On the perceived impact of online classes brought by the pandemic: Case for Philippine engineering students

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Abstract

Essays of fifty-one aeronautical engineering students enrolled in theory of flight were analysed to determine the impact of online classes to their learning due to the pandemic. Collection of data is performed a month after the implementation of nationwide lockdown in the Philippines, where reported COVID-19 cases were at its heights. Majority of the students were using mobile phones and data for their online classes. Students reported that quality of connection greatly affects their learning online. The sudden move to online mode of education affected students' perception of their learning process, both positive and negative notes. Connectivity, accessibility and financial issues were mentioned as disadvantages of online classes. The current emotional and mental conditions of students due to the pandemic were found to greatly affect their learning. The rapid shift of classes to an online set-up has left many students struggling to catch on with their studies. Advantages of online education include self-regulation, flexibility and continuity of learning. Online classes induced improvements in the comprehension skills of students. In general, students perceived online classes to be effective in ensuing continuity of learning during the pandemic. Adequate planning of activities and deadlines, more synchronous sessions and provision of assistance to improve access and connectivity were suggested. Results of this report could be utilised to inform strategies that will help improve delivery of learning courses online.

Keywords: Aeronautical engineering, Engineering education, COVID-19, Online learning, Distance education

Introduction

The COVID-19 pandemic has brought drastic changes to the educational landscape. The majority of higher educational institutions around the world either moved to purely online mode of learning or maintained physical classes with limited number of interactions. The sudden transition to online learning has changed students' perception as well as how they learn. Many believed that distant learning will continue to expand even after the pandemic. Thus, it is critical for educators and school administrators to study the dynamics of learning online, to make higher education relevant amidst the many technological and societal challenges.

Philippines is among the few nations around the world offering a baccalaureate degree in aeronautical engineering. Courses in the programme are normally taught in a traditional classroom setting, where lectures pertinent to aircraft and its operations, require skill demonstration or a visit to an actual aircraft. Just like any engineering degree, several courses in the programme necessitate activities to be conducted in the laboratory. More often, lecture classes were held together with laboratory activities. In response to restrictions due to COVID-19, higher educational institutions in the Philippines re-opened classes with most having them delivered online. Some schools suspended the offering of laboratory courses while others have it on a very limited scale. Prior to the pandemic, the learning management system (LMS) used by most universities in the country is confined to basic electronic messaging, notification and sending or uploading of typical school documents. Full-fledged online LMS for teaching and learning is available only to very few institutions, most of them related to information technology or technical-vocational programmes. Indeed, most students and faculty members in the country are still new with online education when it was first implemented.

Numerous studies have been published with regards to students' perception in online learning. However, few information has been produced to describe the impact of online classes due to the pandemic in student learning. Likewise, the drastic shift to the online platform by many universities during this trying time presents a unique area for educational discussion. The primary goal of this study is to determine the impact of online classes due to the pandemic in the learning process of students. This can be achieved by looking at factors that influence learning online such as quality of access, students' perceived advantages and disadvantages. In addition, suggestions from students on the enhancement of online class experience were gathered. The information gained from this undertaking could be used to devise strategies that will help improve delivery of learning courses online.

Research Objectives

The purpose of this study is to determine the impact of online classes due to the pandemic in the learning process of students. The goal can be achieved by looking at factors that influence learning online such as quality of access, students' perceived advantages and disadvantages and the effects of the online class set-up on their learning process. This paper is driven by the following specific objectives:

- Identify ways, means and access of students in online classes
- Determine frequency as well quality of access in online courses
- Elicit students' response on the perceived advantages and disadvantages of online classes
- Describe the effects of online classes in the learning process of students

Literature Review

Several studies attempted to describe the dynamics of student learning online. Students' experience in online learning is one aspect that is widely discussed in the literature about distance education. Various literatures in online education argued that students' learning experience is shaped by a variety of factors such as quality of access, perceived advantages and disadvantages and the effects of the online class set-up to their learning process. Figure 1 depicts the convergence of the said factors in the experience of students in online learning.

Several papers support the relevance of connectivity and accessibility issues in online learning. Roig-Vila et al. (2014); Rose and Blomeyer (2007) emphasised the importance of accessibility in the success of online education. Aside from very good internet connection (high speed) and the use of computers and other devices, accessibility to online programme should take into consideration the physical impairment or disability a student has which could affect learning in a virtual learning environment. In addition, poverty or persisting financial or economic problems of students should be taken into consideration when offering online programmes. The demographic information of students should be taken into consideration in the planning and implementation of online programmes. Aragon and Johnson (2008) reported reasons for non-completion of online course are due to personal issues, instructor responsiveness and delivery in online classes, computer and internet issues, advising, class enrolment and cancellation procedures and perceived learning conduciveness of online courses. Personal issues scored the highest percentage of response for non-completion of online course followed by delivery, instructor responsiveness, IT related issues (computer and internet issues), university support services (advising, class enrolment and cancellation procedures) and perceived conduciveness of online courses to their learning (Frankola, 2001; Hislop, 2000; Moore et al., 2003; Willging & Johnson, 2004; Kuo et al., 2014). Muilenburg and Berge (2005) noted that cost and access to the internet as well technical problems with the use of the online platform are perceived by students as challenges in learning online.
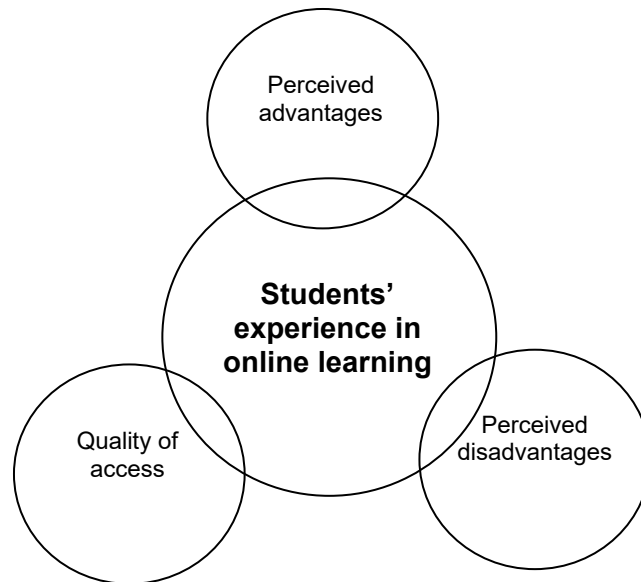
Students have mixed insights when it comes to the implementation of online learning and how it affected their learning process. Ease of access was mentioned as one of the advantages of online classroom compared to traditional setting (Ward et al., 2010). Meanwhile, less flexibility and inconsistency in the delivery of teaching were mentioned by students as disadvantages of distant learning (El Mansour & Mupinga, 2007). Qiu and McDougall (2013) reported that the effort needed for online classes is two to three times greater than face-to-face discussions. Additional time is needed for preparing materials online as well as reading the responses of participants in classes. Moreover, the prolonged engagement in online classes makes the readings and writings more intensive in the part of students and instructors (Qiu & McDougall, 2013). Experiences shared by students on the impact of online learning due to the pandemic will bring forth information on aspects of online learning that needs to be reinforced, improved or changed. This paper attempts to know the dynamics of learning amidst the pandemic by looking at the perception of engineering students.

Oh and Jonassen (2007); Ward et al. (2010) stated that students find online classes insufficient as many have difficulties in comprehension and learning online. Muilenburg and Berge (2005) noted that students who do not learn from traditional classes reported a lot of challenges in online learning. Wang and Woo (2007) as cited by Ward et al. (2010) mentioned that there were fewer interactions, communications and responsiveness in asynchronous online classrooms compared to face-to-face learning. Arkorful and Abaidoo (2014) noted that emphasis or clarifications on some topics is better in traditional classroom compared to e-learning. Arkorful and Abaidoo (2014) also argued that e-learning might not be appropriate in medical and engineering fields, where demonstration of practical skills is important. Muilenburg and Berge (2005) observed that students found online learning exciting and fun when there is high degree of social interaction. Tiene (2000) said expressions and communications in asynchronous online classes are highly textual in nature, whereas traditional classes are more in speaking. Wang and Woo (2007) also noted that communication is favourable in face-to-face discussions. Gesture, voice and facial expression enhances the manner on how students express themselves to others. Unlike online classes, where communication is mostly textual, students reported that they find difficulty in expressing their feelings and ideas online. Clarifications were also found to be immediate in face-to-face discussions. Ravert and Evans (2007) told that students at lower

levels preferred absolute instruction to achieve learning while higher level students prefer collaborative and interdependent activities to achieve learning.

Figure 1

Theoretical framework of the study

Aragon and Johnson (2008) recommended that technical assistance should be provided to students who are having trouble with the computer or internet. Ryan et al. (1999) as mentioned by El-Mansour and Mupinga (2007), stated that aside from the personal convenience and the flexibility in the delivery of course materials that online classes offer, careful consideration should also be made on the learning and technological capacities of students towards the online classroom environment.

Research Method

Students were asked to write about their perceptions in the conduct of online classes despite the pandemic through an essay. The use of essay as a data collection method is not new and it is one of the tools utilised in qualitative research (Polkinghorne, 2005). Compared to a conventional questionnaire, essays are not too rigid, and can elicit substantial and wide array of information from the respondents. Moreover, essays allow students to elaborate their responses and connect it with their experiences. The task was conducted by the third week of April 2020, a month after the implementation of the enhanced community quarantine (ECQ) in the Philippines and the resumption of classes for most universities. By this time, it is assumed that students have immersed themselves in the conduct and mechanics of online classes as well to MOODLE, the LMS utilised by the university for asynchronous classes. To ensure anonymity of responses among students, the essay was given as a form of assignment, where the faculty in charge is the only one that can access their submissions.

Questions about ways, means, frequency and quality of access were inquired. Perceived advantages and disadvantages of online classes and how the shift to LMS affected them as a learner were also observed. Suggestions for improvement were also included in their assignments. Submitted essays were individually read to capture the common as well the emerging themes arising from each response. Various literatures were

consulted to check whether the themes conform to existing information or if a novel trend and issue exist.

Fifty-one (51) out of eighty (80) aeronautical engineering students enrolled in the course, theory of flight, participated in the study. The theory of flight course is regularly offered in the second semester of freshmen year for BS Aeronautical Engineering programme. Known to be a male dominated field, the programme is now gaining interest from females as shown in Table 1. Moreover, the minimum of age of student participants is eighteen (18). This can be explained by the changes brought in the Philippine basic educational system, where additional years were required for students to spend in secondary education. The majority of classes in universities were suspended prior to ECQ, and students, together with their families, took the opportunity to go to their respective provinces. This is reflected by the distribution of the locations of respondents outside Metro Manila. The majority of known and big universities in the Philippines are found in Manila, and many students in the provinces are pursuing higher studies in the capital prior to the pandemic.

Table 1

Demographic profile of the respondents

Item	Response	Number of responses
Gender	Male	35
	Female	16
Location	Within Metro Manila	32
	Outside Metro Manila	19
Year Level	Freshmen	46
	Sophomore	5
Age	Below 18 years old	0
	18 years old and above	51

Findings

This section discusses information about students' experiences on the impact of online classes brought by the pandemic to their learning. Students' responses were organised according to the order of questions given in their essays. Themes arising from each query were recorded and compared to information available in the literature. Novel trends and issues arising from students' reports were also captured.

The majority of students responded that they accessed the university LMS either through computers (desktop or laptop), mobile phones or a mixed of both gadgets. Humanante et al. (2015) told that accessibility of personal learning environment (PLE) through mobiles is a welcome development in online learning. Mobile devices empower students' role in learning, enabling better interaction with their faculty and access to students support services (Foti & Mendez, 2014). Learning using mobile devices also allows students access to learning contents that would supplement and enrich their knowledge. Moreover, mobile devices allow students to take an active role in their learning. Common themes of response when it comes to means and ways of access can be seen in Table 2.

Though the LMS is readily accessible in mobile phones, others opt to use their laptops especially for learning activities that require file uploads or assignments. Some students prefer laptops over mobile devices in online learning because of its ease of use for

assignments, research note taking and it allows storage of data through USB which most tablets and cellphones do not have (Foti & Mendez, 2014).

Table 2

Common themes of students' response when asked about ways and means of access to online class

Device used to access LMS	Laptop/desktop
	Cellphone
	Tablet
	Mix of two or more mobile gadgets
Ways and means to connect with the internet	Wireless connection (Mobile data)
Problems encountered	Poor network signal due to remoteness of location
	Some do not own a mobile device and need to borrow to access LMS

It is interesting to note that mobile data have been mentioned several times by students when asked about their ways and means to access online classes. Students using prepaid data told that for them to have mobile data, they must go to a loading station outside their home. According to the respondents, the quality of online access when using mobile data has been poor. Students who decided to stay in their provinces during the lockdown reported issues in online access. These situations call for improvements in connectivity, as students perceived it a factor that influence the quality of their learning online.

Among the popular response of students when it comes to frequency and quality of access to online class is schedule flexibility as shown in Table 3. Flexibility and independence are the positive attributes of online learning compared to traditional classroom set-up (Armstrong, 2011). In addition, Arkorful and Abaidoo (2014) and Smedley (2010) mentioned flexibility as one of the primary advantages of e-learning compared to traditional classroom setting. Zhang et al. (2006) emphasised that e-learning allows students to learn at their own without the need to travel and be physically present in the classroom. This can be true during the pandemic, where students are not allowed to interact physically with others. Students reported in their essays that prior experience in an online course helps them to adjust and become adept with the online set-up. Muilenburg and Berge (2005) reported that students' who obtained prior experience to online learning found online classrooms effective.

Table 3

Common themes of students' response when asked about frequency and quality of access to online class

Poor connectivity makes frequency and quality of access in online courses difficult
Power outage might affect students' frequency and quality of access in LMS
Notifications and guidelines about activities were not straightforward, resulting in faulty submissions and frustrations
Asynchronous nature of LMS allows students to be flexible with their learning
Prior experience in online class makes navigation and learning online easy

Students were asked about their thoughts on the advantages and disadvantages of online classes. Flexibility and continuity were mentioned several times as advantages of

online classes while connectivity, financial instability, emotional and mental stress were reported disadvantages of online classes. The common themes of the answers for advantages and disadvantages of online classes can be seen in Table 4 and Table 5, respectively.

Ease of access is reported as one of the advantages of online classroom compared to traditional setting (Ward et al., 2010). Indeed, many students reported in their essays access in courses become easier with online classroom especially during the pandemic. Students perceived online classrooms as a cost-effective measure to access learning (Ward et al., 2010).

Table 4

Students' perceived advantages of online classes

Learning does not stop even classes were suspended due to the pandemic. Keep students busy despite the long quarantine periods
Students learned to be independent learners and be resourceful in studying their courses. Online classes encourage active rather than passive learning
Learning time/schedule is flexible and convenient. Also, costs associated with transportation going to school were eliminated
Learning materials were readily accessible at any time and place. Lectures and reviews were easily done online
Online learning allows students to learn at the same time as other needed tasks at home. Productivity and self-discipline of students improved due to online classes

Hemsley (2002) as cited by Arkorful and Abaidoo (2014) posit that students who relocated could benefit from e-learning. This is true for students who reported that they have temporarily relocated in the provinces prior to the implementation of ECQ.

The LMS used by the school is primarily designed for asynchronous mode of learning. The asynchronous nature of LMS enables students to learn at their own pace, thus relieving some of the pressure and stress commonly present in traditional classrooms (Urdan & Weggen, 2000; Algahtani, 2011; Klein & Ware, 2003; Arkorful & Abaidoo, 2014)

Even though online classes offer learning flexibility, still, many students prefer traditional face-to-face discussions. This is consistent with the findings of Tiene (2000), Johnson et al., (2000); Cooper (2001).

Students reported that most of them are not comfortable and well-versed learning online. Respondents mentioned that they still prefer traditional classroom setup than online classes. Prior to the pandemic, the primary mode of lesson delivery was done in a physical classroom. Also, the sudden shift to online classes makes learning transition difficult for students. This finding is also consistent with the report of Muilenburg and Berge (2005). Oh and Jonassen (2007); Ward et al., (2010) told that students find online classes insufficient as many have difficulties in comprehension and learning online.

Students reported in their essays low interactions as well as lesser rate of instructor responsiveness as a disadvantage of online learning. Students mentioned that one disadvantage of online learning is it does not satisfy the need to further explain topics which could make the learning easier. Several students reported that some topics in the subjects will be better understood in a physical classroom set-up, where the faculty could utilise lab equipment and materials to demonstrate the concepts in actual.

Table 5

Students' perceived disadvantages of online classes

The pandemic induced emotional and mental stress, generating frustrations and anxiousness, that affects learning online
Laboratory activities necessary for deeper understanding of some engineering and scientific topics/lessons were absent
Learning experience online is more of a "compliance" rather than studying what is designed to be learnt
There are lots of learning distractions at home, generating lack of motivation and self-discipline as well being too relaxed in studies
Online class is more tedious than face-to-face classes
Longer hours of stay/use of computer triggered some health problems
Learning online is boring compared to face-to-face discussions. Some students are not self-regulated learners
Online classes lack interaction with peers and faculty. Complex topics & lessons are best clarified during face-to-face discussions
Financial and connectivity issues make learning online difficult
Technical issues in LMS e.g. access, navigation makes online class arduous

Students reported in their essays that there is lack of "feeling" in asynchronous online classes. Moreover, students mentioned that there are some topics that are best explained and elaborated by instructors. Body language was also mentioned by students in their reports. The majority of the students surveyed in this study were in their freshmen year, preferring absolute guidance from their faculty. Students were asked to explicitly discuss the impacts of online class resulting from the pandemic in their learning process. This is where students elaborate their experience in online learning. It is noteworthy to mention that the response made by students in the fourth question were greatly connected to their answers in other queries in their essays. Moreover, students tend to be more vocal about their experiences when it comes to learning in this part of the interview.

Several students reported positive impacts of having online classes due to the pandemic in their learning process. Continuity, self-regulation and reflection in learning were common responses of students in their essays. Numerous students mentioned that learning never stops even during the pandemic. Students reported that online classes make them learn more things and at the same time get away from boredom because of the quarantine. This supports the argument made by Holmes and Gardner (2006) that the most important feature of e-learning is its learner-centeredness.

Students reported that their comprehension skill improved and became more productive in their learning. Students perceived that their self-regulation towards learning improved in online classes. Students reported that learning in the 21st century is more efficient having it online. 21st century education is greatly linked to the use of technology for teaching and learning. The attachment of student with their cellular devices makes online learning more accessible. Borderless education is one key aspect of 21st century learning (Tapsall, 2001).

Students find online classes effective as it gives them more time and options to learn a topic, lesson or subject. Online classes allow students to reflect and work more with their submissions due to long duration of deadlines. El-Mansour and Mupinga (2007) told that online classes allow students to reflect on their lessons. Armstrong (2011) reported that based on student's perception, learning independence is one of the positive attributes of online learning compared to traditional classroom set-up.

Some students mentioned that the implementation of online classes due to the pandemic induce negative effects in their learning while a few reported that online classes do not affect their learning towards their subjects.

Students mentioned in their essays that higher order learning was not evident in online classes. In addition, they felt that they were left behind in lessons and have missed out on activities in their courses. Moreover, students reported that they are not flexible enough to adapt with sudden changes in course delivery. Students perceived that some learning outcomes were not achieved. Numerous students responded that learning for them becomes difficult when classes were suddenly implemented online.

Students also cited in their essays that they are not comfortable learning online because of financial, emotional and mental issues induced by the pandemic. They reported that they find learning in online classes hassle and stressful. Students mentioned that when they are at home, they feel they should be resting. Some students argued that they tend to procrastinate when they are at home.

The lack of other educational resources e.g., laboratory materials and equipment were mentioned by students as a factor affecting their online learning. They have added that the absence of physical interaction makes their learning even more difficult. Tu and McIsaac (2002) told that less interaction between instructors and students resulted in low affective learning, frustration and negative attitude towards the instructor's effectiveness.

Students reported that online classes do not affect them as learners, and they do not perceive it as an alternative to face-to-face classes. Means et al., (2009) mentioned that there is no clear evidence that online learning is superior to other forms of learning.

A summary of students' suggestions in the improvement of online learning set-up is displayed in Table 6.

Table 6

Students' suggestions for the improvement of online classroom experience

Enhancement of user interface for the LMS selected by the school. Provision of technical support whenever it is needed
Considerations be extended to students who do not have laptops or stable internet connection
Longer duration for online classes
Instructions on online activities regarding requirements and grading must be thoroughly explained and clarified to students
Improvement in internet connections be made
More interaction with the professor through video conferencing, video recorded lectures, explore other ways to do alternative learning such as giving references to read
Enable activities that encourage group study for more peer interaction (helping each other out in lessons and activities) and more avenues for instructor/professor interaction for tips, guides and updated news

Robinson and Hullinger (2008) as cited by Gillingham and Molinari (2012) reported that immediate and regular faculty response and interaction as the most important element of students' engagement in online courses. Garrison (2007) as mentioned by Gillingham and Molinari (2012) also emphasised the importance of instructors'/teachers' presence in online courses.

Students find high degree of fulfilment in learning when video lectures were implemented (Scagnoli et al., 2017; Chen & Wu, 2015; Hsin & Cigas, 2013; Sadik, 2015). Scagnoli, et al. (2017) also reported that students have some sense of belonging and motivation when they see their instructors giving video lectures. Students reported in their essays that they want their instructors to have a video recording of their lectures and have it uploaded to LMS. Students mentioned in their essays that they best understand and learn the topics if there is a teacher present. Video lectures (VL) allow students to learn and interact at their own pace using the course materials. (Dale & Pymm, 2009; Ramlogan et al., 2013; Scagnoli et al., 2017).

The challenge of conducting demonstration of practical skills can be resolved. Aragon and Johnson (2008) suggested the use of innovative methods to encourage student retention in online courses. Giving hands-on activities and having students to reflect on their work will improve the social connection of students with the online classroom. Online subgroup discussions are encouraged, as they allow for greater feedback from the students (Qiu & McDougall, 2013). Scagnoli, et al. (2017) suggested a balance between VL and other activities in an online environment as it increases student satisfaction in learning. Moreover, Wang & Woo (2007) proposed that longer timeframes should be dedicated to asynchronous online classes.

Discussion

Perception of students on the impact of online classes due to the pandemic in their learning was studied. This paper was able to capture students' mental and emotional state and how it affects their learning process, and these aspects were often overlooked in some studies about distance education.

It is evident from the response of students that access greatly affects their learning experience online, and the difficulties induced by the pandemic make studying even more difficult. Students have mixed insights on the impact of the shift to online learning amidst the pandemic. Self-regulation, flexibility and learning continuity are among the advantages of the online set-up. Meanwhile, connectivity, financial and mental issues are some of the disadvantages of transitioning to online mode of learning. These findings support previous studies on the perceived advantages and disadvantages of online learning for students. Improvements in the implementation of online classes through adequate planning of activities and deadlines, as well more synchronous sessions and provision of assistance to improve access and connectivity are suggested.

Students reported improvements in learning comprehension as one of the positive effects of online classes. The asynchronous nature of online learning allows students to comfortably learn their lessons at their own pace. Moreover, self-regulation in learning was found to induce positive impacts on students' learning process. Meanwhile, the mental, emotional and social issues associated with the pandemic negatively affect the learning process of students. The sudden shift to online class has left many struggling to catch up with their studies.

It can be inferred that solutions to the present issues in the current educational set-up are already available and it will be just a matter for educators and school administrators to implement strategies that best apply to their respective institutions. Likewise, the results call for emphasis in considering the mental and emotional states of students in the design and implementation of any learning strategy. Information gathered in this study support recent findings on the importance of students' mental, emotional, and social aspects in the learning process. Though, the pandemic was mentioned several times in the paper, there is a need

for studies that will directly and rigorously investigate the impact of the pandemic on students' learning process. Moreover, the sample size used in the study is quite small to arrive with defined factors and reasons that influence students learning online. The approach used in this paper could be extended to other technology and engineering disciplines to gain more understanding about the effects of online classes to students. Correlational studies on the effects of various factors mentioned in this paper to students' learning online are greatly advised. This is to better observe relationships that exist between the different factors that influence students' learning in an online environment.

Conclusion

Students have mixed insights regarding the shift to online learning amidst the pandemic. The sudden move to online mode of education affected students' perception on their learning process, both on positive and negative notes. Overall, students perceived online classes to be effective in ensuring continuity of learning despite the pandemic. Connectivity, financial and mental issues are some of the disadvantages following the transition to online mode of learning. Students' mental, emotional and social aspects were found to be critical in their learning process, which are often overlooked in the design and implementation of online classes. The immediate shift to online classes due to the pandemic has left many students struggling to catch up on their studies. Meanwhile, self-regulation, flexibility and learning continuity are among the advantages of the online set-up. Online learning induced improvements to students' learning comprehension and self-regulation. Solutions to issues associated to the current educational set-up resulting from the pandemic are already available and it will be just a matter for educators and school administrators to carry out strategies that best apply to their institutions. Improvements in the implementation of online classes through adequate planning of activities and deadlines, as well more synchronous sessions and provision to help improve access and connectivity are suggested. The mental and emotional states of students must be considered in the design and implementation of any learning strategy online.

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References

Algahtani, A. F. (2011). *Evaluating the effectiveness of the e-learning experience in some universities in Saudi Arabia from Male students' perceptions* [Doctoral dissertation, Durham University]. http://etheses.dur.ac.uk/

Aragon, S. R., & Johnson, E. S. (2008). Factors influencing completion and noncompletion of community college online courses. *American Journal of Distance Education, 22*(3), 146-158. https://doi.org/10.1080/08923640802239962

Arkorful, V., & Abaidoo, N. (2014). The role of e-learning, the advantages and disadvantages of its adoption in higher education. *International Journal of Education and Research, 2*(12), 397-410. https://www.ijern.com/

Armstrong, D. A. (2011). Students' perceptions of online learning and instructional tools: a qualitative study of undergraduate students use of online tools. *The Turkish Online Journal of Distance Education, 10*(3), 222-226. http://www.tojet.net/

Chen, C., & Wu, C. (2015). Effects of different video lecture types on sustained attention, emotion, cognitive load, and learning performance. *Computers & Education, 80*, 108-121. https://doi.org/10.1016/j.compedu.2014.08.015

Cooper, L. W. (2001). A Comparison of Online and Traditional Computer Applications Classes. T H E Journal [Technological Horizons In Education], 28(8), 52-58. https://link.gale.com/apps/doc/A72960475/EAIM?u=anon~questia&sid=EAIM&xid=936a75e9

Dale, C., & Pymm, J. M. (2009). Pedagogy. *Active Learning in Higher Education, 10*(1), 84-96. https://doi.org/10.1177/1469787408100197

El Mansour, B., & Mupinga, D. M. (2007). Students' positive and negative experiences in hybrid and online classes. *College Student Journal, 41*(1), 242-248. https://link.gale.com/apps/doc/A161282247/EAIM?u=anon~questia&sid=EAIM&xid=73fa372a

Foti, M. K., & Mendez, J. (2014). Mobile learning: How students use mobile devices to support learning. *Journal of Literacy and Technology, 15*(3), 58-78. http://www.literacyandtechnology.org/

Frankola, K. (2001, October). Why online learners drop out. *Workforce, 80*(10), 53. https://link.gale.com/apps/doc/A79352432/EAIM?u=anon~questia&sid=EAIM&xid=92e4b653

Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks, 11*(1), 61-72. https://doi.org/10.24059/olj.v11i1.1737

Gillingham, M., & Molinari, C. (2012). Online courses: Student preferences survey. *Internet Learning.* https://doi.org/10.18278/il.1.1.4

Hemsley, C. (2002, September). Jones International University's focus on quality e-learning opens doors for students worldwide: (Advertorial). *Training, 39*(9), 26-29.

Hislop, G. W. (2000). Working professionals as part-time online learners. *Online Learning, 4*. https://doi.org/10.24059/olj.v4i2.1902

Holmes, B., & Gardner, J. (2006). *E-learning: Concepts and practice.* Pine Forge Press-SAGE Publications.

Hsin, W., & Cigas, J. (2013). Short videos improve student learning in online education. *Journal of Computing Sciences in Colleges, 28*(5), 253-259. http://www.ccsc.org/journal/

Humanante-Ramos, P. R., Garcia-Penalvo, F. J., & Conde-Gonzalez, M. A. (2015). Personal learning environments and online classrooms: An experience with University students.

IEEE Revista Iberoamericana de Tecnologias del Aprendizaje, 10(1), 26-32. https://doi.org/10.1109/rita.2015.2391411

Johnson, D., Sutton, P., & Poon, J. (2000). *ASCILITE 2000*. Southern Cross University Press. https://www.ascilite.org

Klein, D., & Ware, M. (2003). E-learning: New opportunities in continuing professional development. *Learned Publishing, 16*(1), 34-46. https://doi.org/10.1087/095315103320995078

Kuo, Y., Walker, A. E., Schroder, K. E., & Belland, B. R. (2014). Interaction, internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *The Internet and Higher Education, 20*, 35-50. https://doi.org/10.1016/j.iheduc.2013.10.001

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies (ED-04- CO-0040 Task 0006). US. Department of Education. https://www2.ed.gov

Moore, K., Bartkovich, J., Fetzner, M., & Ison, S. (2003). Success in cyberspace: Student retention in online courses. *Journal of Applied Research in the Community College, 10*, 107-118.

Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education, 26*(1), 29-48. https://doi.org/10.1080/01587910500081269

Oh, S., & Jonassen, D. (2007). Scaffolding online argumentation during problem solving. *Journal of Computer Assisted Learning, 23*(2), 95-110. https://doi.org/10.1111/j.1365-2729.2006.00206.x

Polkinghorne, D. E. (2005). Language and meaning: Data collection in qualitative research. *Journal of Counseling Psychology, 52*(2), 137-145. https://doi.org/10.1037/0022-0167.52.2.137

Qiu, M., & McDougall, D. (2013). Foster strengths and circumvent weaknesses: Advantages and disadvantages of online versus face-to-face subgroup discourse. *Computers & Education, 67*, 1-11. https://doi.org/10.1016/j.compedu.2013.02.005

Ramlogan, S., Raman, V., & Sweet, J. (2013). A comparison of two forms of teaching instruction: Video vs. live lecture for education in clinical period ontology. *European Journal of Dental Education, 18*(1), 31-38. https://doi.org/10.1111/eje.12053

Ravert, R., & Evans, M. (2007). College Student Preferences for Absolute Knowledge and Perspective in Instruction: Implications for Traditional and Online Learning Environments. *Quarterly Review of Distance Education, 8*(4), 321-328. https://www.infoagepub.com/quarterly-review-of-distance-education.html

Robinson, C. C., & Hullinger, H. (2008). New benchmarks in higher education: Student engagement in online learning. *Journal of Education for Business, 84*(2), 101-109. https://doi.org/10.3200/joeb.84.2.101-109

Roig-Vila, R., Ferrández, S., & Ferri-Miralles, I. (2014). Assessment of web content accessibility levels in Spanish official online education environments. *International Education Studies, 7*(6). https://doi.org/10.5539/ies.v7n6p31

Rose, R. M., & Blomeyer, R. L. (2007). *Research committee issues brief: Access and equity in online classes and virtual schools*. North American Council for Online Learning. http://www.inacol.org

Ryan, M., Carlton, K. H., & Ali, N. S. (1999). Evaluation of traditional classroom teaching methods versus course delivery via the World Wide Web. *Journal of Nursing Education, 38*(6), 272-277. https://doi.org/10.3928/0148-4834-19990901-08

Sadik, A. (2015). Students' preferences for types of video lectures: Lecture capture vs. Screencasting recordings. *International Journal of Higher Education, 4*(4). https://doi.org/10.5430/ijhe.v4n4p94

Scagnoli, N. I., Choo, J., & Tian, J. (2017). Students' insights on the use of video lectures in online classes. *British Journal of Educational Technology, 50*(1), 399-414. https://doi.org/10.1111/bjet.12572

Smedley, J. (2010). Modelling the impact of knowledge management using technology. *OR Insight, 23*(4), 233-250. https://doi.org/10.1057/ori.2010.11

Tapsall, S. (2001). 'All aboard' the borderless education bandwagon. *Open Learning: The Journal of Open, Distance and e-Learning, 16*(1), 35-46. https://doi.org/10.1080/02680510020027115

Tiene, D. (2000). Online Discussions: A Survey of Advantages and Disadvantages Compared to Face to-Face Discussions. Journal of Educational Multimedia and Hypermedia, 9(4), 369-382. https://link.gale.com/apps/doc/A72890608/EAIM?u=anon~questia&sid=EAIM&xid=ebf2e322

Tu, C., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *American Journal of Distance Education, 16*(3), 131-150. https://doi.org/10.1207/s15389286ajde1603_2

Urdan, T. A., Weggen, C. C., & Co, W. H. (2000). *Corporate E-learning: Exploring a new frontier.*

Wang, Q., & Woo, H. L. (2007). Comparing asynchronous online discussions and face-to-face discussions in a classroom setting. *British Journal of Educational Technology, 38*(2), 272-286. https://doi.org/10.1111/j.1467-8535.2006.00621.x

Ward, M. E., Peters, G., & Shelley, K. (2010). Student and faculty perceptions of the quality of online learning experiences. The International Review of Research in Open and Distributed Learning, 11(3), 57. https://doi.org/10.19173/irrodl.v11i3.867

Willging, P. A., & Johnson, S. D. (2004). Factors that influence students' decision to dropout of online courses. *Journal of Asynchronous Learning Network, 8*(4), 105-118. https://doi.org/10.24059/olj.v13i3.1659

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker, J. F. (2006). Instructional video in E-lEarning: Assessing the impact of interactive video on learning effectiveness. *Information & Management, 43*(1), 15-27. https://doi.org/10.1016/j.im.2005.01.004