

IMT 570 Research Report

Facilitating Effective Learning in an Online Environment

Executive Summary

Online learning experiences are often not as engaging as their classroom counterparts. In addition to this, there are also many benefits and use cases of online learning which remain untapped. We studied the use of digital learning platforms in making online learning optimally suited to users and help facilitate an effective learning experience. During the research, we delved deeper into the following questions:

- 1) How might we enhance online learning using an effective combination of tools, platforms, and processes to make it more engaging for users?
- 2) What are the challenges/problems faced while facilitating online learning on existing platforms?

We used a mix of qualitative and quantitative methods and found the primary challenges to be:

- The difficult initial adjustment to the online learning environment
- Isolation among students and faculty, due to less interaction and collaboration
- Difficulty in motivation and focus

Thus, our recommendations are:

- A hybrid synchronous and asynchronous approach, with a focus on interaction and collaboration by facilitating video or voice communication in real-time. This can be recommended for facilitating classes using existing tools in the market as well as for designers of new online learning platforms
- Smaller class sizes and shorter duration of classes to retain the focus of learners
- Fostering motivation and engagement among learners by making it an environment where communication is encouraged. This can be done by means of ice-breakers and introductory games

Introduction and Background

Background

According to federal data, 5,257,379 million students took one or more online classes in 2014 (Littlefield, 2020), and the number continues to grow every year. With the advancement of technology, online learning systems and MOOCs have seen a surge in usage during recent times and are becoming an integral part of the higher education landscape. The global pandemic has also necessitated most educational institutes abruptly migrating to online paradigms

completely. While this sudden shift has created chaos among professors, students as well as the IT service teams at educational institutions, to ensure the smooth operation of this new system it has also created a unique testbed for online learning experiences to ensure that an online experience retains and potentially enhances the intrinsic elements of a traditional classroom environment for all stakeholders, such as faculty members and students. Previous studies have also shown that “the majority of students who take web classes do so not necessarily because the format suits their learning styles, but because they are attracted by the convenience, availability, and flexibility of scheduling the classes” (Bocchi, 2004). Studies have also shown that students can feel isolated and disconnected in online learning environments and hence student engagement is critical to student learning (Dixon, 2016). Thus, it is important to study online learning environments in light of both their advantages (convenience, flexibility, outreach) and disadvantages (isolation, retention, radical shift in the mental model), as well as address learner preferences such as synchronous versus asynchronous modes of learning, appropriate length of the sessions, engagement techniques, and popular tools.

Problem Statement

There are several issues in the case of online learning - be it difficulty in transitioning to digital platforms for professors and students, a lower retention rate as compared to in-person programs, a lack of effective interaction and collaboration, negatively impacting stakeholder motivation, to name a few. These unforeseen circumstances due to the global pandemic have only underscored these issues that have been lurking for quite some time now. As online learning education is here to stay and will certainly grow in the near future, our research recognizes the need to address these issues as well as to study how it can be enhanced.

Research Objectives

In light of the issues and opportunity areas discussed above, our research addresses **how online learning experiences in digital learning platforms can be made more engaging** for professors and students alike. We aim to do so by defining the following objectives:

1. To understand pertinent challenges with respect to digital learning systems and study their impact on learners and teachers
2. To identify popular online learning tools and platforms currently in use
3. To recommend a set of digital tools and methods to make online learning experiences more engaging

Biases and Boundaries

Information management programs at most universities in the US have a robust technical infrastructure for online learning and offer courses that are conducive to being taught online. This is in contrast with courses offered as labs, design studios, etc. which have a heavy in-person requirement which cannot be replaced with an online equivalent. Given that our participants mostly partake in these courses and have access to good technology and connectivity, our study is scoped to information management programs in the US. We thus

recognize that our findings may be biased to exclude courses with a heavy in-person component as well as an evaluation of learning platforms in poor technical accessibility. We also acknowledge that student engagement in these unprecedented times might be impacted by other factors such as stress and anxiety. While this is not the focus of our project, we do realize this may impact our findings.

Approach and Methodology

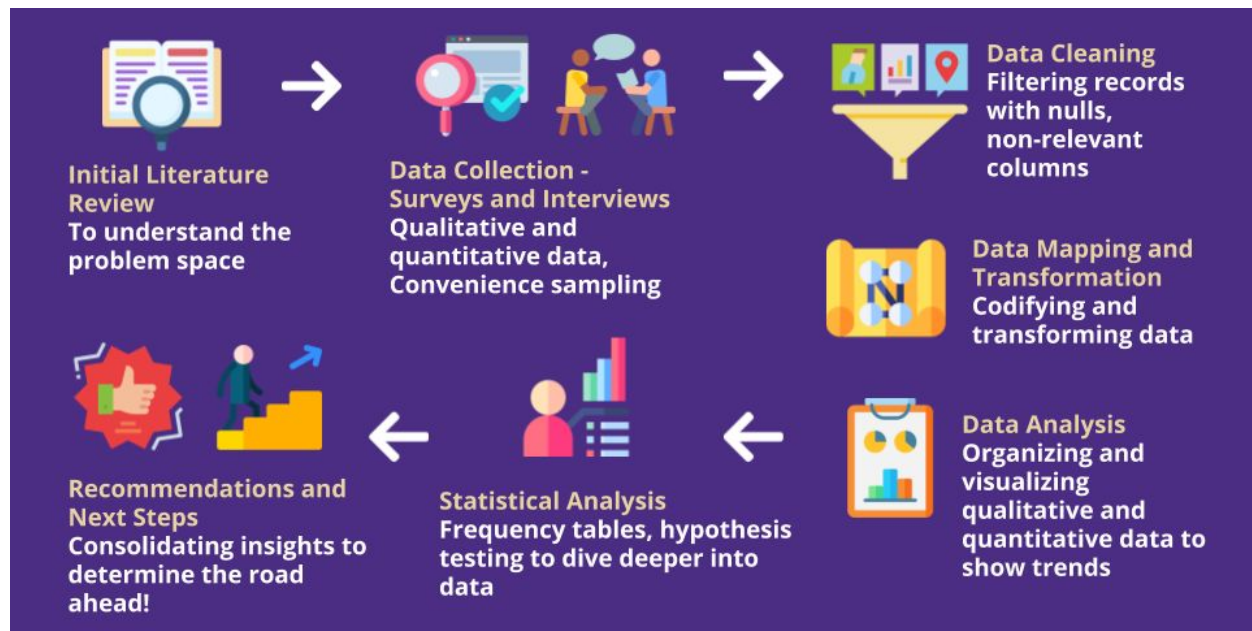


Fig 1 - Overview of the research process

Observation Methods:

The primary methods we used were **surveys** and **interviews**. The observation methods were selected to ensure a healthy mix of qualitative and quantitative data. While surveys helped us capture data (such as demographics, preferred tools, and methods) from a large number of participants, interviews helped us delve deeper into the more complex, multi-dimensional aspects of online learning experiences (such as thoughts, emotions, frustrations and specific use cases).

Sampling procedure and selection of subjects.

Considering the availability and the willingness of the participants, we chose to do **convenience sampling** - a non-probability sampling technique and perhaps the easiest sampling method. “Although, useful results can be obtained, the results are prone to significant bias, because those who volunteer to take part may be different from those who choose not to (volunteer

bias), and the sample may not be representative of other characteristics, such as age or sex". (Ben-Shlomo, 2013).

Thus, we recruited participants from our personal and social network (with the help of social media applications) who met the following basic criteria:

1. Must be/have been a student/faculty
2. Must be taking/have taken at least one class online
3. Must have reasonably reliable Internet access and a personal/shared access device

Data Collection Procedure:

We collected data using a Google Form survey and conducted one-on-one interviews over voice or video calls. We circulated the survey on several closed groups with graduate student members on social media platforms. The interviews were held with currently enrolled students and teachers to either recorded or transcribed depending on the interviewee's preference. The survey focused on collecting specific information regarding demographics, familiarity with online tools, perceived current engagement on online learning platforms and improvement suggestions, and the interview questions focused on more personal elements of the experience, like feelings, emotions, and specific use-cases. (The complete list of survey and interview questions are linked in Appendix 1)

Validity and Reliability:

To ensure that the collected data is valid and reliable, we went through several iterations of refining and fine-tuning the questions. While designing the surveys we identified the length of the surveys, the number of points on the rating scale, the phrasing of options on a rating scale, and most importantly, the layout, which played a critical role in the quality of the information provided by the respondent. We also ensured that we were prepared for the one-on-one interview sessions with well-structured and systematic questions, aside from the basic screening criteria. In addition to this, we made sure to clean the data to remove typographical errors, data validation, and data enhancement, making it complete, consistent, and uniform.

In addition to this, while we did ensure validity and reliability by taking the aforementioned steps, we also appreciated the variety in the data of different participants (provided the basic screening criteria were met) as it greatly enriched our findings.

Ethical Considerations:

We identified the following ethical considerations, risks, and remedies associated with our research:

- **Respecting participants' confidentiality and privacy** - We made participants aware of what their data will be used for - what will be done with case materials, audio, and video recordings. We clearly communicated to them that their information will not be made available to anyone other than our research team.

- **Informed consent** - We secured their consent through consent forms and kept them fully informed about the evaluation being conducted with the collected data
- **Voluntary participation** - We made sure that participants were aware that they are free to withdraw their participation at any time without impacting them negatively
- **Assessing relevant components and biases** - We aimed to keep our evaluations and research questions focused and as simple as possible. We identified and tracked sources of bias through the course of our research.

Findings and Analysis

To determine an effective combination of tools and processes of online learning technologies, we started by consolidating our insights from our qualitative and quantitative data. This included an affinity diagram to organize our qualitative data, visualizations to gain a preliminary understanding of our quantitative data, as well as statistical analysis to delve deeper into our survey results.

1) Qualitative Data Analysis:

Our qualitative data sources were summary highlights from our literature survey and some qualitative questions in our survey. Our key challenge earlier was organizing this data since it was unstructured and scattered. Creating an affinity diagram greatly helped us in this regard, as well as with analysis. By identifying recurring words and themes (using the content analysis coding technique), we gleaned several interesting insights from our data. We grouped our insights into learning preferences, challenges, benefits and potential solutions.

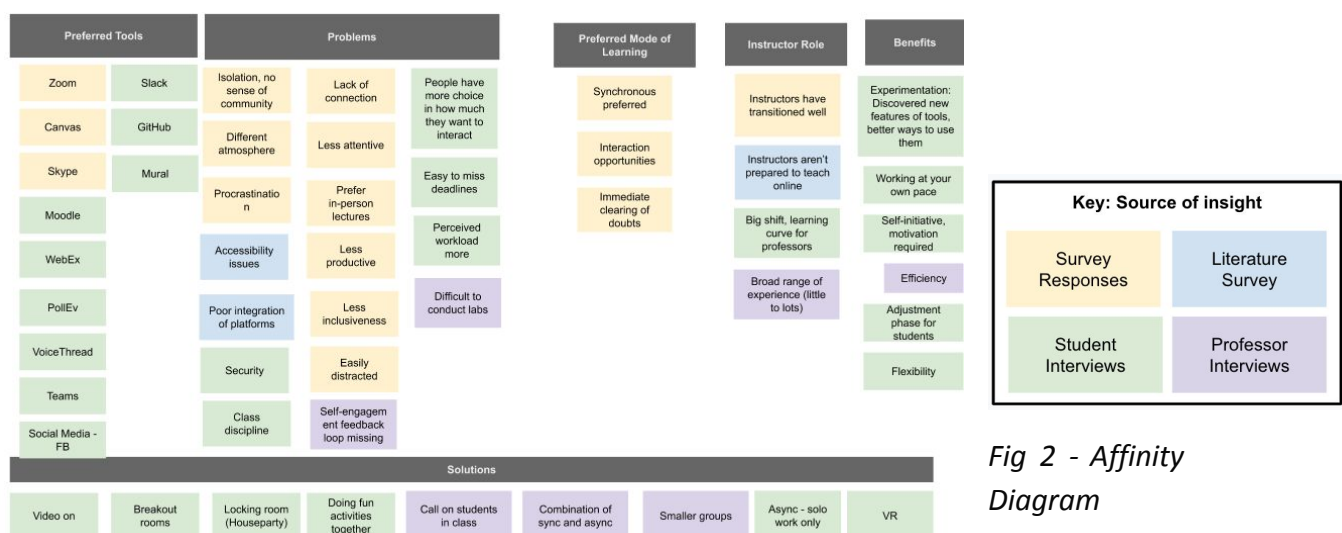


Fig 2 - Affinity Diagram

We also visualized our survey results to understand the impact of online learning and tools preferred by a majority of users.

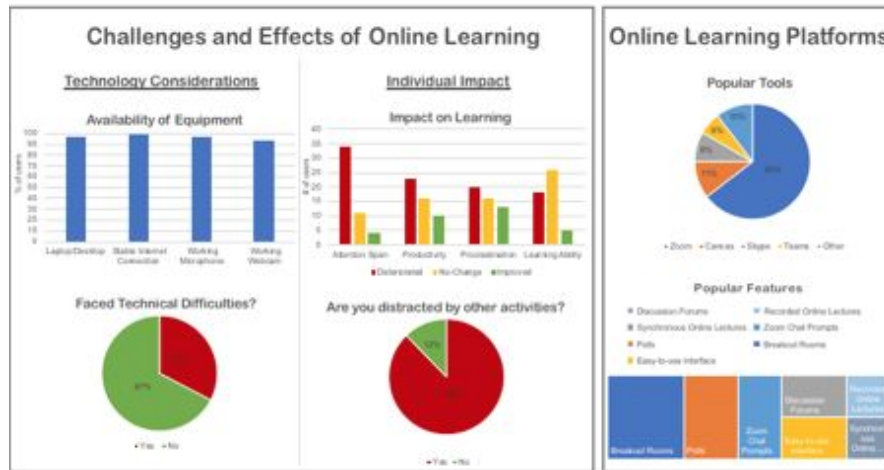


Fig 3 - Data visualization

These visualizations helped us to focus on two complementary aspects of our research question. Firstly, what are the challenges and difficulties in learning online? Are these due to external factors like technology availability or internal factors related to learning, such as attention span and focus? Secondly, what are the various platforms available and how are they helping users? The visualizations help us navigate the vast space of data with respect to these elements and thus, tell learners' stories in terms of their experience.

From this, we understood that a majority of problems were faced due to the challenges of personal adjustment rather than technical issues. We also identified Zoom to be unanimously popular and preferred features to be elements such as breakout rooms, polls, and chat prompts - all of which relate to interactivity and collaboration. This aligns with our findings from interviews conducted with students and faculty alike, both of whom identified isolation and detachment to be a major challenge in the online paradigm.

2) Quantitative Data Analysis:

In addition to this, we also did a hypothesis test to study whether those who prefer synchronous learning prefer synchronous learning tools. (Appendix 2)

While we were successful in proving this, we also found that many participants who stated their preferred mode of learning as asynchronous also preferred synchronous tools such as Zoom. This was an interesting insight that conveyed that regardless of delivery, learners feel a need for collaboration by means of synchronous interaction.

Limitations:

However, we identified the potential for error in results since we used a chi-square test for a relatively small sample of data. We hope to improve the accuracy of our findings by using the Fisher exact test instead, which is better suited to small samples of data.

Summary of Findings

Based on the analysis of the qualitative and quantitative data, we identified our primary findings to be:

- Most of our users, being new to the online learning paradigm, faced trouble adjusting to the new model but recognized it to be a one-time effort, which would have to be self-motivated to a large extent. However, they did demonstrate a preference for online learning tools that were easy to use and easily learnable.
- There was a unanimous lack of real-time interaction identified, which spawned related feelings of isolation, making it difficult to adjust to change and stay motivated. This also made collaboration challenging and often ineffective.
- However, users did identify some associated benefits, such as:
 - Discovering new uses of tools by finding new avenues for experimentation
 - Tailoring one's learning experience based on their individual comforts and preferences (for example, introverts may prefer to interact on discussion boards and extroverts may prefer to leave voice notes or speak in class - an online learning paradigm enables both)
- Users (professors and students) identified a need for smaller groups and a hybrid model of synchronous and asynchronous delivery of instruction
- As for learning platforms, users found a combination of Zoom and Canvas to be most effective, possibly as it helps them access course material by means of the aforementioned hybrid model.

Recommendations

Based on our research, we outlined the following recommendations for instructors:

Finding #1: Lack of real-time interaction identified, which spawned related feelings of isolation and challenges in collaboration

Recommendations:

Ensure that there is some level of synchronous communication in every class

While it may not be feasible to conduct all classes in real-time, it is essential to have some face-time among students and instructors. This helps them feel connected and reduces the isolation felt and also fosters motivation and collaborative spirit. Many participants suggested simply keeping the video on gives the online paradigm a semblance of normalcy.

Instructors can foster interaction among peers

Facilitating ice-breakers and even introductory games or a mental health check-in at the beginning of each class can help build a sense of community in the class. Some students also acknowledged that they missed the daily interaction with new peers as a means of building classroom relationships, which made it difficult to smoothly engage in team activities. This can help remedy this difficulty in connection.

Finding #2: Need for smaller groups and increased learner focus

Recommendation:

Instructors can structure classes into smaller chunks of time, allocated to different activities, as is the case in regular classes. This helps bring a sense of order and routine, which would make it easier for learners to adapt and focus on structured pieces of content. It would also help to have smaller groups of students interacting at a single time to make the interaction both easier to conduct and more meaningful.

Finding #3: Shift in the mental model and adapting to online learning

Recommendation:

To assist users to adapt to this new model, **training sessions can be conducted with a focus on user engagement**. This should also be kept in mind while adding new features as it can be related to BJ Fogg's (Agrawal, 2020) study which states that user behavior with respect to a product can be related to motivation, ability to use it and triggers prompting effective usage. This can be seen in the popularity of existing use cases of popular tools like Zoom and Canvas, which have a simple, accessible interface, perform efficiently, and prompt the user to interact

with the system for different functions and can thus be extrapolated to newer tools and features as well.

Potential Limitations:

- Participants were mostly from the University of Washington Information School, or at other graduate programs of Information Schools in the US. Their courses were thus of a similar, technical nature, and perhaps easier to transition to the online paradigm.
- Most participants had good technical infrastructure and connectivity. We thus cannot assess whether the popular tools would work seamlessly with limited bandwidth.

Conclusion and Next Steps:

Through the course of this project, we identified some interesting insights with regard to online learning. Given the potential for its growth, we hope to transform these into action by taking the following steps:

- **Prototype our ideas:** With the knowledge that users have gained a level of comfort with existing tools like Zoom and Canvas, we would like to pilot our recommendations by means of prototyping a sample “virtual classroom” using these tools, but with smaller groups (class groups of about 10 students each) and hybrid delivery. We would ensure participants keep their video on and create an interactive environment to assess the impact on learner engagement, motivation, and focus. We would keep these sessions short, about 20-30 minutes each so that users do not lose interest. By conducting several such iterations and gauging user feedback, our long-term goal is to design a more interactive, collaborative, and engaging digital learning platform.
- **Address the limitations of our study:** We would like to validate our findings across different user groups (by geography, course type, age, etc) and would hope to do so with the availability of more time and resources

Appendix 1 - Data Collection Procedure

Link to Google Form Survey: <https://forms.gle/RaTS5ERnRHhhBohw7>

Interview Script:

For students / learners:

Question	Objective / Probe Points
1) Hi! How is the quarter/semester going for you so far? 2) How are online classes going?	<i>Ice breaker/settle in Introduce the topic - "We are studying engagement in an online learning environment and would like to learn about your experience in this interview..."</i>
Tell me a little bit about your classes? What courses are you taking and how are they delivered?	<i>Understand what their learning environment is, what their context/situation is</i>
1) You mentioned X, Y tools (in part II), what else do you use? 2) How are they used in class? 3) What is the duration of your class? Any specific way you structure them? (Breaks etc)	<i>Overview of tools and processes, how they are used in combination</i>
1) How has this experience compared to in-person classes? 2) What do you like/dislike about it?	<i>Understand their emotions, ask probing questions, ask probing questions to lead to engagement. Ask about challenges (if they are facing them) or what they are doing right. Also, redirect to tools as potential solutions. For eg, wrt feeling isolated in class - "So do you keep your video on to feel more connected to your classmates?"</i> Note trigger words like distraction, isolation, etc.
1) How do you think you can resolve the challenges you identified? 2) Why do you think these solutions will help?	<i>Get users to come up with solutions</i>
What does the word "engagement" mean to you, in a learning/classroom context?	<i>Identify concepts/definitions that users associate with engagement.</i>
Thank you for participating! Any questions/suggestions for us?	<i>Sign off</i>

For teachers:

Question	Objective / Probe Points
Hi! How is the quarter/semester going for you so far? How are online classes going?	<i>Ice breaker/settle in Introduce the topic</i>
Tell me a little bit about your classes? What courses are you taking and how are you delivering them?	<i>Understand what their learning environment is, what their context/situation is</i>
What tools do you use? Why? OR You mentioned X, Y tools (in part II), what else do you use? How have they been working out for you?	<i>Overview of tools and processes, how they are used in combination</i>
How has this experience compared to in-person classes? What do you like/dislike about it? Do you feel like your students are less motivated? Why / Why not? Do you feel less motivated? Why / Why not?	<i>Understand their emotions, ask probing questions, ask probing questions to lead to engagement. Ask about challenges (if they are facing them) or what they are doing right. Also, redirect to tools as potential solutions. For eg, wrt feeling isolated in class - "So do you keep your video on to feel more connected to your students?"</i> Note trigger words like distraction, isolation, etc.
How do you think you can resolve the challenges you identified? Why do you think these solutions will help?	<i>Get users to come up with solutions</i>
What does the word "engagement" mean to you, in a learning / classroom context?	<i>Identify concepts / definitions that users associate with engagement.</i>
Thank you for participating! Any questions / suggestions for us?	<i>Sign off</i>

Appendix 2 - Statistical Analysis

Observed values:

	Asynchronous Learning Preferred	Both	Synchronous Learning Preferred	Grand Total
Asynchronous Tools Preferred	2	5	6	13
Synchronous Tools Preferred	5	11	20	36
Grand Total	7	16	26	49

Expected values:

	Asynchronous Learning Preferred	Both	Synchronous Learning Preferred	Grand Total
Asynchronous Tools Preferred	2	4	7	13
Synchronous Tools Preferred	5	12	19	36
Grand Total	7	16	26	49

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