

# The Use of e-Learning Course during the COVID-19: A Systems Thinking Approach

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**Abstract** - *In the era of the Internet, most educators have been supported by powerful tools ranging from e-books and e-learning sites to cloud services, and students' learning environment has been a mix between traditional study (in class) and e-learning through some kind of online learning platform. Due to the uncertainty of the rapidly changing COVID-19 situation, all colleges and universities have to shutter their physical campuses and move their courses to remote and online formats hastily. This prompted many to wonder if all of the faculty are ready and qualified to teach online courses and/or if all of the students are ready to learn in the comprehensive online environment. If not, what ultimate impact will be to our higher education during this national emergency virus pandemic since there is no choice but depend on where they sit currently, not to mention the negative reviews and concerns regarding the online education. To make this transfer seamlessly and conflict mitigation, this paper applied systems thinking for an e-Learning course and proposed a flexible grading method for an e-learning environment, which will enhance students' grades by allowing students to control their own study paces and the amount of efforts spent in the course, which can bring a successful online learning experience.*

**Keywords:** *Coronavirus Learning; E-Learning; Flexible Grading Method; Higher education; Systems Thinking*

## 1. INTRODUCTION

The concept of online learning has been with us for many years, but only around a quarter of students and educators have acquired the off-campus lifestyle and learning skills associated with online learning according to the report from the National Center for Education Statistics (2018)[13]. Over the course of a couple of weeks, as it was getting abundantly clear that the COVID-19 virus would pose an imminent threat to the citizens of the US mainland and social distancing guidelines were introduced to all aspects of our lives, online learning is now reality for all college students. By acknowledging a student's current challenges, as described in the Student Learning Process section of this paper, great efforts should be made by the educator to accommodate the student through this transition. The remainder of the paper is organized as follows: Background and the impact of the rapid change on higher education is explained in section 2. Benefits of e-Learning to higher education is presented in section 3. Students' successful online learning environment, including the philosophy of systems thinking, student learning process, e-Learning course design, and a flexible grading method, are discussed in section 4. Finally, conclusions are shown in section 5.

## 2. BACKGROUND AND THE IMPACT OF THE RAPID CHANGE ON HIGHER EDUCATION

Due to the uncertainty of the rapidly changing Novel Coronavirus Disease 2019 (COVID-19) situation, the

Trump administration released new guidelines on March 16, 2020 to slow the spread of the coronavirus. Americans have been advised to avoid nonessential travel and gathering of more than 10 people ("Gatherings Should Be Limited," 2020, para. 2). Therefore, in order to practice the recommended preventative hygiene and social distancing measures to help prevent the spread of COVID-19 in the community, all colleges and universities have to shutter their physical campuses and move their courses to remote and online formats immediately. Institutions, including faculty, academic advisors, dormitory administrators, and various department officers, have to work with each student individually to assess their status needs and academic progress to determine the best course of action for their enrollments in the current and up-coming semesters; if they are international students, institutions will also need to consider how to maintain their legal status on their U.S. campus. By the same token for the prospective students, institutions will need to rely on online communication, host virtual events, and/or consider alternatives to application criteria as well as changes to application and enrollment timelines (Martel, 2020[7]).

## 3. BENEFITS OF E-LEARNING

With the widespread interest in using the Internet, more and more people involve web-based tools to communicate with others online, and many of them will actually post and exchange their personal thoughts through the social media channels, which replete with feature rich, interactive user interfaces (O'Reilly, 2005[10]). Because of the prominent usage trend of computer assisted

students' learning, many educators have set up web-based collaborative learning environments in their classroom. It is distinguishable between traditional instruction method and web-based collaborative learning approach (McCarty, 2009[8]). The former teaching method, instructors deliver the learning content directly by lecturing in the classroom setting while students passively receive the information and knowledge from them. However, the former approach allows both teachers and students cooperate and work together to discuss, share, and construct information on learning tasks as well as preparing students' technological skills in today's workforce. Instructors play as facilitators or guidance for students' learning needs while students may be trained as autonomic learners. Academic users' learning experience can be highly stimulated by this type of online interaction since it can transform people, knowledge, skills, and performance (Villar & Alegre, 2006[14]). Subsequently, students are expected to be automatic learners through e-Learning. e-Learning is defined as "learning that is enabled electronically", which has become one of the popular teaching pedagogies for the future of education. Greenhow, Robelia, and Hughes (2009) stated that e-learning has more benefits than traditional face-to-face teaching. The characteristic of this idea is that students' learning is conducted on the internet, where it can take place through electronic technologies and media; therefore, it can be at any place and any time, which is self-paced for different learners. Web-based educational tools share common features which enable users to connect with resources and communicate with others for both personal needs and learning purposes. Even when many of these web tools were not specifically engineered for academic purposes, they may be repurposed to facilitate educators' specific objectives, especially as collaborative learning environments (Villar & Alegre, 2006[14]; Barack, 2007[1]; and Salmon, 2011[11]).

## 4. STUDENTS' SUCCESSFUL ONLINE LEARNING ENVIRONMENT

### 4.1 Philosophy of Systems Thinking

The concept of "Systems Thinking" originated in 1956 by Dr. Jay Forrester, the founder of Systems Dynamic Group at MIT's Sloan School of Management. It is the foundation of the field of *system dynamics*, which uses a holistic approach to look at system's constituent parts interrelate and provides an effective understanding of the theory (Sterman, 2000)[12]. Unlike the traditional analysis, systems thinking adopts feedback loops and time delays to illustrate the entire system's behavior. The application of the feedback loop diagram (i.e. causal loop diagram, CLD) explains the interrelationships among tasks, and a CLD is a tool of analysis focusing on the entire system, not just one interaction between two variables (Sterman, 2000)[12]. A CLD is a visualizing diagram, which consists of a set of nodes (i.e. variables) connected by arrows (i.e. causal links), that show the

causal influences among the variables. Each causal link has its polarity either positive (+) or negative (-) to indicate that a change in one variable causes the other variable to change in the same (i.e. positive causal link) or opposite (i.e. negative causal link) direction. Time delay is indicated in the diagram by a delay box. There are two types of delays (information delay and flow delay) identified in the system. Whenever a process output lags behind its input, a delay occurs. When a closed cycle occurs in the diagram, it can be either defined as a reinforcing feedback loop and a balancing feedback loop, denoted by R and B in the loop identifier. A reinforcing feedback loop indicates a positive feedback process, meaning if the node in which the link starts increases, then the link ends increases as well. Similarly, if the node in which the link starts decreases, then the link ends decreases as well. On the other hand, a balancing feedback loop indicates a negative feedback process, meaning the starting and ending are in opposite directions; therefore, if the node in which the link starts increases, then the link ends decreases, and vice versa. It is important to note, however, a CLD can only tell you what would happen if there were changes (Liu & Liu, 2012)[6].

### 4.2 Student Learning Process

Figure 1 describes student's learning process which indicates the relationships among student's efforts, work pressure, work hours, productivity, energy level, assignment due date, and work completion rate. We leave out the possibility that students drop out of the class during the semester.

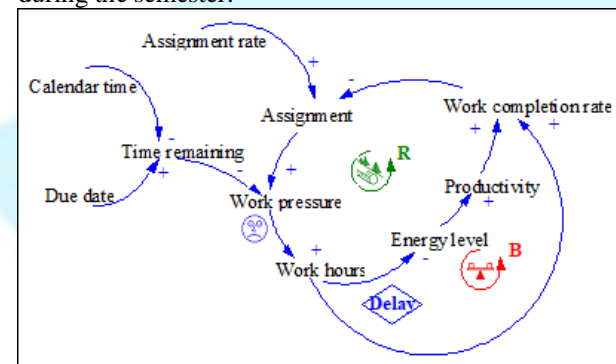


Figure 1: CLD of Students' Learning Processes

In this CLD, the assignment rate is assumed to be exogenous and will be given after students enrolled for a course. Assignment (backlogs) will surge because assignment rate increases but will subsequently diminish when work completion rate increases. However, if for some reason, assignment backlogs continue at a high level, work pressure will also increase simultaneously. While work pressure can be relieved by having longer due dates for those assignments, larger backlogs and relatively shorter due dates will cause an undue burden on the students as well. Students, therefore, will need to spend more time and effort to complete assignments on time.

Once students commit to longer work hours, there are two situations that students might face: (1) Midnight-Oil Loop: the longer work hours can increase the work completion rate and reduces the assignment backlogs (see balancing loop B), or (2) Burnout Loop: when student's work pressure remains too long and too high, increasingly longer work hours will eventually force the energy level to decline and fatigue sets in. As the energy level falls, concentration and focus decrease, causing productivity and work completion rates to drop. Lower work completion rate will cause backlogs to remain high, intensifying work pressure and leading to longer work hours. Eventually, students will burnout, and this is an example of reinforcing loop (see loop R). Therefore, if the burnout loop dominates the midnight-oil loop, any of extra work hours will be offset by decreasing work quality and increasing errors. On the end, students will not be able to take a rest break because of the imminent due date, which means that an exhausted student's efforts often are counterproductive despite the additional work hours. As a result, we do not want that to happen just because students are not ready for this immediate change.

### 4.3 Higher Education for an e-Learning Course

Although student efforts determine how well and how much they learn in class, it is also the instructor's responsibility to manage the classroom in a way that motivates student learning and reinforces student understanding of key concepts. According to Salmon's online course model (2011), he suggested that instructors should follow a five-stage model so that learners can get enough support and guidance from each phase. The model includes (1) access and motivation, (2) online socialization, (3) information exchange, (4) knowledge construction, and (5) development (see figure 2).

Based on this model, the procedure for an e-Learning course under COVID-19:

- (1) Access and Motivation: provide free mobile hotspots to those students who might lack access to an internet connection and offer online technology support or guide with tips and resources. Reconsider grading policy/system to accommodate all the students who struggle with online learning and are interrupted by the coronavirus pandemic.
- (2) Online Socialization: design a grading assessment to encourage students in online learning environments interact with classmates on a regular basis, just like the traditional classrooms; interact with students through email, virtual meeting, or any web-based tools since lack of interaction between instructor and students is a common challenge in an online learning environment.
- (3) Information Exchange: create a discussion board where students can collaborate, share information, exchange knowledge, and develop new ideas since cooperative learning can be an effective motivator through the positive social/peer pressure.
- (4) Knowledge Construction: assign a problem/project

either individually or in a group where students can transfer knowledge from theory to practice and allow students to find satisfaction through a problem/project so that they can discover for themselves in the underlying principle.

- (5) Development: evaluate students' learning experiences as well as provide both positive feedback and constructive criticism to reflect their achievements during the whole process.

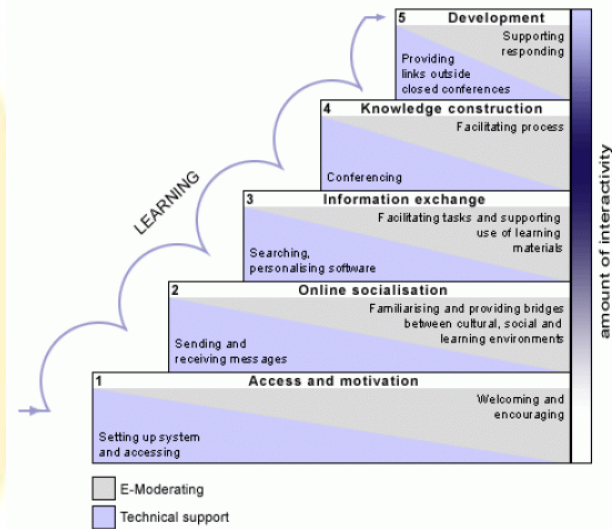


Figure 2: Five-Stage Model to Teaching and Learning Online (Salmon, 2011, p. 32)

### 4.4 A Flexible Grading Method

According to Biehler and Snowman (1990)[2], students' learning motivation can be classified in the following categories: internal motivation and external motivation. Internal motivation is seen when students want to get the benefits from academic tasks to gain knowledge for its own sake and apply what they have learned in real life scenarios without any sort of external reward. By contrast, external motivation is promoted by a desired reward such as praise, privilege and/or some bonus points toward student grades. If students are experiencing difficulties in keeping up with their assigned workloads and are falling behind as a direct result of the campus closures, students may lose their motivation and drive to perform their best. Studies (Zhu & Wang, 2012[15]; Miller, 2016[9]; Davidson & Katopodis, 2020[3]) suggested that instructors should allow students to have as much as possible control over their own education while instructors, on the sideline, just provide guidance and a new perspective on improving students' performance. That being said, instructors should ensure that students understand all their options and the possible consequence of their decisions. Therefore, this study proposed an idea of the flexible grading method, which linked closely to the online knowledge base, such as blackboard portal, and inclined to self-study method. First of all, this flexible grading system should be fair and conflict-free against any instructor's original grading policy, and then.



instructors should set realistic performance goals to ensure that students are capable of achieving them and have a customized rule based on different students' needs.

All or part of the following suggestions can be implemented into students' grading evaluation process during this emergency period of distance learning:

1. Participation: allow students to post and exchange their ideas, opinions, and learning experiences on the discussion board.
2. Repetition: allow students to have multiple attempts on their regular quizzes so that they can gain a better understanding and get a better grade through repetition.
3. Substitution: allow students to substitute a paper instead of an exam to avoid the test anxiety.
4. Motivation: provide students more bonus or extra assignment opportunities to gain more points and practice exams before the actual one (i.e. Midterm and/or Final Exam)
5. Evaluation: provide self-assessment into the process; allow students to evaluate their own learning and performance so that they can identify their strengths and weaknesses accordingly.
6. Alternation: provide students an option to choose either a letter grade or pass/fail grade.
7. Online Learning Module (OLM): this module should contain a series of slides, materials, and questions to support the level of each learner. Students either have to complete all of the required tasks or score the minimum grade before allowing to move forward.

Generally speaking, students can gain more freedom in their own study because this flexible grading system will motivate them to pursue a better performance and allow them to be in control of their own grades and education.

## 5. CONCLUSION

The majority of US college students have chosen a traditional on-campus type education over the online college option. Whether their choice of an on-campus learning experience was driven by the need for belonging in a student community, the structure of a class schedule or an easier way for the student to stay focused and disciplined, that choice was taken away from them the day when their campus closed down. This drastic change in the learning environment is clearly beyond the student's control. Consequently, an accommodation is desirable during such a circumstance. As we move instruction into alternative modes, we need to change our expectations and assessments accordingly. The Flexible Grading Method seeks to ease the stress and burden imposed on the students by allowing them some freedom in the way their academic performance is measured.

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