well to a flipped classroom approach. Using the flipped strategy might also work better in graduate school, as classes tend to be smaller in size.

Robust Planning and Preparation

As mentioned by some participants, teachers' robust preparation for the asynchronous content is necessary for the successful implementation of a flipped classroom. This includes effective assessments that could track students' learning and compliance with the assigned activities. Literature on the flipped classroom suggests that the approach effectively keeps students motivated and engaged (Aji and Khan, Flipped Classroom 8), with students expressing a preference for hands-on activities instead of lectures (Pierce and Fox 3). Therefore, a balance needs to be kept between keeping students engaged and ensuring that they are also learning in the process. This is crucial as there are claims that flipped classroom's effect is merely on student engagement and that no significant differences in performance can be found between flipped and traditional courses (Smallhorn 51).

With that said, teachers generally perceive a flipped classroom as an innovative, potentially beneficial, effective classroom management strategy. However, substantial planning and training are necessary for teachers to implement a flipped classroom set-up successfully; as expressed by participant 27, "*teachers must learn how to facilitate learning and design good scaffolds with relevant ICT integration and appropriate content so that goals will be achieved efficiently.*"

Given the findings above, it can be said that effective adoption and implementation of a flipped classroom approach, from teachers' perspectives, would entail the attainment of certain conditions that need to be balanced with existing constraints. It requires effort from both students and teachers, and an honest account of the advantages and disadvantages of the approach and how it would contribute to teaching and learning effectiveness once applied in the classroom.

Conclusions and Recommendations

Findings from the short survey among teachers shed light on their perceptions regarding using the flipped classroom model in online teaching. There have been insights shared that can be considered in designing flipped courses even in the post-pandemic era. This article contributes to increased awareness and promotion of the flipped classroom approach, with

appropriate warnings of specific conditions where the application of the model might not be optimal.

As most of the flipped classroom research has focused on student perceptions and learning, the online survey with teachers attempted to address this gap. However, we acknowledge that the small sample size limits the generalizability of our findings and that future studies should consider gathering survey data from more respondents. Another option is to conduct in-depth interviews to obtain richer insights into the flipped classroom approach's feasibility and acceptability from the teachers' perspective. As the gender and age of the respondents were not collected, these factors may be considered variables that could impact findings in future studies. We also recommend that more research be done to empirically evaluate the effectiveness of the flipped classroom method in blended or hybrid learning as we transition into the post-pandemic era.

References

Aji, Chadia and Khan, M. Javed. "The Impact of Active Learning on Students' Academic Performance." *Open Journal of Social Sciences,* vol. 7, no. 3, 2019, pp. 204-211. doi.org/10.4236/jss.2019.73017

Aji, Chadia, and Khan, M. Javed . "Flipped Classroom and its Impact on Student Engagement.*" 2019 American Society for Engineering Education National Conference*, Tampa, Florida June 15-19, 2019, pp. 1-11. https://peer.asee.org/32850.pdf

Albert, Michael H., and Brian L. Beatty. "Flipping the Classroom Applications to Curriculum Redesign for an Introduction to Management Course: Impact on Grades." *Journal of Education for Business*, vol. 89, no. 8, Taylor and Francis, Nov. 2014, pp. 419–24. https://doi.org/10.1080/08832323.2014.929559.

Baker, Courtney N., et al. "The Experience of COVID-19 and Its Impact on Teachers' Mental Health, Coping, and Teaching." *School Psychology Review*, vol. 50, no. 4, National Association of School Psychologists, Mar. 2021, pp. 491–504. https://doi.org/10.1080/2372966x.2020.1855473.

Brady, Anna K., and Deepak Pradhan. "Learning Without Borders: Asynchronous and Distance Learning in the Age of COVID-19 and Beyond." *ATS Scholar*, vol. 1, no. 3, American Thoracic Society, July 2020, pp. 233–42. https://doi.org/10.34197/ats-scholar.2020-0046ps.

Chi, Michelene T. H., and Ruth Wylie. "The ICAP Framework: Linking Cognitive Engagement to Active Learning Outcomes." *Educational Psychologist*, vol. 49, no. 4, Routledge, Oct. 2014, pp. 219–43. https://doi.org/10.1080/00461520.2014.965823.

Cummins-Sebree, Sarah, and Eliah White. "Using the Flipped Classroom Design: Student Impressions and Lessons Learned." *Association for University Regional Campuses of Ohio*, vol. 20, spring 2014, pp. 50–64.

Detlor, Brian, et al. "Student Perceptions of Information Literacy Instruction: The Importance of Active Learning." *Education for Information*, vol. 29, no. 2, IOS Press, Jan. 2012, pp. 147–61. https://doi.org/10.3233/efi-2012-0924.

Hansen, Morten Hartvig. *Great at Work: How Top Performers Do Less, Work Better, and Achieve More*. Simon & Schuster, 2018

Heiss, Elise M., and Susan P. Oxley. "Implementing a Flipped Classroom Approach in Remote Instruction." *Analytical and Bioanalytical Chemistry*, vol. 413, no. 5, Springer Science+Business Media, Jan. 2021, pp. 1245–50. https://doi.org/10.1007/s00216-020-03147-w.

Hussey, Heather D., et al. "Promoting Active Learning Through a Flipped Course Design." *Advances in Educational Technologies and Instructional Design Book Series*, IGI Global, 2014, pp. 23–46. https://doi.org/10.4018/978-1-4666-4987-3.ch002.

Hussey, Heather D., Aaron S. Richmond, et al. "A Primer for Creating a Flipped Psychology Course." *Psychology, Learning and Teaching*, vol. 14, no. 1SAGE Publishing, July 2015, pp. 169-85. https://doi.org/10.1177/1475725715592830.

Irawan, Edi, et al. "Youtube Channel Development on Education: Virtual Learning Solutions During the Covid." *International Journal of Advanced Science and Technology*, vol. 29, no. 4, 2020, pp. 2469–78. repository.iainponorogo.ac.id/656.

Krishnamachari, Bhuma, et al. "The Role of Mask Mandates, Stay at Home Orders and School Closure in Curbing the COVID-19 Pandemic Prior to Vaccination." *American Journal of Infection Control*, vol. 49, no. 8, Elsevier BV, Feb. 2021, pp. 1036–42. https://doi.org/10.1016/j.ajic.2021.02.002.

Labrador, Dorothy Joann Lei O. *Flipped Classroom Vs. Lecture Class: Their Effects on Motivation, Classroom Engagement and Task Performance in a Writing Class.* 2017. De La Salle University. PhD dissertation. *Animo Repository*, animorepository.dlsu.edu.ph/etd_doctoral/1362.

Leite, Higor, et al. "COVID-19 Outbreak: Implications on Healthcare Operations." *The Tqm Journal*, vol. 33, no. 1, Emerald Publishing Limited, July 2020, pp. 247–56. https://doi.org/10.1108/tqm-05-2020-0111.

Limniou, Maria, et al. "Traditional and Flipped Classroom Approaches Delivered by Two Different Teachers: The Student Perspective." *Education and Information Technologies*, vol. 23, no. 2, Springer Science+Business Media, Mar. 2018, pp. 797–817. https://doi.org/10.1007/s10639-017-9636-8.

Öncel, Aksay Fatih, and Ali Kara. "A Flipped Classroom in Communication Systems: Student Perception and Performance Assessments." *International Journal of Electrical Engineering Education*, vol. 56, no. 3, SAGE Publishing, July 2019, pp. 208–21. https://doi.org/10.1177/0020720918788718.

Pierce, Richard A., and Jeremy T. Fox. "Vodcasts and Active-Learning Exercises in a 'Flipped Classroom' Model of a Renal Pharmacotherapy Module." *The American Journal of Pharmaceutical Education*, vol. 76, no. 10, 2012, pp. 1-5. https://doi.org/10.5688/ajpe7610196.

Shaikh, Areeba, et al. "COVID-19 and Mental Health: A Multi-country Study—the Effects of Lockdown on the Mental Health of Young Adults." Middle East Current Psychiatry,

vol. 28, no. 1, Springer Science+Business Media, Dec. 2021, pp. 1-10
https://doi.org/10.1186/s43045-021-00116-6.

Simon, Patricia. "Calling Attention to Mental Health Issues in a Developing Country: Views and Recommendations From the Philippines Post-elections." *Asian Journal of Psychiatry*, vol. 74, June 2022, pp. 1-2. https://doi.org/10.1016/j.ajp.2022.103198.

Smallhorn, Masha. "The Flipped Classroom: A Learning Model to Increase Student Engagement Not Academic Achievement." *Student Success*, vol. 8, no. 2, Queensland University of Technology, July 2017, pp. 43–53. https://doi.org/10.5204/ssj.v8i2.381.

Tang, Tao, et al. "Efficiency of Flipped Classroom With Online-based Teaching Under COVID-19." *Interactive Learning Environments*, vol. 31, no. 2, Taylor and Francis, Sept. 2020, pp. 1077–88. https://doi.org/10.1080/10494820.2020.1817761.

Tanner, Maureen, and Elsje Scott. "A Flipped Classroom Approach to Teaching Systems Analysis, Design and Implementation." *Journal of Information Technology Education: Research*, vol. 14, Jan. 2015, pp. 219–41. www.jite.org/documents/Vol14/JITEv14ResearchP219-241Tanner1840.pdf.

Thorn, William, and Stéphan Vincent-Lancrin. "Education in the Time of COVID-19 in France, Ireland, the United Kingdom and the United States: The Nature and Impact of Remote Learning." *Primary and Secondary Education During Covid-19*, Springer, 2021, pp. 383–420. https://doi.org/10.1007/978-3-030-81500-4_15.

Tucker, Bill. "The Flipped Classroom: Online Instruction at Home Frees Class Time for Learning." *Education Next*, vol. 12, no. 1, Routledge, Jan. 2012, pp. 82-83

Wilson, Stephanie R. "The Flipped Class." *Teaching of Psychology*, vol. 40, no. 3, SAGE Publishing, May 2013, pp. 193–99. https://doi.org/10.1177/0098628313487461.

Xie, Xin, et al. "COVID-19 Pandemic – Online Education in the New Normal and the Next Normal." *Journal of Information Technology Case and Application Research*, vol. 22, no. 3, Taylor and Francis, Nov. 2020, pp. 175–87. https://doi.org/10.1080/15228053.2020.1824884.

Yu, Krista Danielle S., et al. "The Economic Impact of Lockdowns: A Persistent Inoperability Input-Output Approach." *Economies*, vol. 8, no. 4, MDPI, Dec. 2020, pp. 1-14. https://doi.org/10.3390/economies8040109.