How to be successful in Hyflex Learning - Student and Teacher's Perspectives

By: Dharini Suresh Kumar

Supervised by: Dr. Sherrie Komiak

Submitted to the School of Graduate Studies in partial fulfillment

of the requirements for the degree:

Master of Science in Management (IS Specialization)

Faculty of Business Administration

Memorial University of Newfoundland

Graduating: May 2023

St. John's Newfoundland and Labrador

Abstract

The hyflex learning mode has benefitted the learning and teaching community by providing a flexible learning environment amidst the pandemic challenges. In this thesis, I build on literature about student satisfaction and academic self-efficacy (ASE) in hyflex learning compared to different learning modes (distance vs. hyflex vs. traditional in-person) following the Hyflex core principles as a foundation, as hyflex mode provides an excellent alternative for the teaching and learning community even after the pandemic. I explore how experiential learning and the learning modes impact students' satisfaction and self-efficacy mediated by the four core principles. This thesis addresses the literature gap by examining if and how students perceive equal learning opportunities and experiences.

Two studies were conducted to understand student and teacher perspectives of hyflex classes. Study 1 focused on unveiling the challenges of implementing a successful hyflex course from a teacher's perspective. Study 2 compared student satisfaction and academic self-efficacy in the different learning modes (distance vs. hyflex and traditional in-person vs. hyflex).

The thesis contributes by revealing the definition of hyflex classes, addressing the challenges faced by both the teaching and learning communities, reviewing their recommendations, and examining the pros and cons of hyflex learning. The study also talks about the challenges faced by the teaching community in implementing a hyflex course and discusses ways to better learning. Theoretical contributions, practical implications, and an agenda for future research are discussed.

Keywords: Hyflex Learning, Student Success, Equal learning experiences

Acknowledgments

First, I would like to thank my supervisor, Dr. Sherrie Komiak, for patiently and wisely guiding me through this challenging yet rewarding process. Her prompt and insightful feedback was always appreciated, but her kindness, compassion, and a good sense of humor were appreciated even more. She made this experience particularly wonderful and has been an incredible mentor for me every step of the way. Thank you, Sherrie, for patiently supporting me and sharing many valuable insights academically and beyond. Thank you for always being there whenever I needed you.

Secondly, I would like to thank Dr. Yuxi Shi, for her valuable insights and her time and attention in reviewing my every step in this thesis completion. Sharing our experience created a vital sense of community for me, and I will forever be grateful to you for this.

Family gives me a reason to stick to the end of this journey. I want to thank my parents, Suresh Kumar and Kavitha, and my brother Karthikheyan for their unconditional love and support. I am forever grateful to my fiancé Tejhaskar for his incredible tenacity and understanding during these amazing years of intellectual pursuit. You inspire me to grow every day. With you by my side, I know I can do anything. Thank you

I want to thank all my incredible friends I met while en-route to knowledge! I also want to thank everyone from Memorial University's Faculty of Business Administration, School of Graduate Studies, for supporting my pursuits.

Table of Contents

Lists of Tables

List of Figures

List of Abbreviations

S.No	Abbreviation	Full Meaning
1	TAM	Technology Acceptance Model
2	CoI	Community of Inquiry
3	Hyflex	Hybrid-Flexible
4	ASE	Academic Self-Efficacy

Chapter 1: Introduction

The education sector has been blooming in the 21st century with technological advancement, business, and management. Education has become more complex, involving many new frameworks and structures to become more and more inclusive. The primary mode of receiving education has been the traditional in-person classroom where students went to a learning community place/school to attend classes. But as the population increased and the need for knowledge increased, so did the education sector. Schools had to accommodate more than 50% of their original student capacity. And with that, the emergence of different learning modes has been developed. Now students have various learning modes: Traditional in-person, Online/Distance, Remote, and Hyflex.

Various researchers have explored the concepts of online learning disciplinary areas. The roots of this can be traced to the technology acceptance model (TAM) (Alavi, Yoo, & Vogel, 1997). Universities worldwide have been interested in the topic of distance learning to increase the accessibility of higher education and be more inclusive (Jung, 2003). After decades of trial and error, most universities worldwide provide different learning modes for students to learn from anywhere. Students who couldn't attend classes in person or couldn't afford the universities could learn everything online now. Online courses include theoretical lessons, and now have access to the more practical approach and provide online internships, certificates projects, etc.

With the pandemic rising and all the schools being shut down, the large-scale use of a hyflex framework came into existence. Hyflex systems were in use even before the pandemic but hadn't been a pervasive learning mode. The early research work by Ben J. Arbaugh (2000) on flexibility and interactions in online classrooms drew various researchers' attention and interest in hyflex

systems. Hyflex has now become the new mode of learning and working in various sectors. Different sectors like business, work, healthcare, and education are now starting to follow the framework of the hyflex system.

In terms of education, hyflex learning has been defined as a learning mode that combines both face-to-face and online learning into one cohesive experience (Beatty, 2019). Almost half the population of the class is learning from home (online), while the rest attend classes in person simultaneously, on a rotation or preference basis. Hyflex learning has gained its name (Beatty, 2007) due to its high flexibility to the users/students. Even though it seems pretty straightforward, a vastly complex system is involved in the hyflex teaching.

A traditional in-person classroom would involve all students present in the class with one teacher guiding them. An online course would involve all students present in the online room or platform and, again, one teacher teaching them in the online rooms. But a hyflex mode is entirely different in its ways of teaching and learning. In a hyflex class, students are simultaneously learning from home and in-classroom. And there is just one teacher to guide and teach both sets of students simultaneously.

There has been various research that has been done on the effectiveness of hyflex teaching. Results have shown that students prefer hyflex education because of its flexibility (Barker J., Wendel T., 2018, Frey B., Faul A.C., Hirsch A., 2018). In hyflex learning, flexibility plays a significant role in terms of how time is used, how courses are taught, how students learn, where students learn from, etc. The students are given the most potent choices on how to learn and where to learn. Students are given the choice to decide whether to attend classes from home or classroom. Hyflex classes have become more popular because of the flexibility it provides. Students who can’t attend classes in person for various reasons like health, money, job, etc., can

now attend classes from their comfort areas and never miss anything. Hyflex design offers flexibility and various other advantages like learner variability, personalized connections, better student engagement, teaching flexibility, etc., (Abdelmalak, M. M. M., & Parra, J. L.,2016, Barker J., 2015).

Even though hyflex learning provides many advantages to the student and teaching community, it also holds many disadvantages (Bărbuceanu, C. D., 2022, Schatzberg, W. E., 2021). Hyflex learning is still developing, and many universities and schools are still modifying their approaches to make learning more successful. The teaching and learning communities are primarily interested in knowing how successful hyflex classes are. Student satisfaction and academic self-efficacy play a vital role in deciding the adoption and success rates of a learning mode in the future.

1.1 Motivation

As mentioned above, hyflex learning existed even before the pandemic and will continue to exist even after the pandemic. Hyflex learning has provided enormous benefits to both the learning and teaching communities. Flexibility is the key motivator for its adoption. Students can take more responsibility for how they study. Students can choose to learn from home or attend classes in person based on their preferences. Hyflex learning is highly helpful for students who often juggle between work and studies. Hyflex learning provides the best of both learning modes (in-person and online).

On the other hand, hyflex learning also provides the teaching community with more flexibility in teaching. Teachers can differentiate their instruction more easily with hyflex learning and focus on different groups of students (online and in-classroom). Teachers may prepare classes and

analyze student learning in a variety of ways, both online and off, allowing them to better meet the requirements of their students. Both teachers and students have more direct access to information with hyflex learning, which facilitates a deeper grasp of the content and creates more opportunities for cooperation.

The student and teaching communities are two crucial communities in any learning mode. Without one, the education system would fail. The learning community depends on the teaching community for its success. No matter which learning mode, the course design, and teaching methodology play a significant role in student success. Teachers provide the learning community with skills and cultivate a positive attitude. Research in 2016 reported that various teaching practices, course design, and content knowledge could impact students' self-efficacy, happiness, and behavior in class (Blazer & Kraft, 2016).

To truly determine the success of hyflex learning, we must acknowledge both the learning and teaching community. In developing a successful hyflex course or design, the teacher's input is most valuable as their input helps design a better and more successful course structure for the student. If the course design does not consider the teacher's concerns and recommendations, then no one could benefit from it. At the same time, the student's input is essential as they are affected by the learning mode. Only if we understand hyflex from students' and teachers' perspectives can we build a model that positively helps both students and teachers attain their goals.

Even with huge benefits, hyflex is still not preferred or understood clearly by many teachers, students, and universities. In many instances during data collection students simply misunderstood hyflex as distance or remote online courses with some sort of engagement. The benefits of hyflex cannot be completely achieved if its structure and model are not understood.

Also, students must be able to compare the benefits of hyflex learning with other modes to understand which mode best suits their learning style.

The new hyflex model mainly differs in its structure, where it includes both students learning in online video conferencing and students' in-classroom. This main difference brings about the challenges and benefits of the new learning model. The new model poses many questions on how and why to implement hyflex in the future.

Therefore, this thesis focuses on unveiling the challenges of hyflex learning from teachers' and students' perspectives. The thesis also compares the hyflex learning mode with traditional in-person and distance learning modes to add to the literature about their differences and benefits. The thesis analyzes hyflex from both the teacher's and student's perspectives thereby giving insights for future development.

1.2 Objective

This study aims to analyze the success and challenges of hyflex learning in the learning and teaching community and their perspective on the same. The research is therefore split into two studies. The research also aims to identify the factors affecting student satisfaction and learning mode adoption levels in hyflex classes.

Study 1 focuses on the teacher's perspective of hyflex learning, their concerns for student satisfaction, and their inputs on how to make the hyflex course design more effective and successful. The teachers now have to manage both online and in-person students at the same time in a hyflex class. By understanding the challenges and benefits hyflex brings to the teaching community, scholars can make future models that will benefit both the teaching and student communities.

Understanding the challenges in a hyflex setting would pave a way for future researchers to address these challenges and build models that benefits all. The structure of hyflex learning is completely new compared to all the other modes. Hyflex mode comprises both students learning in the classroom and online simultaneously in the same class.

Generally, the classes would either take place in the classroom or online. But in hyflex, the class takes place in-person and online at the same time. So, students can join the classes from the classroom or online at the same time. This is the key difference between hyflex and other learning modes.

The teachers have to manage both the in-classroom students and the online students at the same time. The students have to compete with each other for teachers' attention and other interactions. Managing a class with both groups of students (online and in-classroom) at the same time is quite challenging and participating in such a class is also challenging for the students.

A focus group interview was conducted to understand the teacher's perspective of hyflex teaching. Six professors who have taught hyflex undergraduate courses were interviewed. The professors responded to open-ended questions and shared their ideas about Hyflex courses and how to be effective. We use a model of four core principles of hyflex teaching (Learner Choice, Equivalency, Reusability, and Accessibility). The framework is designed with the foundation of factors such as course design and teaching and technical support since they play a crucial role in affecting student success and the development of a successful course design. The course design and teaching imply the experiential aspects of learning for students to be successful theoretically and practically. The technical support addressed the challenges in managing the two student groups in hyflex classes.

Study 2 focuses on determining student satisfaction and academic self-efficacy (ASE) and gaining perspectives on students' learning experiences in hyflex compared to distance and in-person learning modes. An online survey was conducted with the Memorial University of Newfoundland undergraduate students. The study focuses on analyzing factors that affect students' satisfaction and ASE based on the analysis and deliberation of data collected from surveying university students undertaking courses in different learning modes. The paper's objective is to inspect how the independent variables: teaching mode (hyflex/in-person/distance), and experiential learning, influence the students' self-efficacy, satisfaction, and willingness to continue using the Hyflex learning. The survey was built with the help of the Hyflex course design framework model with the primary focus on Learner choice, Equivalency, Accessibility, and Reusability. The student survey results were analyzed using factor analysis, and reports were developed with the help of Tableau.

With the results from the two studies, a solid recommendation for improving hyflex learning and future implementation will be discussed at the end of the research.

Chapter 2: Study 1

2 Student Success in Hyflex Classes. An Interview Study on teachers' perspectives

2.1 Introduction

The concept of hyflex learning is new for the student community and a relatively new model for the teaching community. Since the beginning of the learning era, the teaching curriculum has been developed in a 1:N ratio where there has always been one teacher for many students, given that everyone is located in the same place and time. But with the advancement of technology and the need for social distancing, the hyflex classes have come into existence. One teacher is responsible for students learning in two different modes; online (students learning synchronously from home) and in-classroom. Hyflex classes have proved to be promising in improving class completion rates (Gassevic, Kovanovic, Joksimovic, & Siemens, 2014). Though the concepts of hyflex teaching are simple, the practicality of hyflex teaching/learning is still complex and yet to be understood. Hyflex teaching is a teaching model that integrates the benefits of traditional classroom teaching (in-person) and profound distance/online teaching and blends the teaching elements (Yanli Qi, 2008).

Many researchers look at students' attitudes toward the new teaching mode to fully understand hyflex learning. As hyflex teaching is still evolving, not much research has been done to understand hyflex teaching from the teacher's perspective. Managing a class with both online and in-class students is difficult as the fundamental teaching principles are modified. Today's instructors haven't learned with the help of today's technology, so adapting to the evolving technology might sound complex, considering the unique challenges technology poses (McNeil, 2016). Research has shown that student success depends on teacher preparation and support

(Rubio & Thoms, 2014a). So, the teacher's perspective of hyflex teaching is a crucial factor that helps to design a course structure aiming at student success and efficiency.

The much-needed question to be answered concerning hyflex classes is if it is truly effective and satisfactory for the students compared to other learning modes. What can teachers do to help students succeed in hyflex courses? As discussed above, the biggest challenge in hyflex is managing the two learning channels simultaneously and providing them with equal learning opportunities and experiences.

2.1.1 Motivation:

Even before the pandemic struck, much research was done on Hyflex Learning. Various universities researched to analyze how to be more successful in hyflex learning.

The results reported that the main problem is attaining equal satisfaction between the students learning online and in-classroom in the hyflex mode. Also, when students are given more choices, a high level of autonomy can impact students' learning capabilities and success.

Hyflex learning will continue even after the pandemic because of the positive results in the past few years. It has many advantages that can be used for the best of students.

Many students work part-time to earn a living, few pursue double degrees, and many pursue distance education. If Hyflex learning is utilized to its best, then all such students would benefit from it.

Thus, researching the hyflex mode, especially on how to make learning successful for both sets of students, will prove helpful for the future teaching community to better design and structure the hyflex course.

This study conducts a focus group interview to understand the teacher's perspective of hyflex teaching concerning the four core principles of hyflex teaching; Learner Choice, Equivalency, Reusability, and Accessibility. It aims to answer the research question below and be successful in hyflex teaching.

- From the professor's view, how to achieve equal satisfaction among students in different learning modes in Hyflex classes.
- How to make hyflex teaching more efficient with the help of the four core principles?
- Are the hyflex core principles valuable for student success?

2.2 Literature Review

With technological advancement and internet facilities, instructional methods have entered a new era. Video conferencing methods and online streaming have helped remove distance learning barriers. Since 2003, enrollment in online classes has been steadily increasing, and today most colleges have at least one online course offered (Best colleges, 2016).

Over the past years, much research has focused on analyzing student success concerning the learning and teaching modes and spaces. Many researchers have claimed that a flexible mode and learning space best meet diverse student requirements (Amoroso 2014, Wang et al. 2018). This section will cover the main concepts that form a foundation for this research, namely hyflex systems and hyflex teaching.

2.2.1 Hyflex Teaching:

Hyflex teaching has been defined as a combination of traditional classroom and online learning elements. (Yanli Qi, 2008) It is believed to satisfy the different teaching requirements aroused in

the present technological age and help improve teaching quality. Hyflex teaching is an advanced notion as many new tactics must be used to make the classes effective for students learning from home (synchronously) and students learning from class.

On the other hand, Irvine (2020) emphasized the importance of "concepts" to create a shared learning experience. Both students and teachers must be flexible, and teachers are supposed to design courses while minding student success. Thus the Hyflex model was developed to combine both traditional learning and online modalities, leaving the decision to the students (Beatty 2007, 2019).

Many researchers have focused on making valuable hyflex learning for students with physical abilities and chronic illnesses. Pebbles was the first project to connect such students in hospitals with their own classes via video conferencing (Fels & Weiss, 2001). Several other projects followed this concept to make education available to all. The projects created a hyflex virtual classroom (via video conferencing) for students at hospitals to participate in class activities and learning.

Despite the adoption and benefits of hyflex teaching, the success rates have been dismal (Guidry, K., 2022, Lieberman, M. 2018). The average completion rates have been less than 4.8%, even when the students were automatically given 7% of the grade by peers (Parr, 2013). The design of the course plays a crucial role when it comes to student success in hyflex classes. Research shows that both the learning and teaching community must work hand in hand to reap the benefits of the hyflex courses. The disconnect between the benefits offered and student success has formed the focus of this study.

Even though the deployment of hyflex teaching has been used widely, its impact on teachers has been neglected. Especially during the pandemic, most schools and colleges have implemented hyflex approaches. The technological skills and training required to teach hyflex classes haven't been explored much. Research conducted with elementary teachers showed that they faced stress caused by anxiety while adapting to the new mode of teaching (T. Pressley, 2021). The results showed that teachers needed instructional/technology support from school administrators to teach classes efficiently. In addition, teachers also faced engagement issues with students during hyflex classes and faced high absenteeism rates. (Leech et al., 2020)

A flexible and efficient course design is needed to increase student success. Also, a proper learning space is required where teachers and students are trained to use the technologies and skills.

2.2.2 Teaching Success:

In the past few years, hyflex teaching has paved the way for a new definition of good teaching and what produces the best learning outcomes. Various researchers have tried to analyze the teaching success of the hyflex model. One such recent research has identified the four main factors for teaching success (Ahlgren, R., Häkkinen, S., & Eskola, A, 2020).

- Teacher's pedagogical skills
- Teacher's identity
- Organizational practices
- Educational technologies and facilities

Successful hyflex teaching includes not only good course design but also good practices, methodologies, and resources. Teachers' pedagogical skills are defined by their ability to plan

courses, instruct students, and manage the classroom. The teacher's identity refers to their can-do attitude towards hyflex teaching that promotes a positive and motivating environment for students to learn. Organizational practices include designing the course to be more inclusive and easily adaptable. The educational technologies and facilities include the online platforms and software tools used in the class. Effective hyflex teaching necessitates both a knowledgeable and adaptable instructor and organizational and technological approaches to facilitate the teachers' jobs.

As discussed earlier, learning flexibility and modified course design are the fundamentals of building a successful hyflex class.

2.2.3 Challenges in Hyflex Teaching:

The increase in pandemic and the need to follow strict guidelines of social distancing began the era of hyflex classes. The teaching community had to practice and engage in the new learning mode to understand its strategies to develop a successful course design for students. Hyflex teaching challenges teachers' and students' digital competencies and literacy (Bülow, M. W. 2022). Other common challenges doubt the success of hyflex classes in the future.

The hyflex classes are designed to include student groups learning from home and in-classroom to attend courses simultaneously. This involves a lot of prior testing and evaluations to ensure the smooth running of the classes. Technology difficulties require habituation, and the teaching community must meet these challenges (Flynn-Wilson & Reynolds, 2020). Digital competencies of teachers also play a vital role in addressing these challenges and are crucial for learning outcomes. The universities are sometimes not well equipped to provide pedagogical and technological support (Shamir-Inbal & Blau, 2021). In such a class design, where both sets of

students simultaneously interact with the teacher, the teachers find it hard to communicate and interact with both groups (Angelone et al., 2020).

Hyflex classes require teachers to coordinate the synchronous use of digital learning platforms (Ørngreen, 2015). There have been instances where students experience isolation and a lack of attention from the teachers (Blad, 2020; Superville, 2020b; Maxwell, 2020; Smith et al., 2020). Varied interactions among the teaching and learning community have been problematic since adopting the new learning mode (Shamir-Inbal & Blau, 2021). In synchronous hyflex learning environments, the teachers have comparably more difficult tasks of a technical and communicative kind (Zydney et al., 2019a). Simultaneously employing several technologies and multiple levels of coordination can be psychologically taxing for teachers. Distance learners struggle to build learning collaboration in hyflex classes and feel detached (Szeto, 2014; Rambll, 2020).

2.2.4 Student Groups in Hyflex Classroom

Hyflex classrooms are becoming increasingly popular in modern education. In these settings, students have the option of attending classes in person or online via video conferencing (Beatty, 2019). Faculty in a HyFlex environment must be capable of providing effective instruction in both classroom and online forms.

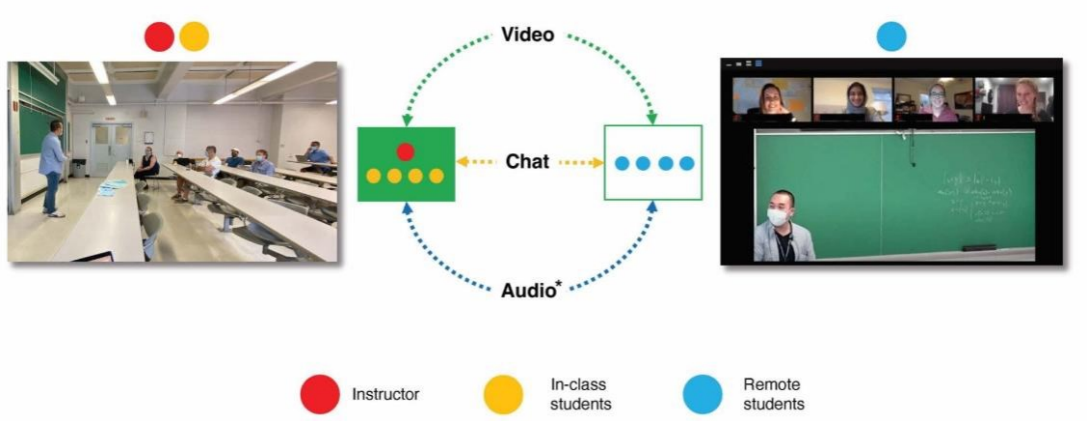


Figure 1: Example of Hyflex Classroom (Columbia University CTL)

The hyflex classroom is divided into two groups: In-classroom students and online students. The in-classroom students follow a traditional in-person learning model. They come to class during fixed class hours and attend the lectures. The online students follow a remote class format (attend classes online during fixed class hours). The whole class is being recorded live for the online students. The online students can view the in-classroom activities, the board or ppt, the professor, and the students in the classroom.

The in-classroom students can interact during the class with their professors and fellow students in-person. Whereas online students interact using chat. All resources are posted online for both groups of students.

There are quite several challenges faced in a hyflex classroom concerning the involvement of two student groups. The dominant problem is communication challenges (Kohnke, L., & Moorhouse, B. L., 2021). Students find it difficult to communicate effectively with each other (online with in-classroom students and vice-versa) and the professor. Uncertainties about handover and turn-taking, in particular, limited the students' ability to collaborate, watch progress, and receive feedback.

2.2.5 Relevant Theories

There have been various models and theories to determine and test the success of hyflex teaching. This sub-section will provide a glimpse of multiple approaches in the literature and a solid theoretical foundation to build the research framework.

CoI Theory

Garrison, Anderson, and Archer developed a structured framework for the process of learning in an online, blended environment. The CoI (Community of Inquiry) model is an inquiry-based learning and teaching model developed on the work of John Dewey. The framework describes the essential factors required to build and create meaningful learning.

The framework identifies three presences: Cognitive, Teaching, and Social, and emphasizes that learning occurs at the convergence of these three presences. Garrison defines presence as a state of mindful awareness, receptivity, and contentedness to both the individual and the group's social, cognitive, emotional, and physical workings (Rodgers and Raider-Roth, 2006, p. 1).

The cognitive presence (CP) is a result of the effective learning process from the practical inquiry cycle (Garrison et al., 2001). Learning is successful if students start exploring and learning more independently. CP is viewed as critical and creative thinking that results from practical inquiry in the learning community.

Social presence (SP) is social communication that promotes positive affect, interaction, and cohesion (Rourke, Anderson, Garrison, & Archer, 2001). Many studies have reported that SP can be a huge factor in students' success in learning (Shea 2008).

Teaching presence (TP) involves course design, organization, instruction facilitation, etc. (Garrison, 2001). TP is also hypothesized to be a strong indicator of online learning quality. Research has also reported a strong correlation between TP and student satisfaction.

Researchers have started to study the overlapping relation between SP, CP, and TP (Garrison, 2000, Arbaugh et al., 2008). Before the introduction of CoI, many researchers tried to analyze these concepts separately. But since the origin of CoI, all these factors are examined together as learning occurs at the intersection of these presences.

Garrison reported that to build a successful educational experience, the course design must concentrate on these three presences, leading to a successful learning experience and satisfaction. But the problem with CoI theory is that it doesn't acknowledge the issues from a teacher's perspective of teaching and designing hyflex courses. CoI states the essential factors required for a successful learning experience for either in-person students or online students, not both together. In instances where both sets of students are learning together, there are a lot of overlaps and gaps in the theory. For example, in a hyflex class, TP and SP are not strong with the online community compared to the in-person community. In such cases, there are no alternatives for achieving success for both learning communities. CoI theory was initially built for online learning environments. In a hyflex situation where both modes of learning are present, the TP in CoI is different among the two learning modes. For in-classroom students, the teachers are present in class which provides them direct connect compared to online students.

TAM

Davis created the Technology Acceptance Model (TAM) in 1989 based on the theory of response action (Fishbein & Ajzen, 1975). According to TAM, user attitudes toward utilizing

technology are predicted by how user-friendly and helpful technology is regarded to be. TAM has been applied in research for various IT like word processors (Davis et al., 1989), telemedicine (Hu et al., 1999), websites (Koufaris, 2002), etc.

Perceived usefulness is defined as the level at which users believe technology will improve their work performance. Perceived ease of use is defined as the level of ease with which users use technology. These two factors play a crucial role in TAM as they help determine the intention to use the new technology.

Even though TAM has great success stories in determining the intention of a community in adapting technology, it doesn't seem fit for examining the hyflex courses. As the research concentrates on more in-depth factors affecting teaching and learning success in hyflex courses and implementing principles for course design, TAM doesn't seem to be the right fit for building the research framework.

CABLES

The Complex Adaptive Blended Learning System (CABLES) is another blended theoretical learning framework commonly used. In the CABLES framework, learners occupy the model's center, and all the other elements impact each other. The CABLES framework comprises six segments, each having its own subsystem. These segments are Learner, Teacher, Technology, Content, Learning Support, and institution. All these segments have a dynamic and integrative relationship. The CABLES framework was created to enable a deeper and more accurate understanding of the dynamic and adaptable character of blended learning (Wang et al., 2005). The framework would help the teaching community develop a blended learning course with key interacting components. Even though the CABLES framework does have elements focusing on

both the learners and teachers, it does call for the gradual layering of support among various learners. It would not help address the question of designing a successful hyflex course. Again the critical problem would be the inclusion of students in both learning modes.

2.2.6 Literature Review Summary:

The literature review explored the concepts of hyflex systems and hyflex teaching and studied the challenges in the present hyflex classes and design. Teachers have an enormous challenge while teaching the hyflex course. They must split their concentration and resources among the two student groups (in-classroom vs. online).

Students enrolled in hyflex courses attend classes simultaneously with different groups (online students vs. in-classroom students). Reaching out to teachers for attention and trying to interact with their classmates is challenging in a hyflex classroom. Competing with their classmates for equal learning opportunities and experiences poses a massive threat to the future adoption of the learning mode.

Even though various studies and theories have been developed to understand and improve student success, not much is concentrated on the main challenges posed in hyflex classes. The motivation of this study is to integrate the above literature and examine which model can be used to develop a course design specially curated for the hyflex classes and student groups. The section below will analyze the essential factors necessary for building a successful course and address the significant challenges in hyflex teaching.

2.3 Theoretical Foundation

As discussed above, many theories and models exist in the literature to analyze and study the success and effects of hyflex classes. But all of them lacked in one issue. They did not address the issue of fairness or equivalency among students in the hyflex learning mode (online vs. in-classroom). With the CoI model, it is difficult to integrate the same framework for both online and in-classroom learning communities. Both TAM nor CABLES help analyze and address the challenges in a hyflex design (specifically two student groups).

Below is the hyflex core principles framework that addresses the above issues in hyflex learning.

2.3.1 Hyflex Course Design Principle:

The Hyflex course design is structured based on the four core principles; Learner Choice, Equivalency, Reusability, and Accessibility (Beatty, 2007). Many universities have followed these four core principles to design and structure their hyflex courses. These principles have provided a solid and consistent foundation for helping teachers develop course structure.

These four principles address the huge research gap found in the above theories. Since it is designed explicitly for the hyflex classes, it gives equal importance to online and in-person learning students. The hyflex core principles provide a way to develop an inclusive, accessible, reusable, flexible, and successful course for both sets of students.

The four principles have helped build learning and instructional goals (Reigeluth, 1983).

- ***Learner Choice:***

Learners' choice focuses on providing meaningful alternative participation modes for students so they can choose between the different modes at their comfort. One of the building

factors of HyFlex courses is providing students with choices. Without such decisions, there is no room for flexibility in the Hyflex course structure. For students to be autonomous, they must be provided with options to explore and learn.

- ***Equivalency:***

Equivalency focuses on providing equivalent learning in all participation modes. No matter where the student chooses to learn, they must be provided with similar learning experiences, including resources, attention, discussions, etc., which lead to equal learning outcomes. Designing classes to offer an equivalent learning experience for students in different modes is the most difficult challenge for the teaching community.

- ***Reusability:***

Reusability focuses on re-using the learning activities or objects from one mode and making them available for students in all other modes as well. For example, sometimes, teachers provide online students with pdf documents or podcasts, videos, and in-classroom students with worksheets. Both these resources must be made available to students learning online and in-classroom as they can provide excellent learning support for both modes of students. This is also useful for students when they wish to review and learn from the resources again, as everything is available online.

- ***Accessibility:***

Accessibility focuses on providing and equipping students with all the necessary technical skills and resources so that students from all participation modes have equitable access to them. For example, video recording should have transcripts for students who have trouble understanding clearly; all the web management systems should be user-screen-friendly, etc.

From the teacher's perspective, various factors must be considered while designing a course structure to include both online and in-classroom students. The above four principles help develop a course that obeys the fundamentals of Hyflex design.

Since the research aims to analyze the teaching success in hyflex courses, the core principles play a huge role in developing a successful approach and implementing the same. The study examines how these principles help build a learning space/course design and affect teaching practices, thereby improving student success.

The four core principles provide a fundamental concept for building a successful hyflex course, which is not implemented in any other framework. The hyflex core principles allow the teaching community to develop courses by addressing all the critical concerns related to implementing hyflex courses. Therefore, the hyflex core principles are chosen as a research framework to build the research models in this thesis.

2.4 Research Framework:

The below framework is developed with the help of the hyflex core principles to answer the research questions.

The study hypothesizes that the development of course design with the help of hyflex principles, technological support, and the implementation of the core principles can lead to successful hyflex learning for all students.

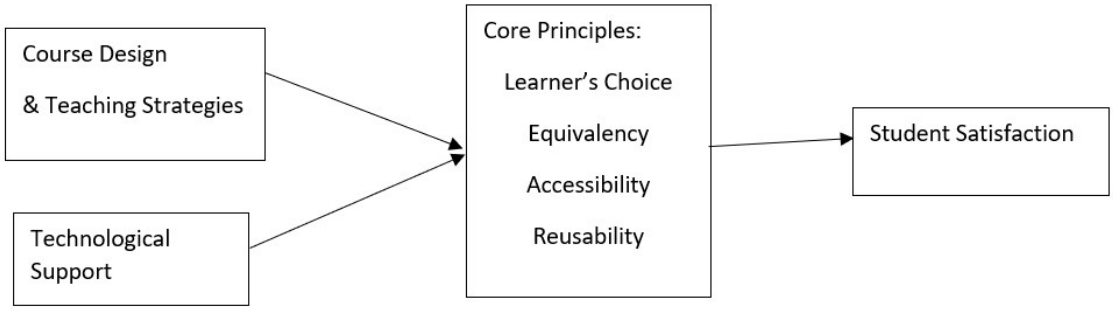


Figure 2: Research Framework

2.5 Methodology

The major component of this study is to analyze how teachers can succeed in hyflex teaching with a concentration on the four core principles of HyFlex design. To understand this, a qualitative approach was followed by conducting a focus group interview for professors teaching hyflex courses. Conducting a focus group would allow us to understand each professor's views in depth compared to a survey or questionnaire. Professors could think about the question for a while and then answer which would give more insights into the same. Focus group interviews would give us a way to ask in-depth questions to clearly understand their methodologies and implementation in-classroom which can't be achieved in a survey.

For the focus group interview, Nominal Group Technique was used to uncover the in-depth opinions of professors. In this method, the individual ideas and thoughts are discussed and shared in the group, and later these ideas are ranked according to their importance. The focus group interview was structured by ensuring that all the participants understood the four core principles of HyFlex design; discussions began with introducing the principles and the questions.

Business professors teaching hyflex classes (at least once in the past) at Memorial University were contacted via email to participate in the focus group interview. The focus group consisted of 5 participants. The focus group panel was limited to only business professors to control the confounding variable. As one professor couldn't make it to the focus group, their response was recorded through a survey.

A consent form was sent to all the professors stating the purpose of the study, length of the focus group, possible benefits, risks, confidentiality and anonymity, and ownership and storage of data. The participants were notified that participation in the focus group was entirely voluntary, and they were free to withdraw from the focus group at any time.

The ethical duty of confidentiality includes safeguarding participants' identities, personal information, and data from unauthorized access, use, or disclosure. The participants were notified that their data will not be released and their names would be hidden, modified, or anonymized for research purposes. After the consent form was signed, a quick poll was conducted to decide the meeting time.

The focus group interview was conducted via Zoom meetings. First, the concept of HyFlex design and the core principles were introduced. Then each professor was asked to introduce themselves and talk about their experience with hyflex teaching. Later the discussions began concerning the different questions posed by the moderator. Finally, an exit survey was conducted after the zoom meeting to rank the crucial concepts from the panel (followed by Nominal Group Technique).

The focus group began with the introduction of the 4 core principles and the definition of hyflex. After this, each of the six professors was asked to elaborate on the below questions. After their

answer, more specific questions (like why you choose this method of teaching, how did you approach this method, etc.) were asked to clearly understand their preferences and teaching methods. The focus group was conducted via Zoom and the entire meeting was recorded. After the session was over, the whole meeting was downloaded and the video was converted to text transcripts to understand and analyze every comment.

"Happy Scribe", a transcription software was used to transcribe the video to text. Once the transcript was downloaded a set of methods were used to make it readable and understandable. Firstly the data was organized based on questions and preferences to make it easier for analyzing. Next, I identified the key themes that emerged from the transcripts by reading through them several times and organizing and color coding. Different themes were labeled and color-coded based. Finally, the transcript was converted to two data sets. One with all the elaborate answers that would help answer the research questions. Two, an Excel data with values "Yes" or "No" to answer the demographic and statistical questions.

The focus group interview and the survey were based on the following questions:

1. Learner Choice:

   Hyflex learning provides both classroom and online modes and enables students to choose between these two modes daily. What would you comment on students' choice of learning mode in hyflex classes? Do you think this choice may promote students' autonomy and help them be more successful in learning? Why or why not?

   This question helps address how the course design (learner choice provided to students) helps achieve student success (satisfaction).
2. Equivalency:

In theory, hyflex teaching should provide learning activities in both the classroom and online modes, leading to equal learning outcomes. Do you have any learning activities designed for students online and in the classroom to achieve equivalent student success? How do you approach differentiating your teaching for students at home and students in class?

This question helps address how the teaching strategies and course structure (equivalent learning opportunities provided to students) help achieve student success (satisfaction).

3. Accessibility:

   As a program may contain more students with varied learning mode-abilities, have you made an effort to implement accessibility fully in all classes? How do you try to achieve accessibility for students in different learning modes? Is there any approach you follow to assess both online and in-class students?

   This question helps address how the teaching strategies (accessibility to all students) help achieve student success (satisfaction).

4. Reusability:

   Ideally, in hyflex teaching, we can utilize artifacts from learning activities in each participation mode as "learning objects' for all students. According to your experience, do you record hyflex classes and post the videos online for students to view and learn later? Why or why not? On the other side, do you make an effort to make the in-classroom resources available to online students too?

   This question helps address how the course design(reusability of learning resources) helps achieve student success (satisfaction).

5. What are the advantages of teaching hyflex classes compared to in-classroom and distance, remote learning mode?

   This question helps us in understanding the teachers' perspectives of hyflex classes and analyze if it can be implemented in the future.

6. Compared to in-classroom and distance, remote learning mode, what has been the most significant challenge or difficulty to your success with hyflex teaching? Were there any technical difficulties in hyflex classes which you might not have faced in a traditional classroom?

   This question helps in understanding the challenges faced in the hyflex classes that might affect its future adoption. It also analyzes if and how technological support may be useful in helping teachers design and manage a hyflex class.

7. Do you think our university should continue to offer hyflex classes after covid? If so, are you willing to teach hyflex classes after covid-19?

   This question helps us in understanding the teachers' perspectives of hyflex classes and analyze if it can be implemented in the future.

First key terms throughout the transcript were identified to analyze the different themes present which are discussed below with some example statements from the focus group. Then each theme was color-coded and grouped based on commonalities and identified as motivators and demotivators which are discussed in depth in the results section.

- Challenging: eg: “I found that that was going to be very challenging to try to navigate the technology in the classroom and checking the students and could be quite distracting as well, even for me as an instructor to try to to juggle all of that.”

- Flexibility: eg: “So without the flexibility and without the choices, hybrid course wouldn't be that appealing to students”
- Choices: eg: “One thing I'm proud of here is the students may have choices they can come to for every single particular class.”
- Motivated: eg: “I'm also motivated to give as much choice as possible to students to motivate them.”
- Attention: eg: “Ideally, in-classroom students tend to get more attention than online students.”
- Difficult: eg: “And like I said, it is really hard to manage both the students, and just dialling in would be difficult for the students as well because they have their own issues”
- Success: eg: “Maybe in-classroom students could be more successful compared to the students online because the students can get customer handle ready notes, which put on the big screen.”
- Interaction: eg: “Ten times more interaction with the students who were who were physically there.”
- Distraction: eg: “But when they have a choice, when they stay home but still want to attend the class, they could have more distraction at home.”
- Course Structure: eg: “I usually upload the methods and structure of the course in Brightspace for students to look in advance.”
- Remote reach: eg: “Definitely, hybrid has the potention to bridge the gap between remote students and schools.”

2.6 Results

The total participants consisted of 6 business professors from the Memorial University of Newfoundland. Five members were present for the group discussion and shared their insights to develop a better model for students. One professor shared their responses through the survey.

A few statistical questions were asked which included gender, area of expertise, highest qualification, retention (will continue or adopt hyflex in the future), and difficulty in teaching hyflex classes.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	3	50.0	50.0	50.0
	Male	3	50.0	50.0	100.0
	Total	6	100.0	100.0	

The focus group consisted of an equal number of male and female members. Throughout the focus group, gender did not play a crucial factor in the experience related to hyflex teaching

Area of Expertise

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Accounting	1	16.7	16.7	16.7
	Finance	3	50.0	50.0	66.7
	Information Systems	1	16.7	16.7	83.3
	Strategy	1	16.7	16.7	100.0
	Total	6	100.0	100.0	

The majority of the members, about 40%, had expertise in finance. The other members had expertise in accounting, strategy, and information systems. Overall, all the members have taught at least one mode of hyflex class in the past.

Highest Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PhD	6	100.0	100.0	100.0

All the group members had the highest degree qualification of Ph.D. Because of this, the experience they had with teaching, in general, was relatable and comparable.

Retention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	33.3	33.3	33.3
	Yes	4	66.7	66.7	100.0
	Total	6	100.0	100.0	

The participants were asked if they would continue to use hyflex in the future (Retention). Around 60% of the focus group members preferred to teach hyflex classes in the future. Hyflex teaching has a strong future for the teaching and learning community, addressed by the 60% of professors. And the rest, 40% of professors, leaned more toward traditional in-person teaching.

Difficulty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	100.0	100.0	100.0

One common factor noticed by all the professors was the complexity of teaching hyflex classes. Everyone felt hyflex courses were difficult to teach, considering the involvement of students learning from two different modes.

There have been considerable agreements and disagreements among the participants concerning teaching hyflex classes. A few concepts were new for some group members, and most faced common challenges with hyflex teaching.

The major principles discussed in the focus group were: Learner's Choice, Equivalency, Accessibility, Reusability, Technological Support, Course Design, and Student Success. Concerning hyflex classes, course design and technical support played a huge role in determining the student's success by valuing the four principles. Below is the summary of the individual tenets discussed in the focus group:

2.6.1 Leaner's Choice:

Almost 85% of professors mostly repeated the word "flexibility" in the focus group. There were different opinions on whether students must be given a choice. With the world moving faster, the students and learning community require a flexible schedule that fits their personal and professional lives. About 75% of professors felt that providing a flexible choice promotes students to be more autonomous and choose a mode that best befits them.

One professor stated, "Providing alternative learning modes is a last useful resort for students who can't come to class." One business faculty stated, "Having multiple learning modes is very helpful because students can adjust to their circumstances." But too much flexibility also poses a downfall. One of the faculty stated, "There might be an impact on learning if the choices are not

the right ones." Being said, a few more professors agreed that depending on the student's mentality and effort, the choice might impact their success.

2.6.2 Equivalency:

The concept of providing equivalent learning outcomes is still unclear in the teaching community. Providing learning opportunities to students from home and in-class to attain equal learning outcomes is the most challenging part of hyflex teaching.

Most of the course is designed for in-classroom students and significantly fewer concentrate on students learning from home. All the members in the focus group stated that no learning activities were specifically designed for students learning from home in hyflex classes. The course and learning activities are commonly designed, which sometimes may be of disadvantage for students learning from home.

2.6.3 Accessibility:

When it comes to student access to resources, the teaching community tries its best to make all the resources accessible to students learning from home and in the classroom. One professor stated, "It is very challenging to provide all the students with equal access to teaching resources." One of the faculty members says, "I make sure I post all the ppts and resources in bright space so every student can access them." Another professor stated, "I explain to the students how to access these resources on the first day of class." Evidently, the teaching community enforces methods to make the resources accessible and attainable to all students but finds it very challenging to succeed.

2.6.4 Reusability:

The concept of reusability is widely used as hyflex classes involve students learning from home and in the classroom. The resources used by students in the classroom have been uploaded online for students at home to view and learn later and vice versa. Developing different resources for both students seems impractical, so reusability is a massive advantage in such cases.

One professor stated, “Reusability of resources will be helpful for students when they couldn’t make it to a class due to some circumstances.” But on the contrary, teachers are also worried that students will take advantage of this situation. One of the faculty said, “I’m worried that students may not concentrate in class because every resource will be available online later.” To conclude, the students are provided with many valuable resources, so it is up to them to make the best use of what’s given to them.

2.6.5 Course Design

Hyflex classes can be challenging to design because they must suit both in-person and remote learners. Effective course design can help to ease some of these issues and ensure that all students have a positive learning experience. The participants in the focus group felt that developing a course design that accommodates the needs of both student groups is challenging. Many a time the course is designed on a basic level majorly focusing on the in-classroom students. Supplementary online resources are provided for online students. The courses are not tailor-made which creates barriers for students in online communities.

One of the professors stated that she tries her best to help the online students after class to understand the lectures better if they approach her. But this isn’t the case most of the time.

A well-structured course can help students comprehend what is expected of them and how they will be evaluated. This is particularly essential in hyflex classes where students' schedules and access to resources may differ. Hyflex classes require flexibility to accommodate the needs of both in-person and remote learners. Course design should allow for different modes of learning, such as recorded lectures and online discussions, to give students the flexibility they need.

Following the four principles would help the teaching community build a course design that accommodates the needs of both learning communities. The four principles emphasize promoting flexibility, equivalency, accessibility, and reusability whereby students in both learning modes experience similar learning regardless of which mode they choose.

2.6.6 Technological Support

Hyflex classes require teachers to use a variety of technology tools and platforms to facilitate learning and engagement for both in-person and remote learners. By using technological supports like online conferencing tools, assessment tools, content creation tools, etc., teachers in hyflex classes can effectively manage course content, facilitate communication and collaboration, and ensure that all students have access to the same learning opportunities. Teachers need to receive training and support in using these tools to ensure their effective integration into the hyflex classroom.

The participants in the focus group revealed that their experience with new emerging technologies can sometimes act as a barrier to giving their best in teaching. Universities need to understand the technical gap and implement support that will enhance the learning and teaching in hyflex classes.

During the discussion, many motivators and demotivators for student success emerged. Below is a summary of them with representative quotes from the talks.

2.6.7 Motivators

Table 1 shows the top leading motivators using the terms developed in the discussion.

A	Flexible Schedule
B	Reach more students
C	Better course design

Table 1: Study 1 Motivator

From the focus group discussion, the top motivator for success in hyflex classes is a "flexible schedule." The main reason behind it is that students can choose when and how they learn by coming to class or learning from home according to their preferences. Flexibility provides students an advantage when they are in unavoidable circumstances.

One professor says, "One of my good students fell sick during covid, but since hyflex classes were flexible, he could still attend classes from his home, which helped him in his performance." Instances like these have played a significant role in students' academic performance. Many a time, students have lost attendance due to personal reasons. But now, with the Hyflex classes, students can join classes at their ease from anywhere. This helps them never to miss a class and stay up to date with the syllabus no matter where they are.

Flexibility also allows financially independent students to concentrate on their work and studies according to their timing. One professor says, "Providing flexible schedules helps students achieve their learning goals even when they face health, money, and other issues." An

experienced faculty stated, “Flexible schedules help not only the students but also the teachers in cases of emergencies giving us a choice of place and time.” This is followed by the ability for education to reach more distant students.

The education sector is now more reachable and attainable by students who can’t learn in person due to various reasons such as distance, health, etc. Since the invention of flexibility in hyflex classes, the ability to reach more students has increased. One professor stated, “The class enrollment has increased because of the flexible schedule, and now more students can take the courses.” With the advancement of technology, more and more students from distant places can attend universities and enroll in classes.

In a survey conducted recently with 2600 faculty members and students, almost half the population (49%) student community and around 35% of faculty members preferred hyflex classes [College 2030]. As hyflex classes are being developed, the complexity increases, so the course design has improved.

One faculty member stated, “All resources are available online, and the students can easily benefit from them.” The course design in hyflex classes also includes resources for the online community; therefore, the classes are recorded frequently, and all the resources are posted online, which helps students to refer to and learn again. This allows for a more effective and efficient learning experience.

The hyflex class is designed in a way to accommodate the needs of both the in-person and online students. Therefore a hyflex course will have a better course structure including engaging and tailor-made course materials and class activities such as group work, case studies, and

simulations, to keep students engaged. A well-designed hyflex course can provide students with the flexibility they need to succeed, while still maintaining a high level of engagement and communication.

2.6.8 Demotivators

Table 2 shows the top leading demotivators using the terms developed in the discussion.

A	More complexity
B	Lack of attention
C	Equivalency not achieved
D	Challenging

Table 2: Study 1 Demotivator

The major problem faced with hyflex teaching is the complexity involved in it. Teaching a class in person and online simultaneously is a complex task and hard to achieve. Most teachers find it quite difficult to manage online and in-person students simultaneously. One faculty member stated, “I can not manage both sets of students simultaneously. I usually tend to concentrate on the students in the classroom.” It has been one of the most extensive setbacks of hyflex classes.

One set of students gets more interaction and a better learning experience in theory and practical. In contrast, the students learning from home tend to get less practical exposure and interactions. Another reason is the lack of attention. Teachers find it hard to give attention equally to both sets of students. Students learning from online platforms tend to get less attention from teachers.

One female professor with extensive experience and teaching responsibilities says, “Students learning from home must approach me separately if they have any concerns and try to get my

attention because it is hard to monitor them during class hours." Another faculty member says, "I can not concentrate on both sets of students at once, and my attention is dragged towards the in-classroom students.

The interactions differ amongst both groups of students leading to a varied learning experience, because of which Equivalency is not achieved in hyflex classes. The most commonly stated term by the professors was "challenging." No matter how many new rules and teaching designs are induced in the curriculum, the teaching community still finds it challenging to adapt to the new teaching mode.

2.6.9 Student Satisfaction:

Students' satisfaction depends on various factors rather than just the course design and resources offered. There were many concerns regarding this in the focus group discussion. All the faculty members believe that not every student faces the same satisfaction in a class. Each student needs a different approach to learning. Some may be satisfied with just online resources, while some may require a lot of assistance. So satisfaction cannot be grouped for students in general.

One faculty member stated, "Anecdotally, satisfaction depends on various other factors. So it is hard to compare the satisfaction of students learning from home and in the classroom."

The four principles play a significant role in providing students with a better learning experience. It makes the students autonomous and helps them decide on their satisfaction levels. The teaching community believes that students learning from the classroom get a better experience in terms of interactions, attention, practical experiences, peer support, etc.

2.7 Discussion

The focus group conducted gave a lot of insights that are crucial for future framework development. Below are the key takeaways from the focus group concerning the research questions:

2.7.1 How to make hyflex teaching more efficient with the help of the four core principles?

During the focus group, almost 75% of the professors agreed that their concentration leaned towards the in-classroom students and couldn't give equal attention to both sets of students in hyflex classes. One professor stated, "I'm not sure what to do but most of the time, my attention is usually grabbed by students in the classroom, and I can not look after the students learning from home." Another professor stated, "I'd recommend the online students to reach me after class and clear their doubts as it is quite difficult to do the same during class hours."

The four principles state ways by which teachers can provide a similar learning experience to both sets of students. The future course design must consider these four principles to make the learning accommodatable and attainable.

Learner's choice and Reusability are already being used in all hyflex classes and are equally available to both learning groups. But the problem comes with Equivalency and Accessibility. To make hyflex teaching more efficient, these two factors must be given more importance, and the course framework must be designed accordingly.

Accessibility is more related to the universities course design policies. To attain more accessibility, the hyflex course must be designed to accommodate students with different learning aids. For example, a student may not be fluent in English, so some transcripts must be available for them to understand and learn on their own time. The universities must also ensure

that they follow the universal design of accessibility guidelines to make education more attainable and usable by students with varied learning mode abilities.

To attain Equivalency, this study suggests that in the online learning mode, students must have a moderator apart from the hyflex teacher to make the online learning experience more efficient. The moderator can be another professor or a teaching assistant. A moderator's primary role is to ensure that the online interactions take place smoothly and that the students' doubts are cleared on the spot.

There have been instances in hyflex classes where the online learning community does not feel much involved during a group discussion session compared to the in-classroom students. In such cases, the online moderator can conduct a separate group discussion for the online students, making them feel more inclusive and providing them with equal learning experiences and opportunities.

2.7.2 How can teachers help to achieve student success in hyflex classes?

As discussed earlier, teachers' role in student success is quite essential as they set the learning environment for students to be more motivated, build positivity, and help them reach their goals. The teachers are responsible for identifying students with learning issues and helping them attain their goals, as not all students are outspoken.

A teacher in a hyflex class must be highly motivated to learn the new mode of learning and build a positive impact on students. Teachers must make the course challenging, encourage students to be more involved in education, and ask questions.

In a hyflex class, teachers must ensure that students learning through the online medium is not distracted during the course and make it more interactive to ensure the participation of all

students. They must also ensure that during the class, the resource used by them are available to both groups of students and are readable and understandable by them. For instance, they must also ensure that they are audible and understandable.

Since hyflex is a new learning mode, teachers must be patient with the students and help them with their difficulties. Regular meetings should be conducted to ensure that all students are progressing and are not stuck. Teachers must also have time in their schedule to meet up with students who find it hard to adapt and provide them with resources to help them cope with the new learning mode.

2.7.3 Are the hyflex core principles valuable for student success?

Almost 90% of the members in the focus group agreed that these four core principles are essential to make the hyflex course successful as it concentrates on providing equal learning experiences for both students learning from home and in-classroom. There are many frameworks present to develop a robust course design for students. Still, not a lot focuses on the successful experience of students in different learning modes in hyflex classes.

The hyflex principles are very crucial factors that are essential to make sure that the course design is successful and satisfying for both the set of students. One professor stated, “I haven’t much thought about accessibility. But I think I should focus more on it next time.” Evidently, the participants in the study feel that when they give importance to these four principles, they can achieve equivalent success among students learning from home and in-classroom.

Learners’ choice provides the students the flexibility they need to become self-dependent and motivated. Equivalency ensures that the students learning from home and in-classroom attain equivalent learning outcomes. Therefore teachers can design a course that would concentrate on

both sets of students and make it more inclusive. Accessibility ensures that all the resources and learning practices are accessible and attainable by both groups of students. Reusability ensures that the resources used by one set of students are available to others and vice versa.

2.8 Conclusion

This study has contributed to the literature by understanding the teachers' perspectives of hyflex classes and validating the pros and cons of the hyflex core principles regarding the student satisfaction of both groups. Hyflex classes have pros and cons, but it is up to the teaching and learning community on how they use the resources. From the focus group discussion and survey the study suggests that using the four core principles help attain equal learning experience can be incorporated into hyflex courses. This study addresses the concerns of the teaching community and presents their perspective on the hyflex course design and its success. During the focus group, the most commonly stated comment was that it was up to the students to decide how they would make use of the hyflex factors.

Hyflex classes provide a lot of flexibility and accessibility to students. It is up to the students to decide wisely on how they would use the flexibility to succeed in their classes. One faculty member stated, “Sometimes students may not attend classes, as everything is to be posted online. But they might miss out on some crucial information and tips that I teach in classes as everything can not be posted online.”

Since hyflex classes have become more accessible, there are chances for students to become lethargic in taking notes or being attentive in classes. In such instances, the performance may be low compared to other learning modes.

The participants in the study encourage the flexibility, accessibility, reusability, and course design of the hyflex classes. But from their perspective, hyflex classes need to be made more efficient. About 75% of faculty members in the focus group preferred in-person classes as they gave them better control over the students learning. From their perspective, students can be more successful in hyflex classes provided they make wise decisions and use the resources efficiently.

The major limitation of this study was the size of the focus group and the experience of the teaching community. Not a lot of professors and universities have implemented hyflex in its right form. Therefore, finding professors with experience in the hyflex domain was one of the biggest challenges in this study.

Chapter 3: Study 2

3 A Comparative Study of Student Success in Distance vs. Hyflex vs. In-Person Learning Modes

3.1 Introduction

The escalation of COVID has changed many of the routines of today's world, especially in the education sector, disrupting it globally. The vulnerable learners have been affected the hardest. The pandemic has forced students and the learning community to shift to the new reality of hyflex learning to improve education during this period of disrupted learning. Since the beginning and before the pandemic, learning primarily took three formats: traditional, distance, and online. IGI Global defines Traditional Learning as typical face-to-face interactions that occur in a physical location. Traditional learning has been the primary form of learning and teaching

for a long time. Students and professors are physically present in a classroom environment where they learn, discuss, and work together. Both the learning community members worked together and had in-person interactions, which led to successful learning and educational experiences.

But as science and innovation developed, so did the field of education. A new model of instruction called “Remote Learning” emerged. Students were registered for the courses; course contents were posted online, then all students in a course could learn from a different location without attending the classes in person. They had access to the study material, known by themselves, and finally followed an examination to complete the course. The introduction of remote learning helped many students from remote places or students who were working on completing their studies. One of the significant drawbacks of remote education was the interactions and the experience. There weren’t many community interactions where students could discuss, learn or ask questions.

The first generation of web-based instructions, blended learning, and e-Learning began in 1998. Although the concepts were quite unclear, they paved the way and gained tremendous accomplishments throughout the years. The availability of learning platforms increased gradually. “Online Learning/Distance Learning” emerged again. Now students can learn anywhere at any time without having to be registered at a particular organization. The emergence of online education gave students ample opportunity to learn various courses at their own pace and choose their instructors and languages. Many schools started providing online courses for students who preferred that mode, providing all course materials online that can be downloaded and used accordingly. Yet another significant reason why students prefer online learning is the sense of autonomy. Students believe that when they are in charge of their learning, they perform better and are more successful in learning (De Beaufort L., 2016).

Variations of online learning have been developing since the introduction phase. There were times when online courses provided only course content and external learning materials. But today, online education offers one-to-one coaching and interactive group classes and even provides a virtual class learning experience.

In the past few years, due to the high rise in the pandemic, and the requirement for social distancing, a new learning model has emerged with the help of the most recent developments in technology-based learning, namely, "Hyflex or Hyflex Learning." Ross and Gage defined hyflex education as a form of blended learning that reduces face-to-face classroom time, replacing it with out-of-class online learning activities. [1]

Hyflex mode learning consists of some in-classroom students and other online students during the same class time. This is a new model of education that includes in-person training and e-learning. There would be a rotation among the students such that every Student experiences both online and in-classroom learning within the same course. The course structure is designed so that various materials are available online and can be understood and completed by both categories of students.

The emergence of the new mode of learning is highly oriented towards "Flexibility." The hyflex learning mode provides the teaching and the learning community with the utmost flexibility to learn and teach comfortably. More offices and schools have started implementing hyflex even after the pandemic.

During the pandemic, this new model poses enormous challenges for students and instructors simultaneously, considering the adaptation of the new model. The learning community has thoroughly experienced online courses, but hyflex learning differs hugely, which may take time

for adapting. Not only for students, but hyflex learning has also been a great challenge for teachers. Managing a class of students in-person and simultaneously addressing the online group of students is a massive difficulty that hyflex poses.

The two groups of students, in-class and online, face the same order of difficulty in interactions and learning. There are instances where online students find it hard to cope with the teacher's lecture. Few might find it less audible, few might not see what's written on the boards, and few might not have access to the in-class resources. Unlike online classes, teachers can not record lessons and post them because the hyflex courses are in real-time. Teachers find it hard to address and manage online students while managing in-class students. And online students might find it hard to interact with other students and professors. Hyflex learning poses enormous difficulties that must be addressed so that the learning community makes the best use of the new learning mode and can be implemented in the future as well.

3.1.1 Motivation:

According to a global survey [Forbes 2022, UNESCO], students are overwhelmingly in favor of continuing hyflex learning. Regardless of the difficulties experienced in the hyflex mode, the new design setting is considered an important step stone for future development in various sectors, especially education. During and after the pandemic, the hyflex set has been widely used in the technology, work environment, and education sector.

The hyflex setting has increased the scope of learning. Schools and universities have increased their student enrollment with the help of the hyflex setting. Now students can attend classes from anywhere regardless of their location and availability. But many universities and schools have returned to the traditional mode of learning, which includes only in-person or distance

separately. This could also be attributed to the fact that hyflex learning was not used to its maximum and the challenges weren't overcome to build a successful course design.

This section introduces the motivation for exploring hyflex learning, and the benefits of hyflex design to students and educational organizations

Need for Hyflex:

It is known that hyflex bloomed because of the pandemic and the need for flexibility and social distancing. But flexibility is not the only solid benefit of hyflex systems. Hyflex has enormous pros that can be extracted to benefit the teaching community, administrators, students, employees, and work environments.

Accessibility: Hyflex learning offers accessibility to students and the teaching community locally and globally. No matter their general health or location, students can access lessons through hyflex learning, and for many students, virtual learning is a more affordable alternative. Also, since hyflex learning allows students to attend classes from home or in person, all the resources are posted online for easy access. Students can now never miss a class, as there is an online option available to them.

Variability: Students have more control over their learning and can interact with course material in the ways that work best for them. Hyflex learning provides a mix of different course components that provides students more power over their learning.

Opportunity: Hyflex learning provides a great opportunity for teachers and students to engage more in learning activities. Schools can increase their enrollment for courses as hyflex learning can be offered as a mix of both in-person and distance learning.

Engagement: Hyflex learning enables both students and schools to access more affordable courses. Students usually perform better when they are engaged in the classroom. Now schools can provide a better course structure with the help of hyflex learning as it is a blend of synchronous and asynchronous learning and is a new way to keep students engaged. Some kids grew up in a time when smartphones, tablets, and other technological devices are common; as a result, they are probably accustomed to using technology for work and school. Technology integration into the classroom enables professors to interact with students and circulate course material in a setting where students feel comfortable and secure.

Safe Environment: According to a survey, 99% of teachers reported that they prefer a safe and healthy learning environment. Hyflex learning provides a safe and flexible environment where students can learn regardless of their health conditions. Even after the pandemic, students who are sick could choose to learn from home, thereby reducing the spread of infection.

Hyflex Over Other Learning Modes:

The In-person learning mode has been in existence for a very long period. Students and teachers have leaned more toward in-person learning because of the one main reason that everyone is present together at the same time. This means that students and teachers can easily engage with each other and learn as one. It is believed that traditional classrooms will continue to offer benefits that arguably cannot fully be obtained in any other manner (Chen, C. C., & Jones, K. T., 2007).

With the introduction of distance learning, a lot of the older student population preferred it over in-person learning because it is convenient for students who need to manage numerous other

commitments (Hannay, M., & Newvine, T., 2006). Distance learning provided a balance between personal and educational life. Students could learn on their clocks.

Hyflex learning environment provides educational advantages to students and universities by integrating the best aspects of traditional in-person settings and distance learning together (Hannay, M., & Newvine, T., 2006).

Students miss a lot of in-person benefits while learning in distance courses such as student-teacher/ student-student engagement, practical experiences, not receiving timely feedback, not enough accountability, etc. Since purely distance courses have very less or no face-to-face interaction, almost 40%-80% of students drop out of the courses as it is less accountable. Distance course also makes it difficult to design the course to meet the needs of students who require in-person components.

At the same time, students miss technological advancements in in-person learning. Students have less control over how and where they learn. Based on living situations, commuting might be a trouble. There is no digital equivalency for in-person classes. If a student misses a class, there is no way he could attend the same class again as there aren't any digital recordings available.

Hyflex learning provides the best of both worlds. Students can get access to both in-person and distance resources at the same time. Hyflex learning provides students with more power over their learning schedules and abilities. Hyflex learning helps students with different/varied learning preferences by providing a mix of digital and physical resources, and students can choose the best that benefits them. Hyflex can be utilized to provide a better learning experience for students by addressing the challenges in distance and in-person learning modes.

Comparing the student success (satisfaction & ASE) in in-person, distance, and hyflex modes will provide clear information for students on why they should choose a particular learning mode. Students can decide wisely based on their preferences and learning styles. Understanding the perception of students about the different learning modes will help the teaching community address students' comments and concerns and build a better learning model providing better learning experiences.

Need for Experiential Learning:

Experiential learning is defined as one's capacity to transfer knowledge and skills to other contexts (Awidi, I. T., & Paynter, M., 2019). One gains the ability to think critically, examine issues, and develop effective solutions through experiential learning. Students today concentrate on studying skills and knowledge as part of their education. The best way to grasp things is through practical education, which is just as vital as theoretical knowledge.

When students comprehend and adopt a practical approach, their learning style is altered, improving their confidence levels. Experiential learning helps students become active learners where they understand the concepts deeply and not just memorize them. Experiential learning is also an interactive process that boosts students' interest in learning.

Incorporating experiential learning in hyflex courses can elevate the success of hyflex learning by providing the students with great practical exposure and flexible learning. Students can enhance their skills, understand concepts better, handle real-life problems, etc., all while learning with flexibility.

3.1.2 Research Gap:

Hyflex learning has gained huge relevancy due to the flexibility and engagement it offers to students and teachers (Norgard, 2021). Even after the pandemic, researchers claim that universities might shift to hyflex learning to better deal with changing contexts (Miller et. al., 2021). Future researchers must design courses based on physical and digital resources to accommodate the learning needs of the diverse student community.

In the last 10 years, many researchers have proposed the hyflex models to build successful course designs (Beatty 2007, 2019, Irvine et al., 2013). But even now, many schools and universities misinterpret hyflex as just an online course. To make a successful hyflex learning experience in the future, more empirical research is required to analyze how students and teachers perceive the new learning model based on solid course design. Another key factor in building a successful learning experience is providing students with practical exposure, which allows them to learn and explore practically.

This study aims to fill the research gap by analyzing the impact of the different learning modes, experiential learning, and course design on student success defined by satisfaction and self-efficacy. The study primarily focuses on understanding if there is a difference in students' learning experiences in the different learning modes based on the newly developed Hyflex course design (Beatty 2007, 2019). The research sheds light on the factors essential for student success through a qualitative research approach.

3.1.3 Objective of the Study:

Hyflex learning has a lot of variations present. Many schools and universities have implemented hyflex classes differently; therefore, the results of student and teacher satisfaction might vary

largely. Even within Memorial University, many teachers implemented hyflex classes differently from the original method (identified in the focus group).

Hyflex is generally misinterpreted as distance courses with an engagement component. And because of this misconception, the benefits of hyflex are not extracted to their fullest, and many universities are returning to in-person/distance courses.

The study, therefore, concentrates on using the core principles of hyflex learning to bridge the gap by comparing student satisfaction and ASE based on this solid foundation. The study proposes a research model based on the values and principles of the Hyflex course design to answer the research question. The rationale is that learning is more effective when proper techniques and values are followed in course development.

According to a survey conducted in 2019, about 80% of students believe that they need a practical component to their course to make it more relevant and gain more knowledge. But with the hyflex model where students are present in both online and in-classroom locations, implementing experiential learning is quite challenging. The study incorporates the concepts of experiential learning to analyze if and how it affects student success in hyflex learning when implemented with the help of the core principles of course design.

The study proposes that with proposer designs, the hyflex model may have great potential to achieve a high level of course registration rate, student satisfaction, and academic self-efficacy.

To summarize, this research aims to investigate the impact of independent variables (learning mode, experiential learning) on the four core principles of Hyflex course design, thereby affecting their satisfaction, and ASE.

The objectives of this study are to analyze the below research questions concerning the above independent factors:

Research Question 1: Do students perceive a higher level of satisfaction, and self-efficacy in hyflex courses compared to in-person and distance courses?

Research Question 2: Does experiential learning play a positive role in determining student success?

To answer the research questions, we build a research model following the hyflex core principles to compare student success in hyflex, traditional in-person, and distance learning modes. This would provide future scholars and students a guide on the difference between in-person and hyflex mode, their implementation, success, and challenges faced by students in them. The research model also analyzes the impact of experiential learning on student success which will be discussed in later sections.

3.2 Literature Review:

This chapter will present a review of the literature on this study's significant themes. It will begin with a detailed examination of the hyflex learning context, which this study revolves around. The literature reviews the various learning mode and their development to date. This section will provide a detailed view of this context, briefing the different terminologies and examining the different approaches. With the research and development in the education sector, we can see that students have been experimenting with the different learning modes and have a preference compared to other learning modes. The following section will provide a brief examination of the various themes.

3.2.1 Learning Modes Overview

This study revolves around the different learning modes in the education sector and their importance in students' success in learning. Since time known, traditional classroom learning has been the most commonly used method of learning. But later, various other modes were developed due to technological advancement and the need for more access to education. Below the different learning modes are discussed in detail:

Traditional In-Person Learning:

For a time known, traditional learning had been the only mode of learning where teachers and students came together to discuss, learn and share knowledge. Traditional learning is defined as typical face-to-face interactions in a physical location such as a school or college (Gaimaro, A., & Lomellini, A., 2021). The learning occurs in a common area, such as a classroom, where the moderator or lecturer provides instructions and regulates the learning flow. Before the various learning modes came into existence, traditional in-person learning was the only efficient and successful learning mode. Apart from gaining knowledge, students hone their interpersonal skills and build their confidence and communication/interaction skills. The daily routine of going to classes developed punctuality and discipline in students. The most crucial reason some students still prefer traditional learning over other modes is that it provides a space for in-person interactions with professors and other students, whereby they build their interpersonal relationships and share knowledge and learn better.

Distance Learning

In the late 1800s, access to education was limited by many factors. A few significant factors were geographic distances between education institutions and rural populations (Banas, E. J., & Emory, W. F., 1998). In an attempt to provide education to all, the emergence of "Distance

Learning" began. Universities began offering correspondence courses which were the primary means of distance learning. Distance Learning is defined as a planned teaching experience that uses a broad spectrum of technologies to reach learners at a distance (Greenberg, 1998). During the introduction phase, distance learning has primarily focused on non-traditional students such as full-time workers, nonresidents, and individuals in remote areas (Al-Arimi, A. M. A. K., 2014). However, as time moved on, distance learning has been adopted widely by the academic world and has seen gradual, ongoing growth. Today, distance learning offers both asynchronous (delayed interaction between professors and students) and synchronous modes (real-time interaction between professors and students). The central promise made by distance learning is the convenience of time and space. Students needn't be present in the class physically with the instruction in the given area. This is the foremost significant advantage that distance learning offers to non-traditional students.

Apart from providing education access to people in remote areas, distance learning also provided many benefits to the institutions. Distance learning addressed problems related to increased demands at a time of minimal resources, efficient use of technology, and sharing of resources (Valentine, D.,2002).

Despite these advantages, distance learning still has its flaws. The quality of instructions, hidden costs, misuse of technology, and instructors' attitudes and students play a vital role in affecting the quality of distance learning courses. Despite the need for improvement, the future of distance learning seems bright. Increasing numbers of students enrolling in distance learning classes underscore the need for a "comprehensive and thoughtful evolution of distance education if it becomes the educational model of the future" (Harnar et al., 2000).

3.2.2 Experiential Learning

Experiential learning is simply a learning process where students "learn by doing" and reflect on their experiences. (BU Center for Teaching & Learning) Hands-on laboratory experiments, internships, practicums, fieldwork, study abroad, undergraduate research, and studio performances are just a few examples of experiential learning activities.

Experiential learning can be visualized as an integration of three main concepts: (Kolb 1984)

- Knowledge
- Activity
- Reflection

Knowledge is considered the concepts and facts students acquire through past experiences. Activity is how students apply the gained knowledge in a "real-world" setting. Reflection is the analysis and synthesis of knowledge and training to create new knowledge" (Indiana University, 2006, n.p.).

3.2.3 Hyflex Learning (Hyflex)

The Hyflex model emerged with the critical concept of flexibility in learning. The term flexibility in education has been perceived differently throughout the ages. Van de Brande defined flexibility as "enabling learners to learn when they want (frequency, timing, duration), how they want (modes of learning), and what they want (learners can define what constitutes learning to them)" (Van den Brande, 1993). In 2019, flexible learning was commonly defined as an approach to education where students engage in learning activities that meet their own needs (Hilliam & Williams, 2019). Naidu, 2017 stated that flexible learning is a valuable principle and defined it as "a state of being in which learning and teaching are increasingly freed from the limitations of time, place, and pace of study." Despite the various definition, flexible learning is

a student-centered approach concentrating on learners' needs and preferences (Andrade & Alden-Rivers, 2019; Bryant et al., 2003; Gearhart, 2008; Goodyear, 2008; Li & Wong, 2018; Naidu, 2017; Soffer et al., 2019; Wanner & Palmer, 2015).

Hyflex Learning is an educational model developed with the foundation of flexible learning. The term hyflex stands for a combination of two words, “hy”(hyflex) and “flex”(flexibility). Dr. Brian Betty defined the term hyflex and also pioneered this delivery mode. It is defined as “a flexible participation policy for students, whereby students may choose to attend face-to-face synchronous class sessions in-person (typically in a traditional classroom) or complete course learning activities online without physically attending class” (Beatty, 2019). Teachers take courses for both in-person students and online students simultaneously in one learning place. Hyflex courses can make education more attainable for students if planned well.

Hyflex learning is often mistaken for blended learning as both contain almost similar teaching elements. But there are minor differences between them.

Blended learning combines in-person teaching with asynchronous learning methods. Students have access to online resources and can watch or use them during their own time.

On the contrary, hyflex learning is a teaching method where teachers simultaneously instruct in-person and remote students. Asynchronous teaching methods can supplement synchronous, face-to-face instruction in hyflex learning models.

Hyflex learning combines traditional and online classes’ benefits to create a singular learning experience. A few of the significant benefits are:

- Flexibility: Hyflex classes provide students with a flexible learning schedule and a choice of instructional mode (attend classes online or in-person).

- The freedom of independent academic exploration
- More efficient use of resources

A typical hyflex classroom (Figure 3) consists of both online and in-person students, who attend the classes simultaneously. The teacher has to manage both the online and in-person students at the same time.

Figure 3: Hyflex Classroom

The biggest downside of the traditional in-person approach is accessibility, particularly for individuals who cannot easily get to campus. The main drawbacks of the pure distance model are a lack of human interaction and access to all campus facilities. Combining in-person and distance approaches while adhering to health and safety rules results in a more accessible and flexible program that fosters stronger human connections and allows access to all campus resources. Hyflex provides the best of both worlds (in-person and distance).

3.2.4 Need for Hyflex:

Hyflex was coined and designed even before the pandemic struck (Beatty, 2007). Therefore, the concept of flexibility isn't new and has prevailed in the literature even before the pandemic. HyFlex learning contributes to bettering student results and experience. Technology is becoming

more and more ingrained in people's daily lives and experiences. To give students more flexibility, educators must make necessary course corrections, and institutions must invest in the infrastructure needed to accommodate this level of flexibility.

In today's fast-moving world, many students are becoming independent learners. They are working part-time to fund their courses and gain experience simultaneously. According to a student survey, many students prefer a flexible learning schedule because it helps them meet their personal and professional goals (Nazarenko, A. L., 2015). Students want to be more autonomous and independent in learning. They like a design where they make the decisions and can learn according to their schedule and learning preferences.

Many students have not been able to take a course for various reasons such as location, affordability, accessibility, class capacity, etc. Today, with technological advancement, universities can increase the class capacity for courses, and now more students can enroll in a particular course. The increased use of hyflex design makes education more attainable and accessible to students.

The hyflex classes seem appealing and convenient for students and teachers who must manage numerous other personal matters (Hannay, M., & Newvine, T. 2006). Also, the online mode in the hyflex classes can be used to enhance learning, especially for students who tend to be reserved in the classroom setting (Ni, A. Y. 2013). Developing a robust hyflex course can help students and the teaching community take education to the next level and be more successful.

3.2.5 Student Learning Success

Many variances in measuring student success have been explored in the literature. Students' accomplishments, future professional and personal goals, and knowledge development are the most used factors in testing student success.

Student success is usually determined by the factors such as knowledge, responsibility, and connection.

Academic Self-Efficacy (ASE):

Academic self-efficacy is an influential factor in improving a student's academic performance. It is defined as an individual's belief in their ability to succeed in a specific situation or accomplish a particular task (Bandura, 1977, 1997, 2012). It is measured by an individual's self-evaluation of their ability to achieve a goal. Much research has proven that ASE is highly associated with academic performance (Richardson et al., 2012; Honicke and Broadbent, 2016). A higher level of ASE is correlated with higher performance scores.

Student Satisfaction:

Student satisfaction is of the utmost importance to institutions with far-reaching implications for overall student success, retention, and graduation rates (Joo et al., 2018; Porter et al., 2014) that contribute to an institution's financial stability, reputation, and future recruitment benefits. Students' satisfaction can be defined as a short-term attitude resulting from an evaluation of students' educational experience, services, and facilities (IM Salinda Weerasinghe, and R. Lalitha, S. Fernando, 2017).

3.2.6 Student Success in Traditional Learning

According to research and literature, traditional in-classroom learning has been proven to be more successful than online or other learning modes (M. Zwaagstra, 2020). Simply because one can think of traditional education as a pre-prepared learning schedule and design. Teachers develop course designs for the in-classroom students where everyone is treated equally, and all students have access to all the resources equally.

The teacher's attention is fully split among the students present in the classroom and can easily monitor and manage them. Students can easily interact among themselves and also with the teachers. Teachers can keep track of all the students simply because, in in-person learning, the class strength is kept to a minimum to gain more access to successful education.

Students are less prone to distractions when present in a classroom compared to other learning modes. They can easily access the resources provided in the school and clear doubts instantly. Research states that traditional classrooms will continue to offer benefits that arguably cannot fully be obtained in any other manner (Chen, C. C., & Jones, K. T. 2007).

Evidently, it has been proved that students in traditional in-person classrooms perceive more interactions, participation in class activities and projects, class discussions and group works, etc., and consider them the most beneficial instructional strategies contributing to their success (Hurlbut, A. R. 2018).

One of the concerns in a traditional classroom is that there are no methods to address the challenges faced by individual students with varied learning styles. Some students may prefer visual learning, while some may prefer auditory and others may prefer experiential learning. In a

traditional classroom, students have limited flexibility and choices as they must follow the regular mundane study schedule.

3.2.7 Student Success in Online Learning

One majorly used learning mode is the online learning mode. Online learning/Distance Learning has made education more accessible and attainable for remote students. Throughout the years, online learning has proven to be quite successful for educated students who are self-learners.

The majority of students that succeed in online learning environments are self-directed learners with excellent technical and time management abilities. Even with the teacher's presence, sometimes there might be technical difficulties in an online class. So only if an individual is highly self-regulated and self-motivated students can they succeed in an online class (Abrahamson, 1998; Browne, 2005).

Resources are posted online, and students can easily access them anytime, at any number of times. Students can also access all learning resources online (mostly free) and can schedule their timings. Students can decide when to learn and what to learn. Entirely online or web-based learning has benefits like flexibility, student-centered learning, a range of learning pedagogies, and self-paced learning.

However, when comparing online and in-person programs, most students find online classes aren't as helpful as in-person classes. The main reason is the lack of hands-on practical lessons and less social interaction in the online course. Research has also shown that when comparing students' performance, in-classroom students performed about 24% better than online students. (Emerson, L., & MacKay, B, 2011). Students are more prone to distraction which may cause a setback in their learning.

3.2.8 Challenges in Hyflex Learning

HyFlex learning has certain downsides, even though it can increase student achievement and open more opportunities in the education sector. First of all, hyflex is a combination of both worlds, in-classroom learning, and online learning. Both have their own setbacks, and since hyflex combines them simultaneously, it has to address both issues.

To ensure the success and long-term advantages of the HyFlex approach for the student, the teacher and student must trust one another and work together as partners in learning. When given more choices, students may not choose wisely, so hyflex learning might not be as successful as perceived. It also depends on the choices students make in determining the success of a hyflex course. The student must be motivated and actively contribute to the classroom environment. To guarantee they are fulfilling the course objectives, HyFlex students must be self-disciplined and prudent with their time, especially if they select an asynchronous alternative.

Online learners could find it challenging to establish personal connections with their professors and get their attention, especially with the enormous class size. On the other hand, online students occasionally try to avoid the instructor's attention by hiding out in a virtual environment.

According to research, some students miss the social supports that come with participating in a face-to-face learning environment, such as taking notes alongside their friends, studying together, or exchanging tales about their experiences in the classroom.

Another critical challenge in hyflex learning is the combination of online and in-classroom students. Both students compete with each other for the teachers' attention, resources, interactions, etc. A well-designed HyFlex course can foster an atmosphere where students take responsibility for their education and are successful in their learning.

3.2.9 Literature Review Summary

This section reviewed relevant literature on different learning modes, specially hyflex and student success, and revealed gaps and challenges in these areas. The new learning mode has a lot of benefits for the learning, teaching, and management communities. But at the same time poses enormous challenges for the different communities involved.

Students being the center of attention, their success in hyflex mode determines the future adoption and continuation of the model. Student success is determined by their ability to learn independently and be self-satisfied and successful in learning.

Students' satisfaction in hyflex classes compared to other learning modes is the leading motivator for the development of this study. To achieve successful learning among students and future adoption, the hyflex course must address the challenges faced by students in distance and in-person learning modes and promote a high sense of reliability.

In the following section, I build on the literature about building successful hyflex course design and develop my theory and subsequent hypotheses.

3.3 Theoretical Foundation

The previous section discussed misconceptions and interpretations of the hyflex mode. In many instances, the benefits of the hyflex model are not extracted to their fullest merely because of the structure it is built. There are various variations of hyflex models present. Factors such as course alignment, orientation, engagement, and accessibility have been given the most important while developing a solid framework for hyflex learning.

The four core principles are used to address the challenges faced in hyflex course design to provide a better learning experience for students. It provides a strong foundation by discussing

the essential factors that are considered most important in developing a standardized course structure.

The hyflex model emphasizes a student centeredness environment. Beatty, 2019 built a framework to implement the hyflex model in learning practice. The main idea behind this was to empower students to make their own decisions. To create an exemptional learning experience, four core principles were developed as a base for designing hyflex courses.

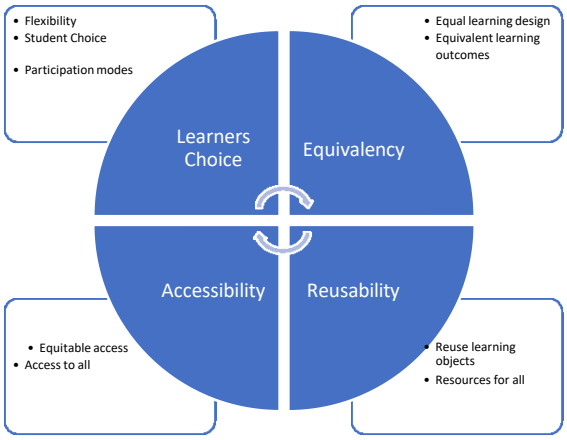


Figure 4: Core principles of Hyflex Course Design (Beatty, 2019)

Learners Choice:

Beatty emphasized that flexibility should be the main principle in designing hyflex courses. The learners must be provided with meaningful alternative participation modes for attending the classes according to their convenience. Students control how they learn and participate in the course based on their comfort, preferences, learning progress, affordability, and other essential factors (Beatty, 2019). A student can choose to attend classes from home/online or in person synchronously or decide to watch recorded lessons asynchronously. Research has shown that when students have choices to learn and are responsible for their learning outcomes, it makes

them more independent and autonomous, thereby increasing their overall performance and confidence (Outram, 2011; Patall et al., 2008). Various student surveys have reported that about 53% of students preferred flexibility in learner's choice. They have experienced a noticeable development in their intrinsic motivation and performance (Keiper, 2020).

Equivalency:

The basic concept of Equivalency is to provide alternative participation modes that lead to equivalent learning outcomes (Beatty, 2019). Providing students with multiple learning modes can seem easy until Equivalency comes into play. Even if one of the learning modes is inferior by design, Equivalency is not achieved. All the learning modes provided to students must be of equal standards and offer an equivalent learning experience regardless of their choice. Beatty, 2019 suggested that to implement Equivalency, the instructors must follow an excellent instructional design practice to create learning opportunities for students in all learning modes.

Reusability:

Reusability is defined as the utilization of learning artifacts in multiple learning modes (Borba et al., 2016). To implement reusability, Beatty suggested that an artifact from learning activities in each learning mode should be utilized as a learning object in all other learning modes (Beatty, 2019). For example, an online class may depend on resources such as podcasts, video lectures, online assignments, discussion transcripts, etc. And an in-person class may depend on resources such as worksheets, class notes, practical experiments, etc. Beatty emphasizes that all these learning materials should be made as a shared learning object for all the students and must be

available to all. Research has shown that learning objects play a positive impact on student learning (Tiffani & Sue, 2010). When students were asked about re-using the learning resources, they felt that it simplified their learning experiences (Abdelmalak & Parra, 2016).

Accessibility:

Beatty defined accessibility as equipping students with technological skills and providing equitable access to all participation modes (Beatty, 2019). A well-designed hyflex course should enable students to access all the learning modes easily and equip them with the necessary technological tools and skills. For example, suppose a student cannot attend in-person classes. In that case, an alternative mode, such as online rooms, must be provided for him to participate in classes without missing anything. And in rare instances, the course should be designed with feasible alternatives to accommodate students' needs. Another example of increased accessibility is that closed captioning should accompany all audio or video recordings. Webpages and screen designs should be reader-friendly and satisfy the universal design guidelines for accessibility (Beatty, 2019).

The hyflex learning mode helps instructors and universities address the challenges of online and traditional in-person learning modes. The Hyflex model incorporates synchronous and asynchronous components, all within the same course. Because of such reasons, the hyflex learning mode is preferred by many students compared to other learning modes (Beatty, 2007). Research has proven that due to the benefits of the hyflex mode, there is a higher rate of student participation and satisfaction in hyflex compared to traditional in-person and online classes (Malczyk, 2019). Hyflex has also increased student retention and enrollment in the course (Samuel et al., 2019). With the help of the core principles, Hyflex learning is believed to achieve exceptional results in the following decades.

3.4 Research Model

This section presents the research model for this study. The study aimed to investigate the students' satisfaction and ASE in hyflex classes. The study also explores the effect of the hyflex principles on student satisfaction and ASE in different learning modes. Specifically, the study focuses on determining if there was a variation in students' satisfaction and ASE in the hyflex, distance, and the in-person learning mode. The study also analyzes the impact of experiential learning on student success. The research models are developed to analyze and compare student success in the in-person learning modes with hyflex learning modes.

The below questions guide the study and the research development:

A. Do students perceive a higher level of satisfaction, and self-efficacy) in hyflex courses compared to distance and in-person learning modes?
B. Does experiential learning play a positive role in determining student success?

3.4.1 A. In-Person vs. Hyflex Model

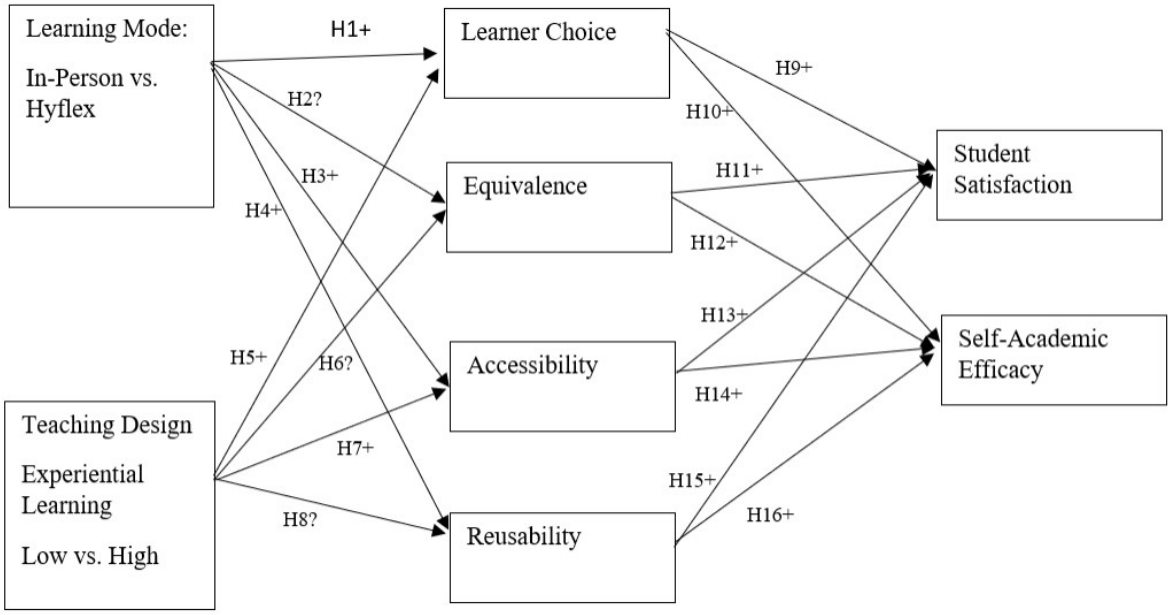


Figure 5: In-Person vs. Hyflex Model

3.4.2 B. Distance vs. Hyflex Model

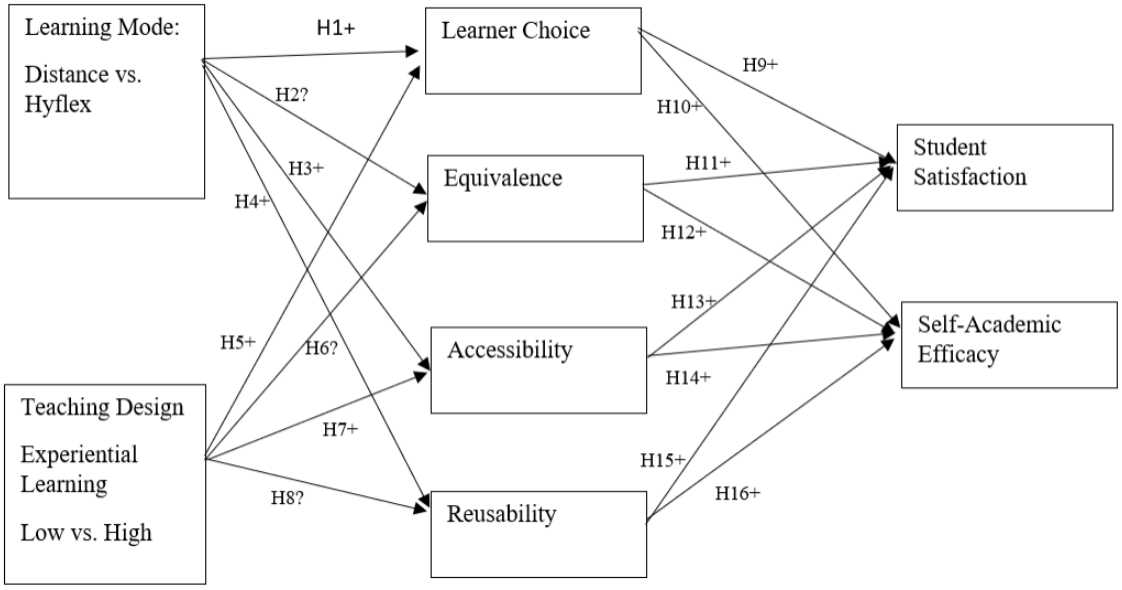


Figure 6: Distance vs. Hyflex model

3.4.3 Hypothesis Development:

Learning Mode:

The primary learning modes present are In-person, distance, and hyflex. IGI Global defines Traditional Learning as typical face-to-face interactions that occur in a physical location. Traditional in-person learning has been the primary form of learning and teaching for a long time. But as science developed, so did the field of education. A new model of instruction called "Distance Learning" emerged. Students were registered for the courses; course contents were posted online, then all students in a course could learn from a different location without attending the classes in person. As time moved on, so did the availability of learning platforms. In the past few years, due to the high rise in the pandemic, and the requirement for social distancing, a new learning model has emerged with the help of the most recent developments in technology-based learning, namely, "Hyflex Learning." Research has concluded that students prefer in-class learning over remote or distance classes. But with the development of hyflex classes, students tend to oscillate between the two because of the range of comfortability and accessibility hyflex classes provide. As discussed in the previous sections, the four core principles form a strong base for developing a successful hyflex course. The central question is how the students perceive these factors in the different learning modes. Answering this question would help the teaching community build a robust course design in all learning modes to impact student success positively.

When it comes to Hyflex vs. In-person learning modes, students are believed to have a higher level of learner choice. This is mainly because, in traditional in-person modes, students can only attend classes by going to the classroom. There is no choice or flexibility provided in attending the classes. Similarly, all the resources are posted online in distance mode, and students must

study independently. There is no choice for a student to learn in person or go to the classroom. Everything is online. The hyflex mode provides students with a daily choice and flexibility in attending classes. Students can choose between learning online (at home or anywhere) or going to the classroom. The flexibility hyflex offers is one of the essential reasons the student community prefers it. Therefore we hypothesize the following:

H1 A: The overall Learner's choice of students increases when the learning mode changes from In-person to Hyflex.

When it comes to Hyflex vs. Distance learning modes, students are believed to have a higher level of learner choice in hyflex. This is mainly because in distance modes students can only learn online with no live classes or interactions. There is no choice or flexibility provided in attending the classes. All the resources are posted online in distance mode, and students must study independently. There is no choice for a student to learn in person or go to the classroom. Everything is online.

The hyflex mode provides students with a daily choice and flexibility in attending classes. Students can choose between learning online (at home or anywhere) or going to the classroom. The flexibility hyflex offers are one of the essential reasons the student community prefers it. Therefore we hypothesize the following:

H1 B: The overall Learner's choice of students increases when the learning mode changes from Distance to Hyflex

Equivalency relates to providing learning opportunities that result in equivalent learning outcomes. Simply put, all students must receive equal opportunities/attention/resources, etc., The students in in-person mode participate as one group in learning. Everyone receives the same

resources/opportunities in class and on online platforms. But that is not the case in Hyflex learning, as it is divided into two groups of students. The level at which students in hyflex learning perceive equivalency could be affected by the factor that the mode is split into two student groups. Whereas in in-person and distance learning modes, all students are treated as one learning group (students in the classroom or students online). The students in in-person and distance learning modes, therefore, have an equal level of equivalency.

When comparing traditional in-person and hyflex learning modes, there could be a difference in the level of equivalency offered to students because of the above-mentioned factor. Therefore, we hypothesize the following:

H2 A: There is equal or no significant difference in the overall Equivalency of students in the Hyflex and In-person learning modes.

H2 B: There is equal or no significant difference in the overall Equivalency of students in the Hyflex and Distance learning modes.

The accessibility principle states that students must have equitable access to learning and resources. If a person cannot attend classes in-classroom, they must be offered an alternative to access the class and mustn't be differentiated in any terms. And resources must be developed by considering students with varied learning abilities. Students cannot access an alternative learning mode in in-person classes. If a student is not comfortable with in-person classes they don't have a choice. Whereas in hyflex, the hyflex principles ensure that students have access to all the resources and participation modes. The contents are created considering the varied learning abilities. Therefore we hypothesize the below.

H3 A: The overall Accessibility of students increases when the learning mode changes from In-person to Hyflex.

In case of distance, if a student is not comfortable with the online platform, he/she must continue in the online mode because there is no technological help/ access to other participation modes or resources.

Whereas in hyflex, the hyflex principles ensure that students have access to all the resources and participation modes. The contents are created considering the varied learning abilities. Therefore we hypothesize the below.

H3 B: The overall Accessibility of students increases when the learning mode changes from Distance to Hyflex.

The reusability principle states that all the resources (online/physical) used in all participation modes must be made available as learning objects to all students. In in-person mode, most of the resources are physical and are available to all the students in the classroom. Even if online resources are used, they are available to all students. The hyflex principle ensures that all the students have access to and can use/reuse the resources in both participation modes. Therefore, we hypothesize the following:

H4 A: There is equal or no significant difference in the overall Reusability in the Hyflex and In-person learning modes.

In distance mode, the primary resource type is online resources and is made available to all students. In hyflex mode, two student groups have different resources. The hyflex principle ensures that all the students have access to and can use/reuse the resources in both participation modes. Therefore, we hypothesize the following:

H4 B: There is equal or no significant difference in the overall Reusability in the Hyflex and Distance learning modes.

Experiential Learning:

The concept of experiential learning has existed since 1994. It is a learning process initiated by a concrete experience (David Kolb). Kolb defines experiential learning as an iterative process involving conceptualization, active experimentation, substantial experience, and reflective observation. There have been various positive impacts of experiential learning in educational sectors (Hesser, 2013). A recent study reported that experiential learning has enormous benefits for students measured by the National Survey of Student Engagement (Finley & McNair, 2013).

The primary question in this study is the impact of experiential learning on student success in different learning modes. Many studies have proven that a higher level of experiential learning can help students achieve higher success and completion rates (Walker, Carolyn, 2018).

But there isn't much evidence to understand the impact of experiential learning on student success mediated by the hyflex principles. Therefore in this study, we try to analyze the impact of experiential learning on the hyflex principles, thereby affecting student success. We believe that the results could be used to develop future models that are more practical and successful. Experiential learning provides adds a practical component to the course, and students can learn by doing. Research shows that experiential learning increases motivation and engagement, thereby increasing self-directed learning (University of Windsor). Therefore we hypothesize the following:

H5: The level of experiential learning will increase the students' perceived learners' choice.

Implementing experiential learning as a huge component of the course is quite challenging as the teachers have to ensure that all students perceive an equal level of experience in the class. But practically, we are unsure if experiential learning impacts the perceived equivalency. When viewed as a whole, experiential learning is a concept that will ensure everyone gains access to the learning experiences. Therefore, we hypothesize the following:

H6: The level of experiential learning will significantly change students' perceived equivalency.

Experiential learning is a way of applying theoretical and academic knowledge to real-world scenarios. We hypothesize that implementing experiential learning could help students gain more access to learning resources and knowledge. As a result, students perceive more accessibility.

H7: The level of experiential learning will increase the students' perceived accessibility.

Experiential learning is more related to the course design component of learning/teaching. The reusability of resources depends on the course design and students' perceptions. Theoretically, there hasn't been any comparison of experiential learning and reusability but practically implementing experiential learning will allow students to gain more access to resources in class. Therefore, we hypothesize the following:

H8: The level of experiential learning will significantly change students' perceived reusability.

Student Satisfaction:

Student satisfaction is of the utmost importance to institutions with far-reaching implications for overall student success, retention, and graduation rates (Joo et al., 2018; Porter et al., 2014) that contribute to an institution's financial stability, reputation, and future recruitment benefits.

The framework developed by Beatty has firmly emphasized that when the hyflex principles are followed, students perceive a higher success rate and satisfaction in the course. The guides also help strengthen the foundation of the hyflex course design. Therefore, we hypothesize the following:

H9: The level of learners' choice will increase the students' perceived satisfaction.

H10: The level of equivalency will increase the students' perceived satisfaction.

H11: The level of accessibility will increase the students' perceived satisfaction.

H12: The level of reusability will increase the students' perceived satisfaction.

Academic Self-Efficacy:

Academic self-efficacy refers to an individual's belief in successfully achieving an academic goal (Bandura, 1997; Eccles & Wigfield, 2002; Elias & Loomis, 2002; Linenbrink & Pintrich, 2002a; Schunk & Pajares, 2002). Self-efficacy in education is a major aspect of the success of students since it affects the decisions they make and the actions they do (Pajares, 2002). Academic self-efficacy (ASE) is substantially correlated with learning, cognitive engagement, analytical thinking, academic commitment, strategy utilization, persistence, susceptibility to negative emotions, and achievement (Linenbrink and Pintrich, 2003). Theoretically, there hasn't been any proof to support that the hyflex principles have a moderating effect on ASE.

Since ASE is understood as a student's convention or belief, we hypothesize that providing students with a higher level of learner choice, equivalency, accessibility, and reusability should allow students to perceive higher success/efficacy.

When comparing in-person and distance with hyflex, hyflex provides more choices to students. Whereas in traditional in-person and distance classes, students are more motivated and monitored. Which lacks in the hyflex classes. In hyflex, students also have to fight for attention and interactions, and resources. But theoretically, there are no assumptions. Therefore, we hypothesize the following.

H13: The level of learners' choice will significantly change the students' perceived self-efficacy.

H14: The level of equivalency will significantly change students' perceived self-efficacy.

H15: The level of accessibility will significantly change students' perceived self-efficacy.

H16: The level of reusability will significantly change students' perceived self-efficacy.

3.5 Research Design

This chapter will present the overview of the study recruitment process, experiment design, and construct definitions. The scales used for the survey and the references will be discussed below.

3.5.1 Survey Experiment

The second major component of this study is to analyze how the students perceived hyflex learning and if there is a difference in the perceived success of students. To understand this, a mixed quantitative and qualitative approach was followed by surveying students at MUN. The survey consisted of both quantitative and open-ended questions, to understand each student's

perspective on the questions. The survey was chosen as a method because it would give students an anonymous platform to discuss their opinions without any concerns. Also, surveys are a feasible approach to getting insights from many students in a shorter period.

3.5.2 Experiment Design:

This study is a two-by-two design. The research design is developed into 4 groups to understand the impact of independent variables in different settings. The students were separated into 4 groups randomly. The scenario description and questionnaire were displayed to each group. After fully understanding the group conditions, participants were required to answer the questionnaire items. We used 10-scale Likert-type questions for the measurement items (values of 1-10 for strongly disagree-strongly agree). Participants finished the experiment by submitting the questionnaire. The whole process was done online.

Experiment Design		Experiential Learning	
		Low	High
Learning Mode	In-Person	Group A	Group B
	Hyflex	Group C	Group D

Figure 7: Experiment Design (In-Person vs. Hyflex)

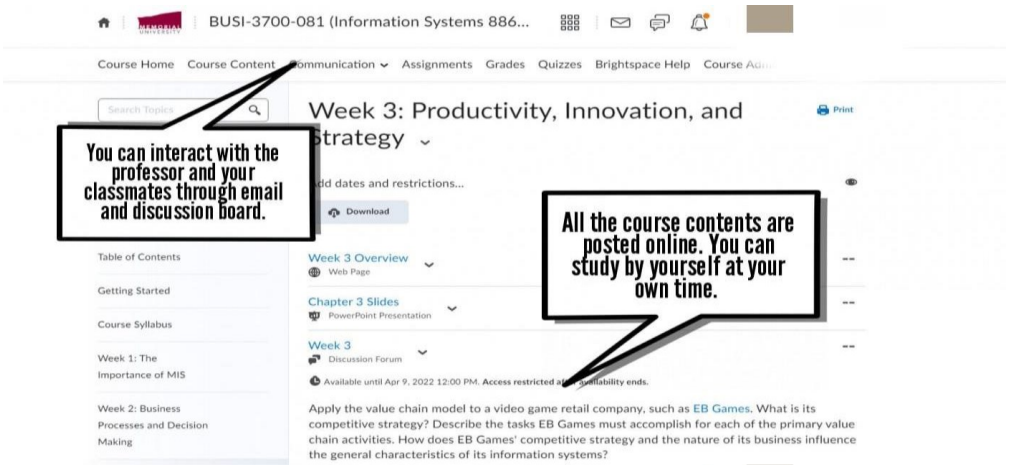
Experiment Design		Experiential Learning	
		Low	High
Learning Mode	Distance	Group A	Group B
	Hyflex	Group C	Group D

Figure 8: Experiment Design (Distance vs. Hyflex)

3.5.3 Methodology

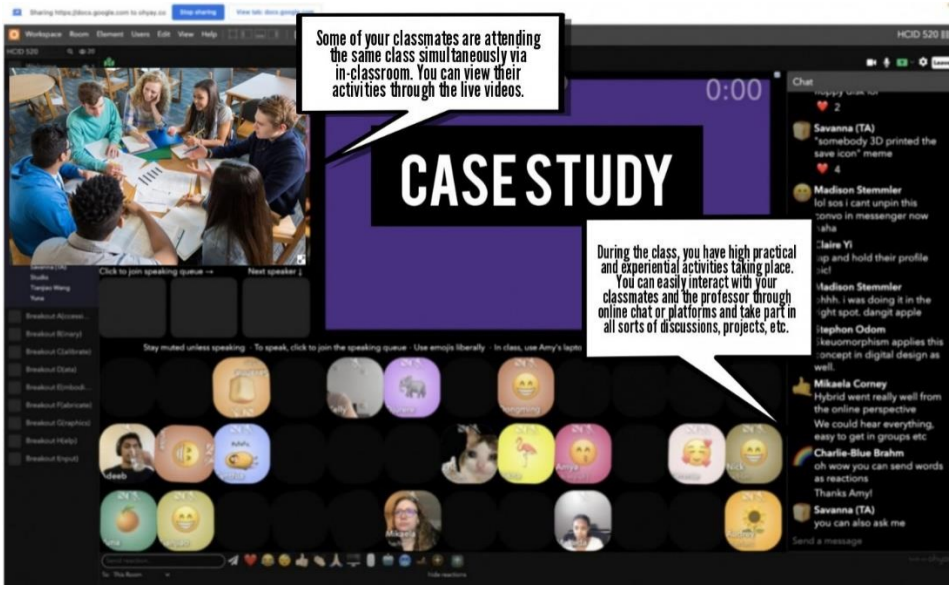
The students were assigned to different group settings as mentioned in the previous section. The unique scenarios were described to the students with the help of illustrative pictures, which are as follows:

Distance Learning:



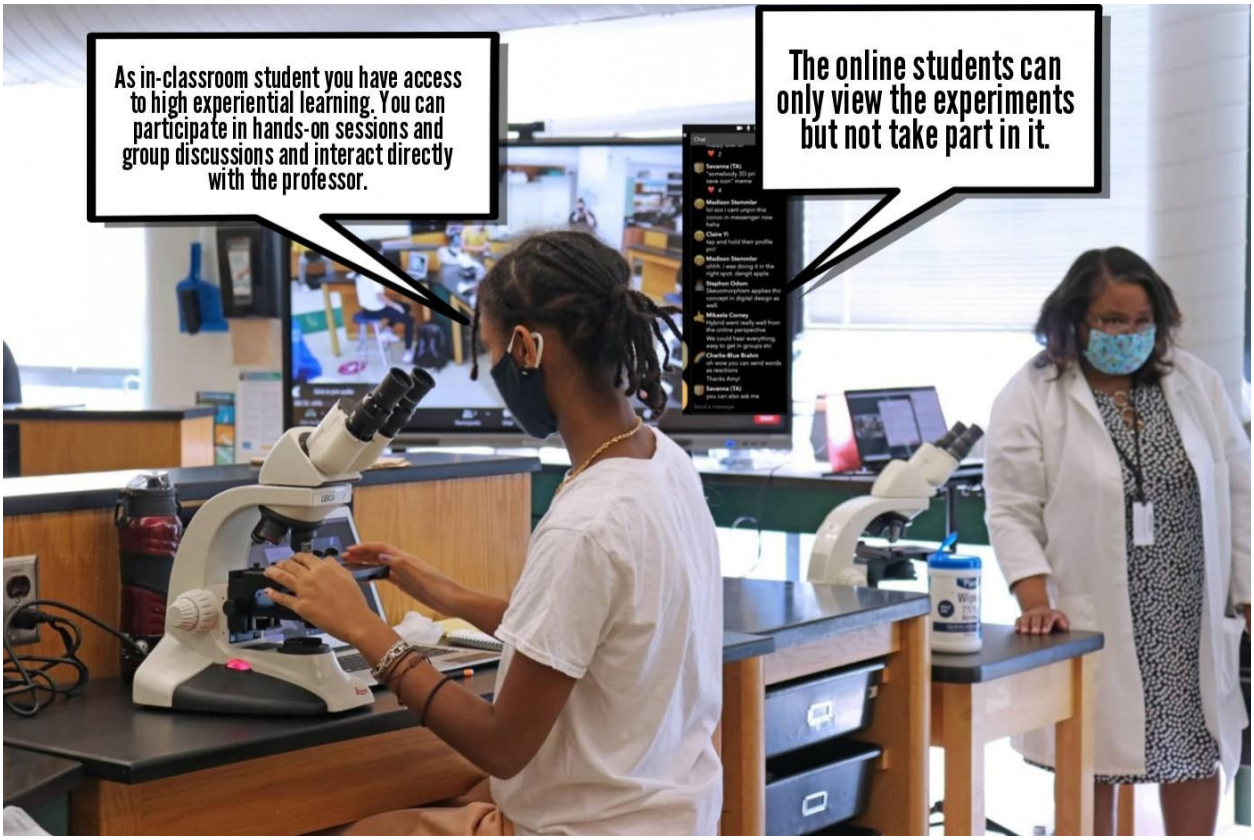
Hyflex Learning Online – Low Experiential Learning:

Hyflex Learning Online – High Experiential Learning:



Hyflex Learning In-Classroom – Low Experiential Learning:

Hyflex Learning In-Classroom – High Experiential Learning:


As in-classroom student you have access to high experiential learning. You can participate in hands-on sessions and group discussions and interact directly with the professor.
The online students can only view the experiments but not take part in it.

Traditional In-Person Learning:

3.5.4 Construct Definition

This section introduces the measurement of constructs in the research model. The items that fully represent the conceptual domain of the constructs may come from various sources, including literature reviews, deduction from the theoretical definition of the construct, suggestions from experts, and so on (Mackenzie, Podsakoff, & Podsakoff, 2011).

The constructs: Satisfaction, Self-Efficacy, and Experiential Learning have been researched by various scholars and therefore have pre-developed and tested measurements. Therefore, in this study, we have used a pre-tested measurement that is related to our area of focus. The reference for the measurements is provided along with the constructs.

The 4 core principles have existed in theory for a long time, but not a lot of measurements can be found. Therefore we developed the measurements for the core principles based on the definitions provided by Beatty. We performed a couple of pre-tests in SPSS to analyze if each construct measured the same item (factor analysis). A mini-survey was created and distributed to 50 undergraduate and graduate students. Each construct had 5-8 items to measure them. After the pre-test, we analyzed and developed the measurements and only included the ones with higher co-relation in the factor matrix.

Construct	**Definition**	**Source**
Learners Choice	Provide meaningful alternative participation modes and enable students to choose between participation modes daily, weekly, or topical.	Beatty, 2007
Number	**Item**	**Source**
L1	This learning mode provides flexibility in attending classes	Developed
L2	This learning mode allows students to choose from staying at home or learning from classroom	Developed
L3	This learning mode gives students a choice in how they complete course activities	Developed
L4	This learning mode gives students control of choosing the best way to learn	Developed
L5	This learning mode provides meaningful	Developed

	choices to be flexible in learning	

Table 3: Measure Items for Learner Choice

Construct	**Definition**	**Source**
Equivalency	Provide learning activities in all participation modes which lead to equivalent learning outcomes.	Beatty, 2007
Number	**Item**	**Source**
Eq1	I feel that this learning mode provides equal learning opportunities for all	Developed
Eq2	I feel that this learning mode provides an environment for the free and open expression of ideas	Developed
Eq3	I feel that in this learning mode everyone has access to equal learning opportunities regardless of their differences	Developed
Eq4	I feel that this learning mode provides equivalent learning experiences	Developed

Table 4: Measure Items for Equivalency

Construct	**Definition**	**Source**
Accessibility	Equip students with technology skills and equitable access to all participation modes.	Beatty, 2007
Number	**Item**	**Source**
A1	In this learning mode, all course materials are accessible to all students	Developed
A2	In this learning mode, all course activities are accessible to all students	Developed
A3	In this learning mode, students are equipped and taught to access the course resources	Developed
A4	In this learning mode, all students are provided equitable access to resources	Developed
A5	In this learning mode, all forms of resources meet universal design for accessibility to help students with varied learning-mode abilities	Developed

Table 5: Measure Items for Accessibility

Construct	Definition	Source
Reusability	Utilize artifacts from learning activities in each participation mode as "learning objects' for all students.	Beatty, 2007
Number	**Item**	**Source**
R1	The resources posted online after class sessions provide meaningful learning support	Developed
R2	The resources used in the classroom are posted online for review later	Developed
R3	All resources used during the course are posted online or in class groups	Developed
R4	Worksheets, written notes, ppts, lecture videos, etc are all provided as resources in the course	Developed

Table 6: Measure Items for Reusability

Construct	Definition	Source
Satisfaction	Students' satisfaction can be defined as a short-term attitude resulting from an evaluation of students' educational	IM Salinda Weerasinghe, and R. Lalitha, S. Fernando (2017) Gray, J. A., & DiLoreto,

	experience, services, and facilities.	M. (2016)
Number	**Item**	**Source**
S1	I am satisfied to communicate effectively with my teachers throughout the semester.	Bayrak, F., & ALTUN, A. (2020)
S2	I am satisfied with the support of my teachers in accessing various educational materials related to the course.	Bayrak, F., & ALTUN, A. (2020)
S3	I am satisfied that my teachers are enthusiastic about online learning.	Bayrak, F., & ALTUN, A. (2020)
S4	I am satisfied to receive feedback from my teachers online	Bayrak, F., & ALTUN, A. (2020)
S5	I am satisfied that my needs are met in the online learning environment.	Bayrak, F., & ALTUN, A. (2020)
S6	I'm satisfied that the course content is consistent	Bayrak, F., & ALTUN, A. (2020)

Table 7: Measure Items for Satisfaction

Construct	**Definition**	**Source**
Self-Academic Efficacy	Academic self-efficacy refers to an individual's belief (conviction) that they can successfully achieve a designated level on an academic task or attain a specific academic goal	Bandura, 1997; Eccles & Wigfield, 2002;
Number	**Item**	**Source**
SE1	I'm confident that I can complete all the work assigned in the course	Harvard-Panorama Student Perception Survey
SE2	I'm confident that I can understand the complicated modules present in the course	Harvard-Panorama Student Perception Survey
SE3	I'm confident that I can learn all the materials presented in the course	Harvard-Panorama Student Perception Survey
SE4	I'm confident that I can do all the difficult tasks presented in the course	Harvard-Panorama Student Perception Survey
SE5	I'm confident that I will remember what I learned in the course, next year.	Harvard-Panorama Student Perception Survey

Table 8: Measure Items for Self-Academic Efficacy

Construct	Definition	Source
Experiential Learning	Experiential learning is an iterative process involving conceptualization, active experimentation, concrete experience, and reflective observation. It is a term referring to learning by doing	Kolb, 2015 Kolb & Fry, 1975
Number	**Item**	**Source**
EL1	I can clearly describe a real-world problem related to this course to someone that knows little about the problem	John Walker
EL2	I have been introduced to more than one way to address the real-world problem(s) that my faculty member/professor brought up in this course	John Walker
EL3	I feel confident in my ability to develop a logical, consistent approach to address a real-world problem related to this course	John Walker
EL4	I can conclude with data collected through this experience.	John Walker
EL5	I can identify and apply information from this course to address and potentially improve real-world problem(s)	John Walker

Table 9: Measure Items for Experiential Learning

Construct	Definition	Source
In-person Learning Mode	The traditional form of teaching is conducted primarily in-person or face-to-face between instructor and student.	IGI Global
Distance Learning Mode	Distance learning is "a planned teaching/learning experience that uses a wide spectrum of technologies to reach learners at a distance and is designed to encourage learner interaction and certification of learning The term distance learning has been applied to many instructional methods: however, its primary distinction is that the teacher and the learner are separate in space and possibly time	Greenberg (1998) Teaster and Blieszner (1999)
Hyflex Learning Mode	The Hyflex-Flexible (HyFlex) course design delivers a student-directed multi-modal learning experience. Students choose between attending and participating in class sessions in a traditional classroom (or lecture hall) setting or an online environment.	Beatty, 2007

Table 10: Variables Definitions

3.6 Data Analysis

This chapter will provide an overview of the data collected, initial cleaning, and usage of the data. Further analysis and results will be discussed below.

3.6.1 Data Collection

In the Winter of 2021, I acquired ethics approval for this study via the Interdisciplinary Committee on Ethics in Human Research (ICEHR) at Memorial University of Newfoundland. The letter of approval can be found in Appendix A.

All the students of MUN were chosen regardless of their degree and experience to gain insights into various thoughts and preferences. As a part of data collection, I visited the classrooms with the teacher's prior permission to seek participants. They were notified that the survey was not a part of their academic requirement. A link and QR code to the survey was distributed in classes to be completed of their own free will. Before starting the survey, the consent form was explained and attached to the link. The participants were notified that participation in the survey was entirely voluntary, and they were free to withdraw from the survey at any time. To gain more participants, I got permission from MUNSU to open a stall and promote the survey among students. I spoke to students and shared the QR code for the survey. Students were again informed that this participation is completely voluntary.

The ethical duty of confidentiality includes safeguarding participants' identities, personal information, and data from unauthorized access, use, or disclosure. The participants were notified that their data will not be released and that their names would be hidden, modified, or anonymized for research purposes.

After the form was signed, students could access the survey. The questions were general and related to student satisfaction, ASE, class learning experiences (experiential learning), and their future intention to continue using distance, in-person, or hyflex learning modes. After completing the survey, students were redirected to a new page where they could enter a draw to win a 150 CAD gift coupon. A lucky draw was conducted after the survey was closed, and 25 students were contacted via email to receive a gift coupon for 150 CAD each.

3.6.2 Data Cleaning

The survey was distributed among Memorial University's students from all departments. To ensure the privacy of personal information, only gender and age were demanded from students. Their participation led to a lucky draw of 150 CAD. Therefore, students were asked for their email solely to contact lucky draw winners.

The first page of the survey consisted of the consent form and survey explanation. Students were notified that this survey was completely voluntary and anonymous. The data will not be used without their consent.

The students were randomly and equally assigned to different groups with different learning schemas/settings. The scenarios were explained with the help of text and interactive images. Students were to read and understand the group they were assigned to. The questions followed up with the interactive images on each page to help students understand the group scenarios.

Initially, there were 1127 survey respondents. The data cleaning process was quite strict about removing unnecessary overlaps in the data. To achieve the highest quality of responses few constraints were included in cleaning the data.

Initially, the survey with 100% completion was only chosen. All the unfinished surveys were removed from the data pool, which led to 958 total survey responses. The average completion time of the survey was 100 seconds. Therefore, responses with a completion time of fewer than 100 seconds were removed from the data pool, leading to 858 total survey responses. After this, the survey responses which did not have consent were removed from the data pool, which led to 852 total responses.

After the initial data analysis, there were 852 responses in total. The secondary data cleaning process was more in-depth to attain a higher fit model. There were seven major components of the survey; Experiential Learning (EL), Learner Choice (L), Equivalency (Eq), Accessibility (A), Reusability (R), Satisfaction (S), and Academic Self-Efficacy (SE).

Within each component, we tried to remove any responses that behaved like outliers in the data pool. This implied removing straight lining from the dataset (all responses were the same regardless of the questions) and removing extreme responses (the same question had both high and low responses). For example, SE had five questions in total. If a student feels a higher level of SE (4 answers high) in a course, there is no way that he/she could respond with an extremely low value for just one question. Similarly, if a student feels a low level of SE, there is no way they could respond with an extremely high value for just one question. This is because all the questions measured the same quantity and item, and extreme variations seem invalid.

After carefully analyzing the data, we figured that any responses with std deviation (within one component) greater than four should be removed from the data pool. First, the Experiential Learning (EL) component was cleaned based on this factor. It left us with 741 valid data responses. Then, Learner Choice (L) was cleaned accordingly, which resulted in 620 valid responses. Likewise, Equivalency (Eq) was cleaned, resulting in 545 valid responses. Cleaning

Accessibility (A) resulted in 507 valid responses. Cleaning Reusability(R) resulted in 483 valid responses. Cleaning Satisfaction (S) resulted in 472 valid responses. Finally, after cleaning Self-Efficacy (SE), we were left with 462 valid responses.

Study 2 dealt with In-Person vs. Hyflex model. Survey responses of students assigned to hyflex and the in-person group were used for model 1, which consisted of 381 responses. Survey responses of students assigned to hyflex and distance groups were used for study 3, which consisted of 380 responses.

The model consisted of two settings: Low vs. High Experiential Learning. Students described the group setting and the scenarios during the survey process. There were still a few inconsistencies in the data pool. Few respondents did not understand their assigned group setting, which is indicated in their responses. The Median value of Experiential Learning (EL) was identified to be 7.0. Therefore, any mean value of EL less than 7.0 portrayed Low Experiential Learning, and a value greater than 7.0 indicated High Experiential Learning.

Some responses within the Low EL group had a mean EL value greater than 7.0, and few responses within the High EL group had a mean EL value less than 7.0. To remove inconsistencies in the results, such responses that didn't abide by the group settings were removed from the data pool.

This resulted in 223 valid data responses in the model (In-person vs. Hyflex) and 222 valid data responses for study 3 (Distance vs. Hyflex). Altogether, there were 303 unique, valid data responses.

3.6.3 Data Analysis Method

After the initial and secondary data analysis, the data pool consisted of 223 samples for the research model. To answer the research questions, we must use a versatile data analysis method capable of testing complex correlations between many variables. Structural equation modeling (SEM) is a set of statistical techniques that allows the examination of a set of interactions between one or more independent variables (IVs) (either continuous or discrete) and one or more dependent variables (DVs) (either continuous or discrete) (Ullman & Bentler, 2012). Academics and researchers widely use this strategy to analyze data received from questionnaires (Mustafa, M. B., Nordin, M. B., & Razzaq, A. B. A., 2020).

Though it can be used for exploratory purposes, SEM is more of a confirmatory approach (Schreiber, Stage, King, Nora, & Barlow, 2006), thus it is effective for evaluating the model in this study. SEM's versatility is one of its strengths, allowing for the examination of complicated connections, the use of multiple types of data (e.g., categorical, dimensional, censored, count variables), and comparisons between alternative models (E. J. Wolf, Harrington, Clark, & Miller, 2013). The usage of AMOS software to customize this SEM method is ideal since the analysis performed will yield more precise results (Barbara, 2010).

3.6.4 Sample Size

The choice of sample size has generated debate in the literature. Some scholars claim that arbitrary sampling, which produces high commonalities with no cross-loadings, is unethical. Thus, sampling may be determined by the nature of the data, i.e. Some researchers say that if data is strong enough, the sample size may be minimal, whilst others urge for item-ratio sampling.

Several arguments can be made in favor of arbitrary sampling. For example, Johanson and Brooks (2010) advise social researchers that the minimum number of participants for sampling is 100. For a thorough item analysis, a sample size of 100 to 200 people should be used, as standard errors for Cronbach's alpha value grow as the sample size lowers.

As long as item intercorrelations are relatively strong, Hinkin (1998) and Hinkin et al. (1997) recommend N=150 to gather sufficient data for exploratory component analysis. However, researchers distinguish between statistical and practical significance because the likelihood of achieving statistical significance improves as the sample size grows. According to Cabrera-Nguyen (2010), some researchers debate over sampling size and believe that sample size relies on the acquired data and that the sufficiency of sampling is decided after examining the gathered data.

Previous research has made suggestions for the minimal sample size needed to perform various analyses. For example, exploratory factor analysis cannot be performed if the sample contains fewer than 50 observations (which are still sensitive to other factors). In contrast, simple regression analysis requires at least 50 samples and, in most cases, 100 samples (Hair et al., 2018). Pearson Correlation analysis requires a bare minimum of 200 samples (Guilford, 1954).

Kline (2011) suggested that a minimum of 200 cases is needed to conduct SEM studies. Although de Winter et al. (2009) indicated that the sample size in EFA might be as little as 50, Wolf et al. (2013) contended that there was no rule of thumb for sample size in CFA. Therefore, based on the above suggestions, we argue that the sample size for this study will suffice.

3.7 Results

This section discusses the results of the analysis and presents the means, standard deviations, intercorrelations, reliability, and Confirmatory Factor Analysis. The demographic and evaluation results of the model are discussed below.

3.7.1 Demographic Results

All the valid responses satisfied the criteria discussed in the previous section. All the respondents understood the group settings, answered the questions correctly, and were committed to providing their best answers.

Tableau was used for data visualization purposes. A healthcare organization recently revealed that using Tableau for data analysis and visualizations saved them "thousands of hours in repetitive data processing" (Tableau, 2015). Tableau was chosen as the data visualization software for this research since it is utilized by many companies and clients and is free for students. The detailed report of demographics is discussed below:

Age:

The data pool consisted of students from different age groups. About 61.4% of students belonged to the age group of 18-24 which is more than half the data population. Around 1.65% of students were under 18 and 5.28% of students were 30+. Therefore, the extreme cases (under 18 and over 30) do not affect the results highly as their experiences may differ.

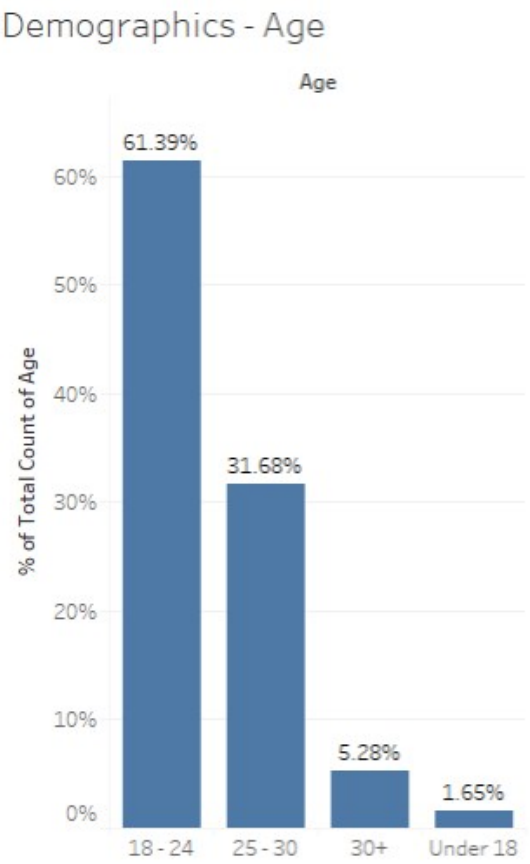


Figure 9: Demographics - Age

Gender:

The data pool consisted of about 57% of male students and around 41.6% of female students. The ratio of male and female students is almost equal and therefore there aren't any indirect effects of gender roles on the results.

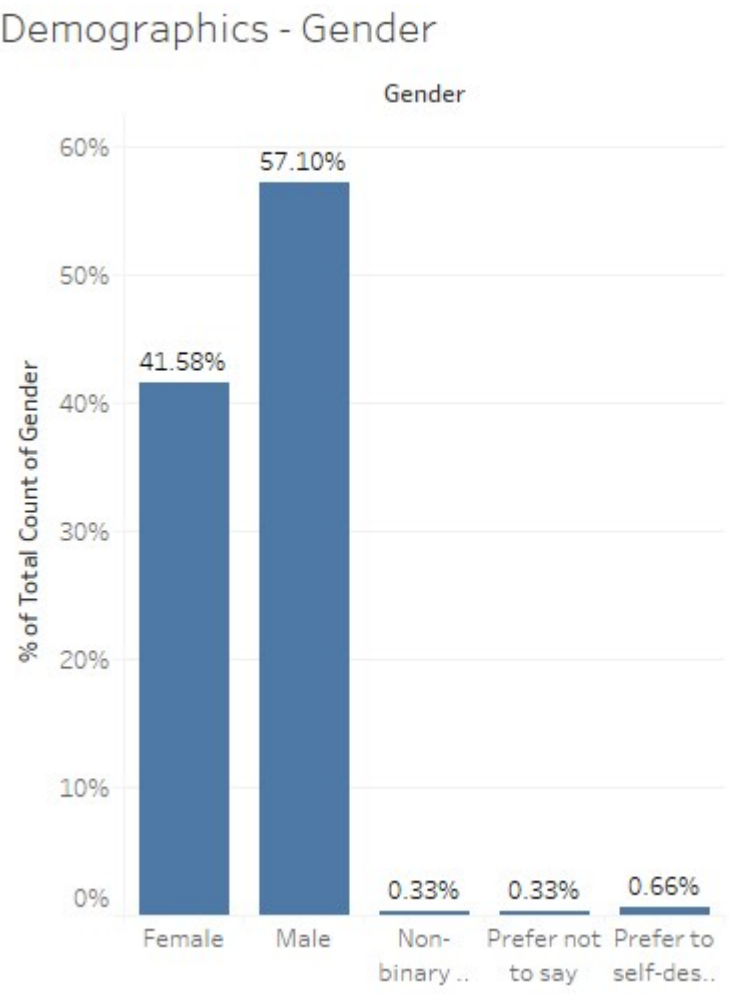


Figure 10: Demographics - Gender

Nationality:

Concerning nationality, the survey gave 3 options to students: Within Newfoundland, Other Provinces, and International Students. Almost 47% of the data population were local Newfoundland students. About 20% of the population constituted international students and 32% of the population were Canadian students from other provinces. There are almost equal numbers of students who are locals and from the outside (different provinces, international). Therefore the preferences are not affected by one student group.

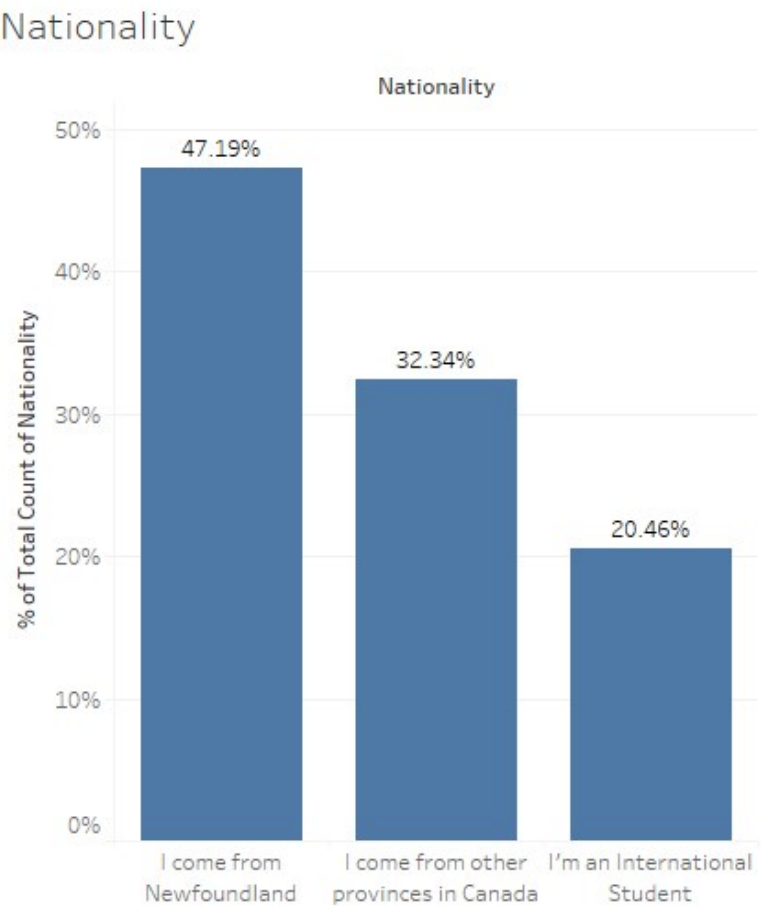


Figure 11: Demographics - Nationality

Degree:

Around 26.4% of the population constituted students with a BCom degree. There is an almost equal number of undergraduate and graduate students in the data pool. About 45% of the population belongs to undergraduate students and about 35% of the population belongs to graduate students.

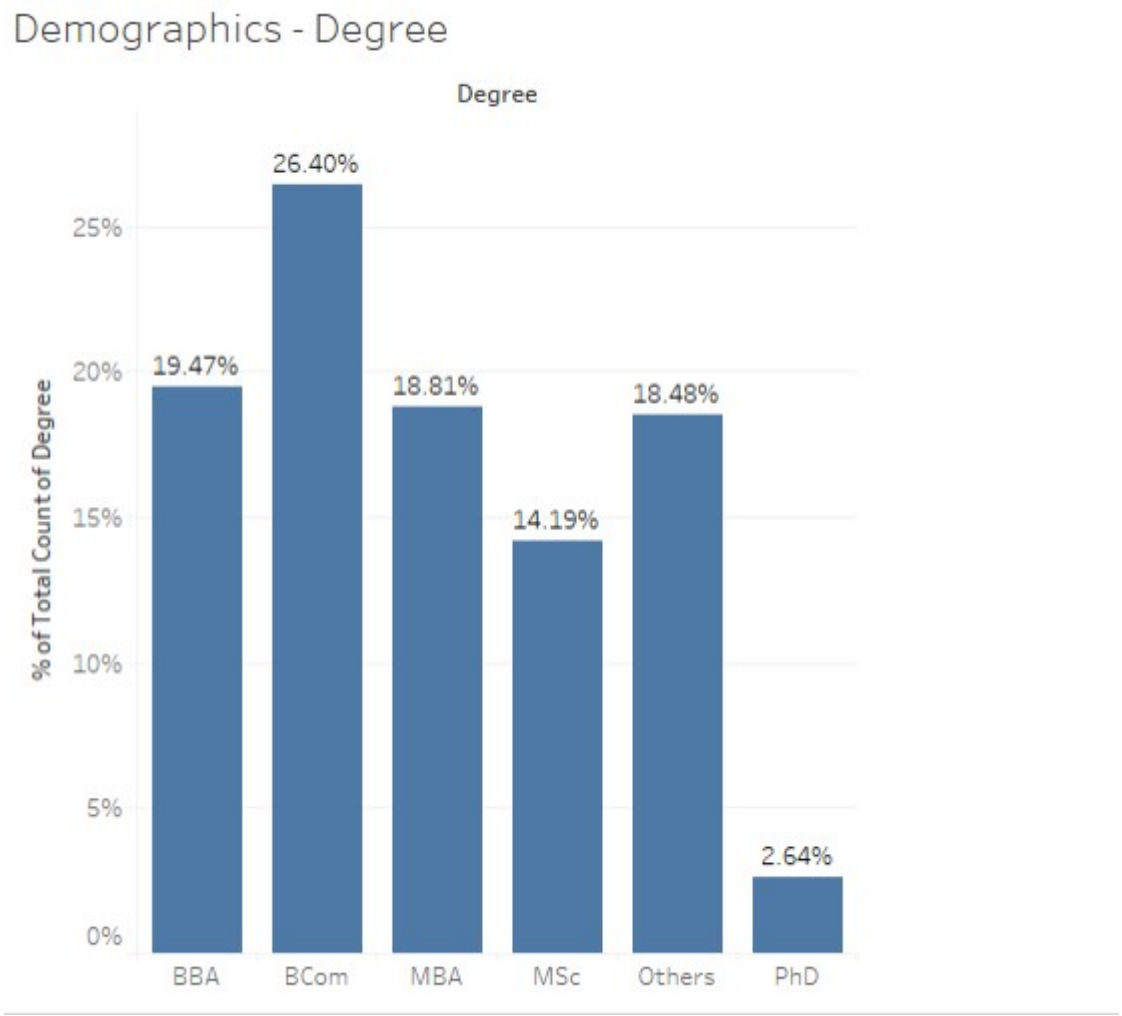


Figure 12: Demographics – Degree

***Experience*:**

The survey randomly assigned the students to different learning settings. But to understand students' prior experiences, there were few questions about their prior experiences in learning modes. In the distance group, almost 64% of students had prior experience learning in the distance mode. Within the hyflex group, 52% of students had prior experience learning in a hyflex mode. And in the in-person group, almost 71% of students had prior experience learning in the in-person group. Therefore within each group, more than half the population had prior experience with the learning settings that they were assigned to.

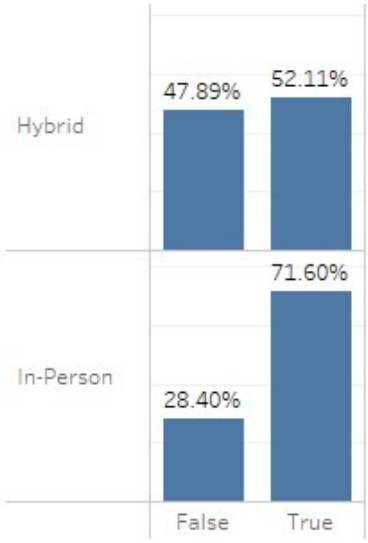


Figure 13: Demographics – Experience Match

3.7.2 Measurement Model Results:

Convergent Validity and Reliability

Internal consistency, commonalities, and factor loadings were examined in the data. Analyses were conducted concurrently to improve the judgment of retention criteria. Convergent validity was tested using three indicators: factor loadings, composite reliability (CR) coefficients, and the average variance extracted (AVE). Any factors with loadings less than 0.6 were excluded from

the scale. The item (S5) had a factor loading of 0.67 and therefore was removed from the scale and analysis.

Factor	**Items**	**Factor Loadings**	**CR**	**AVE**
Experiential Learning	EL1	0.809	0.905	0.657
	EL2	0.790		
	EL3	0.840		
	EL4	0.763		
	EL5	0.849		
Learners Choice	L1	0.849	0.934	0.740
	L2	0.838		
	L3	0.860		
	L4	0.880		
	L5	0.874		
Equivalency	Eq1	0.859	0.909	0.715
	Eq2	0.883		
	Eq3	0.849		
	Eq4	0.788		
Accessibility	A1	0.836	0.909	0.667
	A2	0.813		
	A3	0.811		
	A4	0.877		
	A5	0.739		

Reusability	R1	0.814	0.908	0.713
	R2	0.855		
	R3	0.855		
	R4	0.852		
Satisfaction	S1	0.835	0.910	0.669
	S2	0.781		
	S3	0.800		
	S4	0.826		
	S6	0.846		
Academic Self-Efficacy	SE1	0.777	0.912	0.674
	SE2	0.828		
	SE3	0.837		
	SE4	0.855		
	SE5	0.807		

Table 11: Factor Loadings & Convergent Validity

All the items had an outer loading > 0.7 and are above the minimum acceptable levels of outer loadings. The CR coefficient values show a range of 0.905 – 0.912. The AVE coefficient values show a range of 0.657 – 0.740. These results were all greater than the specified standards of 0.60 (CR coefficient) and 0.50 (AVE), confirming the constructs' convergent validity (Fornell & Larcker, 1981, HUANG, J., & PHONGSATHA, T., 2022).

The composite reliability value (>0.7) suggests that the constructs have high internal consistency reliability. The AVE value (>0.5) suggests that the constructs have a high level of convergent validity. The model's evaluation criteria have been met, providing support for the measure's reliability and validity.

3.7.3 Structural Model Results

For testing the Structural Model in CFA, a few of the standard indices from the literature were chosen. They are chi-square X2 value ratio, degree of freedom df, chi-square freedom CMIN/df, RMSEA, gauge adapter NFI, comparative adaptation index CFI, and value-added adaptation index IFI. The results of the two model are discussed below.

A. In-Person vs. Hyflex

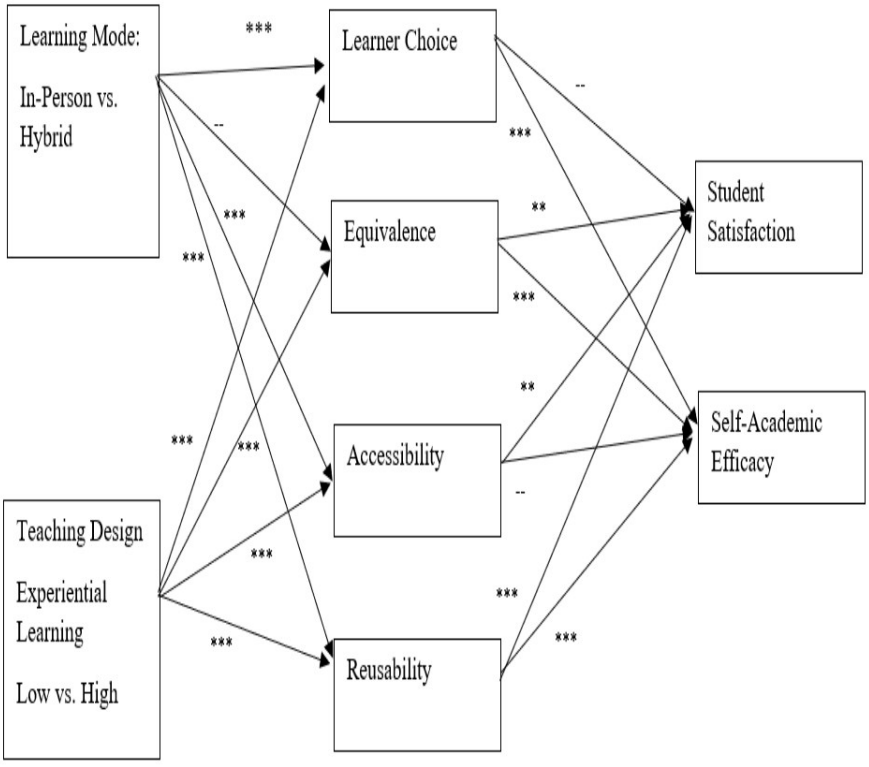


Figure 14: In-Person vs. Hyflex Hypothesis Results

CFA Model: In-Person vs. Hyflex:

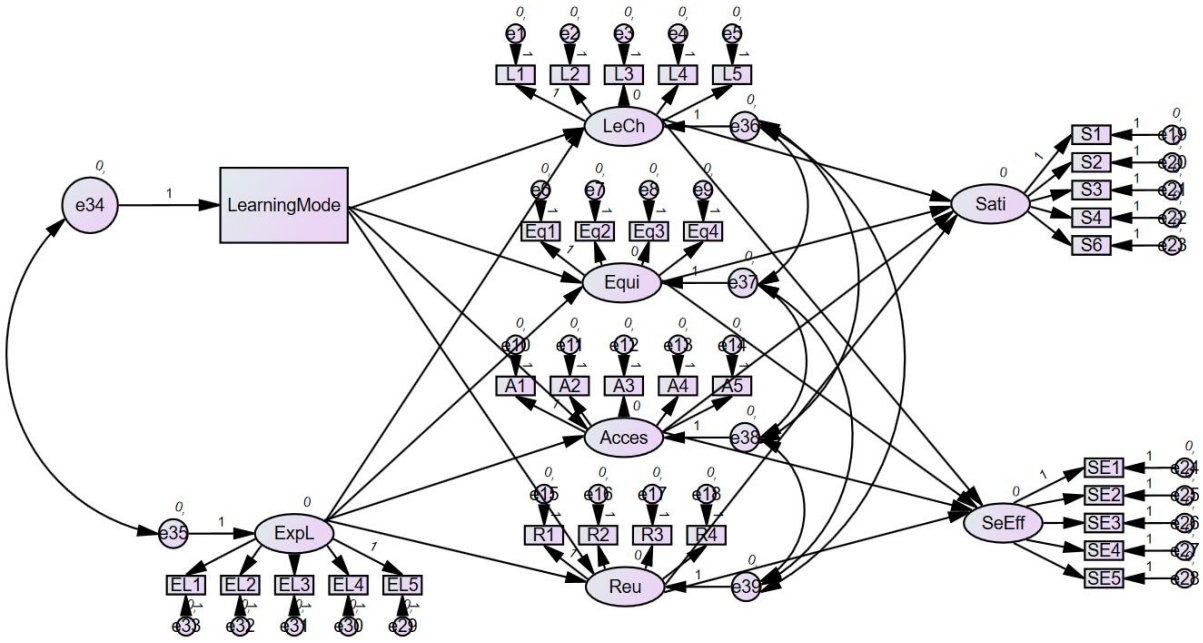


Figure 15: In-Person vs. Hyflex CFA

As mentioned earlier, the factors with low factor loadings were removed from the analysis. Therefore, S5 is not included in the CFA model.

Model Fit:

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	122	1397.633	507	.000	2.757
Saturated model	629	.000	0		
Independence model	68	7302.135	561	.000	13.016

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.089	.083	.095	.000
Independence model	.233	.228	.237	.000

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.809	.788	.869	.854	.868
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

The $\chi 2$/DF ratio is 2.757, meeting the standard of <3. (Kline, 2005) A model is considered well-fitting if the Chi-square ($\chi 2$)/degree of freedom (df) ratio is less than 3. The RMSEA value is 0.089, which is less than the 0.1 cut-offs. Recommendations generally state that a model has a good fit if RMSEA is less than 0.08 and an adequate fit if RMSEA is less than 0.1. (Carlback & Wong, 2018; Shadfar & Malekmohammadi, 2013).

The IFI value is 0.869 and the CFI value is 0.868, indicating that the model is a good fit since the IFI $\geq$ 0.8 and CFI $\geq$ 0.8. (Browne & Cudeck, 1993; Garson, 2006; Techapreechawong & Teeraprasert, 2012, Adem Akkus, 2019, HUANG, J., & PHONGSATHA, T., 2022) According to Kline (2011), the most often used fit indices (GFI, AGFI, NFI, NNFI, CFI, and IFI) should be $\geq$0.85. (cited in; Kaya & Altinkurt, 2018; Vassallo & Saba, 2015)

The confirmatory analysis revealed that the fit indices are acceptable and therefore the model has a good fit.

Hypothesis Testing:

			Estimate	S.E.	C.R.	P	Label
LeCh	<---	LearningMode	1.972	.272	7.242	***	par_34
Equi	<---	LearningMode	.405	.246	1.648	.099	par_35
Acces	<---	LearningMode	.659	.164	4.015	***	par_36
Reu	<---	LearningMode	.760	.219	3.463	***	par_37
LeCh	<---	ExpL	.826	.094	8.790	***	par_38
Equi	<---	ExpL	.700	.085	8.192	***	par_39
Acces	<---	ExpL	.728	.076	9.593	***	par_40
Reu	<---	ExpL	.753	.083	9.118	***	par_41
Sati	<---	LeCh	-.045	.041	-1.087	.277	par_42
SeEff	<---	LeCh	-.203	.072	-2.807	.005	par_43
Sati	<---	Equi	.287	.052	5.480	***	par_44
SeEff	<---	Equi	-.015	.085	-.174	.862	par_45
Sati	<---	Acces	.324	.113	2.871	.004	par_46
SeEff	<---	Acces	1.775	.243	7.311	***	par_47
Sati	<---	Reu	.486	.078	6.239	***	par_48
SeEff	<---	Reu	-.493	.127	-3.876	***	par_49

Table 12: Model Estimates

The results from Table 9 indicate that, H1, H2, H3, H5, H6, H7, H8, H10, H11, H12, H13, H15, H16 are all satisfied (p value <0.05). Additionally, the learning mode was found to impact Reusability significantly.

H1 stated that the overall Learner's choice of students increases when the learning mode changes from In-person to Hyflex. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.409, implying that when the learning mode changes from in-person to hyflex, the Leaners Choice goes up by 0.409 standard deviations.

H2 stated that there is equal or no significant difference in the overall Equivalency of students in the Hyflex and In-person learning modes. The hypothesis is not supported as the p-value is greater than 0.05, and the estimate is 0.099. This implies that when the learning mode change from in-person to hyflex, the equivalency is impacted minimally by around 0.09 standard deviations.

H3 stated that the overall Accessibility of students increases when the learning mode changes from In-person to Hyflex. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.207, implying that when the learning mode changes from in-person to hyflex, the Accessibility goes up by 0.207 standard deviations.

H4 stated that there is equal or no significant difference in the overall perceived Reusability in the Hyflex and In-person learning modes. But the p-value is significant and less than 0.05 with an estimate of 0.197, implying that when the learning mode changes from in-person to hyflex, the Reusability goes up by 0.197 standard deviations.

H5 stated that increased experiential learning increases the learner's choice. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.574. This implies that experiential learning positively impacts the perceived learner's choice. Therefore, when EL goes up by one standard deviation, the Learner's choice goes up by 0.574 standard deviations.

H6 stated that there is a statistical impact of experiential learning on perceived equivalency. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.576. This implies that experiential learning positively impacts perceived equivalency. Therefore, when EL goes up by one standard deviation, the equivalency goes up by 0.574 standard deviations.

H7 stated that increased experiential learning increases perceived accessibility. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.766. This implies that experiential learning positively impacts perceived accessibility. Therefore, when EL goes up by one standard deviation, the accessibility goes up by 0.766 standard deviations.

H8 stated that experiential learning has a statistical or no impact on perceived reusability. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.655. This implies that experiential learning positively impacts perceived reusability. Therefore, when EL goes up by one standard deviation, the reusability goes up by 0.574 standard deviations.

H9 stated that an increased level of perceived learner choice increases student satisfaction. The hypothesis is not supported as the p-value is not significant.

H10 stated that an increased level of perceived equivalency increases student satisfaction. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.320. This indicates that the equivalency positively impacts student satisfaction, and an increase in Eq will increase satisfaction by 0.320 standard deviations.

H11 stated that an increased level of perceived accessibility increases student satisfaction. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.283.

This indicates that accessibility positively impacts student satisfaction, and an increase in accessibility will increase satisfaction by 0.283 standard deviations.

H12 stated that an increased level of perceived reusability increases student satisfaction. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 0.512. This indicates that reusability positively impacts student satisfaction, and an increase in reusability will increase satisfaction by 0.512 standard deviations.

H13 stated that learner choice has a significant impact on academic self-efficacy. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is -0.301. This implies that learner choice has a negative impact on SE.

H14 stated that equivalency has a significant impact on academic self-efficacy. The hypothesis is not supported as the p-value is not significant.

H15 stated that accessibility has a significant impact on academic self-efficacy. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is 1.740. This implies that accessibility has a positive impact on SE.

H16 stated that reusability has a significant impact on academic self-efficacy. The hypothesis is supported as the p-value is significant and less than 0.05, and the estimate is -0.584. This implies that reusability has a negative impact on SE.

Model Overview:

Hypothesis	**p-value**	**Estimate**	**Supported/Not-Supported**
H1	***	0.409	Supported

H2	0.099	0.099	Not Supported
H3	***	0.207	Supported
H4	***	0.197	Supported
H5	***	0.574	Supported
H6	***	0.576	Supported
H7	***	0.766	Supported
H8	***	0.655	Supported
H9	0.277	-0.59	Not Supported
H10	***	0.320	Supported
H11	0.004	0.283	Supported
H12	***	0.512	Supported
H13	0.005	-0.301	Supported
H14	0.862	-0.019	Not Supported
H15	***	1.740	Supported
H16	***	-0.584	Supported

Table 13: Hypothesis Results

It is evident from Table 11, that most of the hypotheses were supported by the model. As hypothesized, it is evident that when the learning mode positively impacts the four hyflex principles. When students change from in-person to hyflex, they experience a higher sense of learner choice (flexibility in learning from home or in-classroom), accessibility, and reusability. When all the students are present in the classroom, everyone is treated equally and gains equal

attention/resources. That is why there is no impact of learning mode on equivalency. Students in traditional in-person classes perceive more or equal equivalency levels than hyflex classes.

We hypothesized that the EL would positively impact the hyflex principles, which is evidently proved in Table 11. Experiential learning provides a better course design for students to learn and experience a better curriculum. This allows students to make better choices. Providing experiential learning in classes ensures that everyone gains equal access to resources and opportunities. Therefore, it is evident in the results that experiential learning would help ensure that the hyflex principles are followed and that students perceive a better learning experience.

With the help of literature, we hypothesized that the hyflex principles would positively impact student satisfaction. But in contrast, we found that Learner choice did not affect student satisfaction much compared to the other four factors. This could be understood because the learner's choice is a personal preference, which the students have already chosen. Therefore, it doesn't play a crucial role in determining student satisfaction in a course. Equivalency, accessibility, and reusability are factors related to the teaching design and students' experience. Therefore, they positively impact student satisfaction in a course.

We hypothesized that the hyflex principles would have a significant impact on the perceived academic self-efficacy of students. The results indicate that the learner's choice and reusability significantly impacts the SE of students but is negatively impacted. This can be attributed to the factor that SE depends on the students experiences and results in a course. In traditional in-peron courses students are more motivated to attend classes and are monitors. Which is missed in the hyflex classes because of the flexibility it offers. Students tend to become less inactive which can be seen in the negative impact. Since SE is about how the student perceives their learning

success, Equivalency doesn't contribute to determining their self-efficacy. On the other hand, the perceived accessibility of resources positively and significantly impacts student self-efficacy.

Although the results did not support a few assumptions in this study, the statistically insignificant findings nonetheless provide theoretical insights. Therefore, future scholars and practitioners can endeavor to obtain a deeper grasp of this issue, gaining a more nuanced view of what elements may be linked and what paths might be deleted or reexamined.

As a part of the testing, we also analyzed the impact of control variables (gender, nationality, age, etc.) on the four principles and dependent variables. There weren't any mediating effects because of the control variables.

B. Distance vs. Hyflex

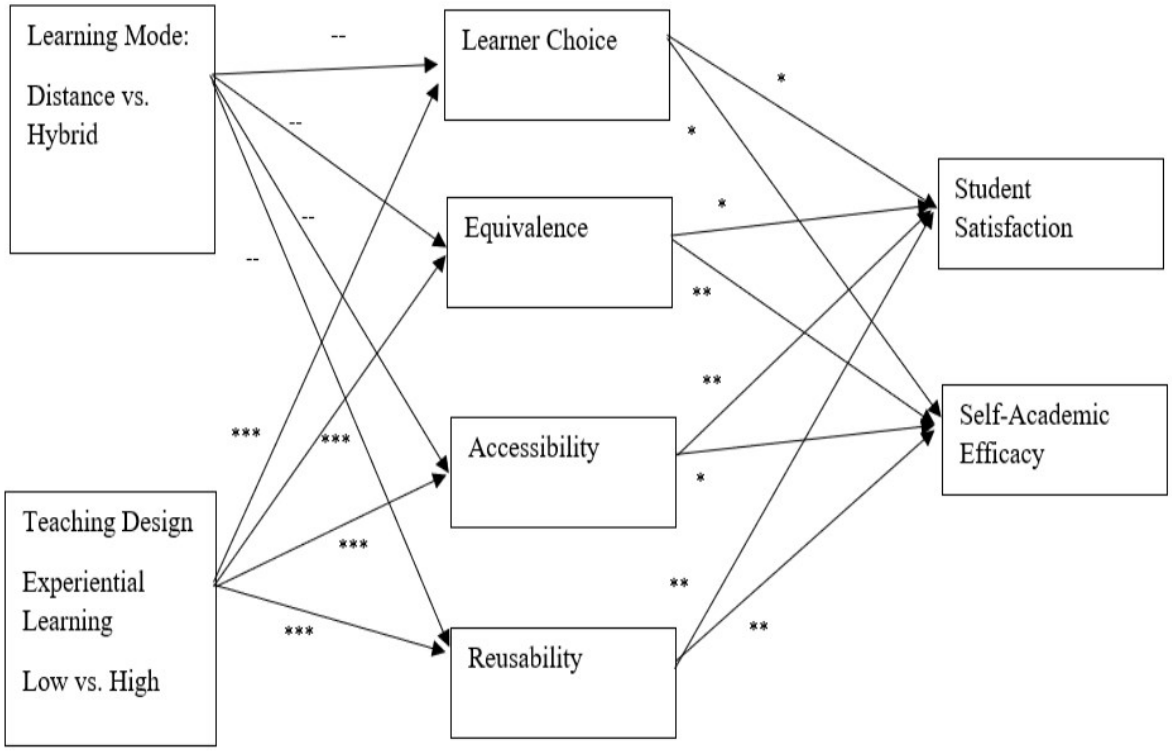


Figure 16: Distance vs. Hyflex Hypothesis Results

Distance vs. Hyflex Model

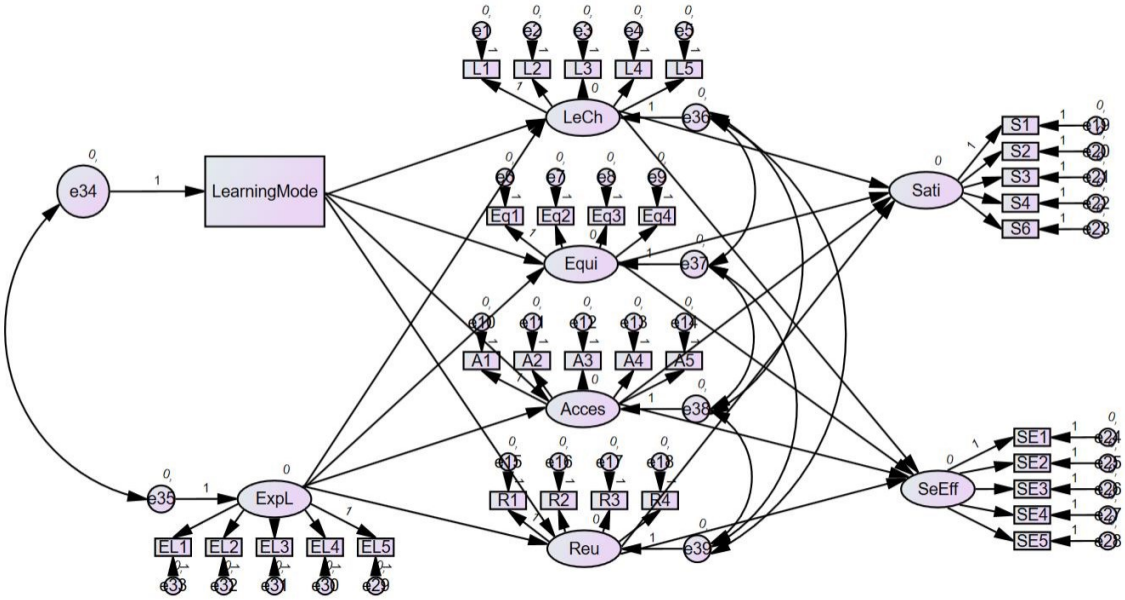


Figure 17: Distance vs. Hyflex CFA

Model Fit:

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	88	1257.276	507	.000	2.480
Saturated model	595	.000	0		
Independence model	34	6869.185	561	.000	12.245

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.817	.797	.882	.868	.881
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.082	.076	.088	.000
Independence model	.226	.221	.230	.000

The $\chi 2$/DF ratio is 2.757, meeting the standard of <3. (Kline, 2005). The RMSEA value is 0.089, which is less than the 0.1 cut-off (Carlback & Wong, 2018; Shadfar & Malekmohammadi, 2013).

The IFI value is 0.869 and CFI value is 0.868, indicating that the model is a good fit since the IFI ≥ 0.8 and CFI ≥ 0.8 (Browne & Cudeck, 1993; Garson, 2006; Techapreechawong & Teeraprasert, 2012, Adem Akkus, 2019, HUANG, J., & PHONGSATHA, T., 2022).

Model Estimates

			Estimate	S.E.	C.R.	P	Label
LeCh	<---	ExpL	.650	.066	9.826	***	
Equi	<---	ExpL	.734	.073	10.068	***	
Acc	<---	ExpL	.718	.065	10.958	***	
LeCh	<---	LearningMode	-.194	.170	-1.146	.252	
Acc	<---	LearningMode	-.146	.165	-.887	.375	
Equi	<---	LearningMode	-.155	.200	-.778	.436	
Reu	<---	LearningMode	-.099	.186	-.534	.593	
Reu	<---	ExpL	.736	.071	10.370	***	
Sati	<---	LeCh	13.929	36.958	.377	.706	
SeEff	<---	LeCh	20.873	54.642	.382	.702	

			Estimate	S.E.	C.R.	P	Label
Sati	<---	Equi	-2.775	7.588	-.366	.715	
SeEff	<---	Equi	-3.873	11.218	-.345	.730	
Sati	<---	Acc	-29.593	79.905	-.370	.711	
SeEff	<---	Acc	-44.250	118.139	-.375	.708	
Sati	<---	Reu	20.388	52.957	.385	.700	
SeEff	<---	Reu	29.489	78.296	.377	.706	

Table 14: Model Estimates

Even though the model fit was good, the estimates seemed insignificant. Most of the hypotheses weren't supported and were insignificant. On further in-depth analysis, we figured out that this insignificance is because of the hyflex group. The hyflex group consists of both in-classroom students and online students. Some irrelevancies were experienced because students conceptualized distance and hyflex online as similar. Therefore to understand and test the model better, we performed an in-depth analysis by comparing distance with hyflex in-classroom mode and hyflex online mode separately.

Distance vs. Hyflex In-Classroom

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	123	1265.572	542	.000	2.335
Saturated model	665	.000	0		
Independence model	70	5058.643	595	.000	8.502

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.750	.725	.840	.822	.838

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.095	.088	.102	.000
Independence model	.226	.220	.232	.000

The model fit fits almost well with $\chi 2/DF$ value 2.335, RMSEA of 0.095 and CFI = 0.838, IFI = 0.840 (>0.8).

			Estimate	S.E.	C.R.	P	Label
LeCh	<---	ExpL	.466	.069	6.738	***	par_34
Equi	<---	ExpL	.644	.079	8.128	***	par_35
Acces	<---	ExpL	.663	.075	8.802	***	par_36
Reu	<---	ExpL	.613	.075	8.221	***	par_37
LeCh	<---	LearningMode	-.032	.182	-.177	.860	par_49
Equi	<---	LearningMode	-.052	.212	-.246	.806	par_50
Acces	<---	LearningMode	-.155	.220	-.706	.480	par_51
Reu	<---	LearningMode	.066	.199	.330	.741	par_52
Sati	<---	LeCh	1.664	.706	2.357	.018	par_38
SeEff	<---	LeCh	2.255	.870	2.591	.010	par_39
Sati	<---	Equi	-1.076	.507	-2.123	.034	par_40
SeEff	<---	Equi	-1.064	.615	-1.730	.084	par_41
Sati	<---	Acces	-2.709	1.222	-2.216	.027	par_42
SeEff	<---	Acces	-3.774	1.502	-2.512	.012	par_43

			Estimate	S.E.	C.R.	P	Label
Sati	<---	Reu	3.934	1.356	2.901	.004	par_44
SeEff	<---	Reu	4.611	1.658	2.782	.005	par_45
Sati	<---	LearningMode	-.260	.586	-.444	.657	par_47
SeEff	<---	LearningMode	-.811	.716	-1.134	.257	par_48

As discussed earlier, the inconsistencies were because of the hyflex online group. Now the results support the hypothesis as expected.

Model Overview

Hypothesis	**p-value**	**Estimate**	**Supported/Not Supported**
H1	0.860	-0.12	Not Supported
H2	0.806	-0.16	Not Supported
H3	0.480	-0.46	Not Supported
H4	0.741	0.22	Not Supported
H5	***	0.648	Supported
H6	***	0.722	Supported
H7	***	0.714	Supported
H8	***	0.757	Supported
H9	0.018	1.307	Supported
H10	0.034	-1.048	Supported
H11	0.027	-2.745	Supported
H12	0.004	3.477	Supported

H13	0.010	1.792	Supported
H14	0.084	-1.049	Supported
H15	0.012	-3.868	Supported
H16	0.005	4.122	Supported

Table 15: Hypothesis Results

It is evident from Table 15 that the Learning mode (Distance vs. Hyflex in-classroom) doesn't have a significant impact on the hyflex principles. Students perceive no big difference in the distance and hyflex classes.

Experiential learning has a positive and significant impact on all four principles, implying again that implementing experiential learning would ensure that the hyflex principles are followed and that students perceive a better learning experience. When EL increases by one standard deviation, the Learner's choice increases by 0.648 standard deviations, Equivalency increases by 0.722 standard deviations, Accessibility increases by 0.714 standard deviations, and Reusability increases by 0.757 standard deviations.

Satisfaction and self-efficacy are significantly and positively impacted by learner choice and reusability. An increase in learner choice increases satisfaction by 1.307 standard deviations. An increase in learner choice increases self-efficacy by 1.792 standard deviations. An increase in reusability increases satisfaction by 3.477 standard deviations. An increase in reusability increases satisfaction by 4.122 standard deviations.

In the results of the previous study we found that when learning mode changes from in-person to hyflex, the learners choice has a negative impact on student self-efficacy. The results from this study supports the previous results. When learning mode changes form distance to hyflex in-classroom, the learners choice positively impacts the self-efficacy. This indicates that when

students are offered less choices, they have more motivation to study and also, the self-efficacy in a in-person classroom is more compared to online as students get access to everything in-person.

In comparison, accessibility and equivalency have a significant but negative impact on satisfaction and self-efficacy. The reason why there is a negative impact of accessibility and equivalency is unknown. Therefore, we tried to find the group means of equivalency and accessibility in distance vs. hyflex in-classroom group in low and high experiential learning.

Group Means: Equivalency		**Experiential Learning**		
		Low	High	Average
Learning Mode	Distance	5.987	8.075	7.031
	Hyflex In-Classroom	6.101	7.840	6.9705

Figure 18: Group Means: Equivalency

The average mean of Equivalency in the distance group is 7.031, slightly higher than the average mean of Equivalency in the hyflex in-classroom group, which is 6.97. This slight difference could be the reason for the negative impact. Students in distance courses perceive higher equivalency than students in hyflex in-classroom groups. When analyzed practically, this makes

sense because, in the distance course, all students perceive an equal level of equivalency. But when it comes to hyflex, the teachers have to manage both the in-classroom students and the online students simultaneously, which could be why there is a slight difference in the perceived equivalency of students. Therefore, when equivalency increased by one standard deviation the satisfaction was negatively impacted as students in hyflex mode perceived higher satisfaction than in distance courses.

Group Means: Accessibility		**Experiential Learning**		
		Low	High	Average
Learning Mode	Distance	6.21	8.05	7.13
	Hyflex In-Classroom	6.02	8.16	7.09

Figure 19: Group Means: Accessibility

The average mean of Accessibility in the distance group is 7.13, slightly higher than the average mean of Accessibility in the hyflex in-classroom group, which is 7.09. This slight difference could be the reason for the negative impact. Students in distance courses perceive higher accessibility than students in hyflex in-classroom groups. When analyzed practically, this makes

sense because, in the distance course, all students perceive an equal level of accessibility. All resources are posted online and are available for all. But when it comes to hyflex, as mentioned above , teachers have to manage both the in-classroom and online students simultaneously. The accessibility principles might differ for students in a hyflex setting as two student groups are present. Therefore, when accessibility increased by one standard deviation, the satisfaction was negatively impacted as students in hyflex mode perceived higher satisfaction than in distance courses.

Group Means: Satisfaction		**Experiential Learning**		
		Low	High	Average
Learning Mode	Distance	6.08	8.06	7.07
	Hyflex In-Classroom	6.18	8.14	7.16

Figure 20: Group Means: Satisfaction

To understand if there is a direct impact of the learning modes on student satisfaction, we ran the model to determine the direct effect of the learning mode on student satisfaction and self-efficacy.

			Estimate	S.E.	C.R.	P	Label
Sati	<---	LearningMode	.430	.158	2.713	.007	par_47
SeEff	<---	LearningMode	.044	.172	.254	.799	par_48

It is clear from the results that Learning mode (Distance vs. Hyflex in-classroom) has a significant and positive impact on student satisfaction. But there is no mediating effect of the four principles on this.

Distance vs. Hyflex Online

			Estimate	S.E.	C.R.	P	Label
LeCh	<---	ExpL	.685	.081	8.448	***	
Equi	<---	ExpL	.743	.088	8.400	***	
Acces	<---	ExpL	.749	.080	9.372	***	
Reu	<---	ExpL	.789	.089	8.885	***	
Sati	<---	LeCh	12.850	17.403	.738	.460	
SeEff	<---	LeCh	13.916	18.408	.756	.450	
Sati	<---	Equi	3.234	4.550	.711	.477	
SeEff	<---	Equi	3.637	4.813	.756	.450	
Sati	<---	Acces	-20.132	28.018	-.719	.472	
SeEff	<---	Acces	-21.300	29.633	-.719	.472	
Sati	<---	Reu	6.022	7.838	.768	.442	
SeEff	<---	Reu	5.562	8.288	.671	.502	
Sati	<---	LearningMode	.286	.164	1.737	.082	
SeEff	<---	LearningMode	.120	.159	.752	.452	

The results indicate that there are inconsistencies, and the results are insignificant. This is attributed to the fact that students misunderstand distance and hyflex online as similar. Future research must clearly differentiate the hyflex from a distance and conduct an in-depth analysis. Yet again, the EL has a positive and significant impact on the four core principles of hyflex

3.7.4 Motivators and Demotivators

The survey results were downloaded and the open-ended questions were analyzed manually unlike the rest of the survey data. Most of the responses to the open-ended questions were one-word themes, which were all grouped. In instances where students explained in depth, the major theme was identified and manually grouped accordingly. All the responses were analyzed separately to identify the major themes and were grouped based on the learning mode and the emerging themes.

Motivators

A major component of this study was to understand if students prefer the hyflex mode and if it will also be adapted in the future. To analyze this, students were asked about the advantages of the three learning modes and their willingness to register for a course in one of the three learning modes in the future.

Below are the motivators/advantages (different themes) that students felt about the different learning modes:

In-Person	**Hyflex**
University Experience	Flexibility/Ability to choose
Better Interactions	Supports financially
Most Used to	Learning freedom

Pay more attention	Learn More/ More Opportunities
Student Engagement	Work better on own schedule
More Intuitive Learning	Convenient
Increases motivation	Time/Efficiency
Live in-campus	Able to work while studying
Learning environment	Study at own time
	All resources are accessible
	Able to learn in both online and in-person
	Able to learn regardless of personal health/mental issues
	Recorded lectures can be viewed anytime

Table 16: Motivators of Learning Modes(Hyflex vs. In-Person)

Table 17: Motivators of Learning Modes(Distance vs. Hyflex)

Distance	**Hyflex**
Easy registration	Flexibility/Ability to choose
Study my own time	Supports financially
Fits my schedule	Learning freedom
No venue restriction	Learn More/ More Opportunities
No fixed class time	Work better on own schedule

	Able to work while studying
	Study at own time
	All resources are accessible
	Able to learn in both online and in-person
	Able to learn regardless of personal health/mental issues
	Recorded lectures can be viewed anytime

The survey results indicated that students felt many motivators in the two learning modes. Around 45% of students in the data population are likely to choose hyflex as their preferred learning mode in the future. And 38% of students would choose in-person classes.

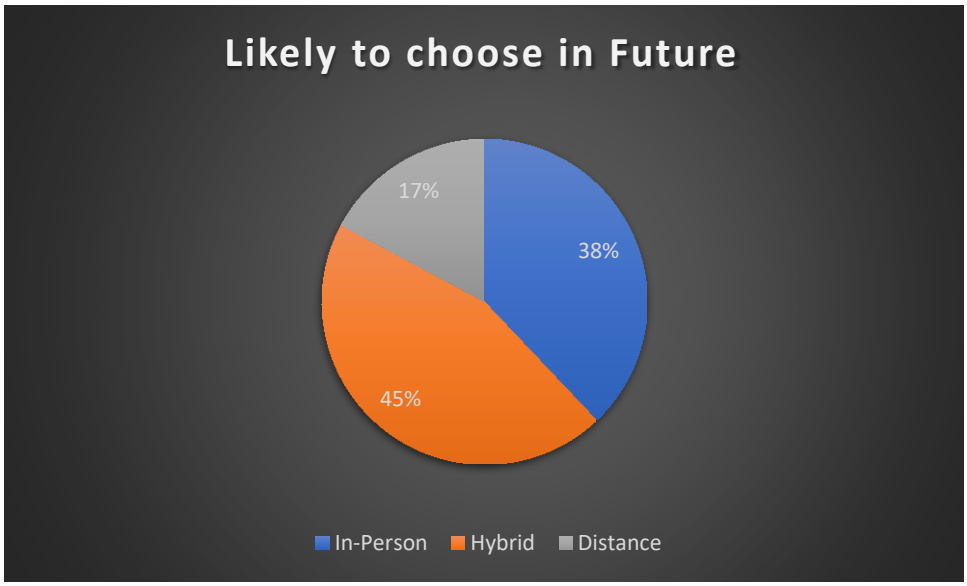


Figure 21: Most Likely to Register in Future

One of the key and most important reasons students prefer in-person learning is the experience it provides. The in-person learning mode provides an engaged, intuitive learning environment and

a university experience for the students. Many students prefer in-person classes as it allows them to interact with their classmates and professors easily.

Another frequently stated motivator was that students are most used to in-person learning experiences and prefer to stay in a safe zone rather than experimenting.

Another reason is that in-person classes create motivation for students. To gain attendance scores, students must go to classes regularly and complete assignments/projects on time. This gives them an intrinsic motivation to study on time and work harder.

On the other hand, the hyflex mode provides enormous benefits for students, which many of the students in the data pool have experienced. Flexibility is the major component of the success of hyflex classes. Students feel that a flexible learning environment allows them to choose how and where they want to learn freely. This provides them with independent learning freedom. The recorded classes provide students a strong backup in learning where they can rewatch the lectures to learn and understand better.

Many students feel that hyflex courses support them financially, as they can choose to attend classes from home when they cannot make it to the campus.

Some students stated that they have personal issues such as anxiety, fear of groups, etc., and they usually find it very difficult to study in person. Missing a class would become very difficult as none of the resources are recorded and posted online. In such cases, hyflex classes have helped students be active in learning while not being in-classroom.

Demotivators:

While all the advantages were discussed, there still were a few reasons why students did not prefer the learning modes. Addressing these concerns will help better the learning experience in the different learning modes, thereby increasing future adoption rates.

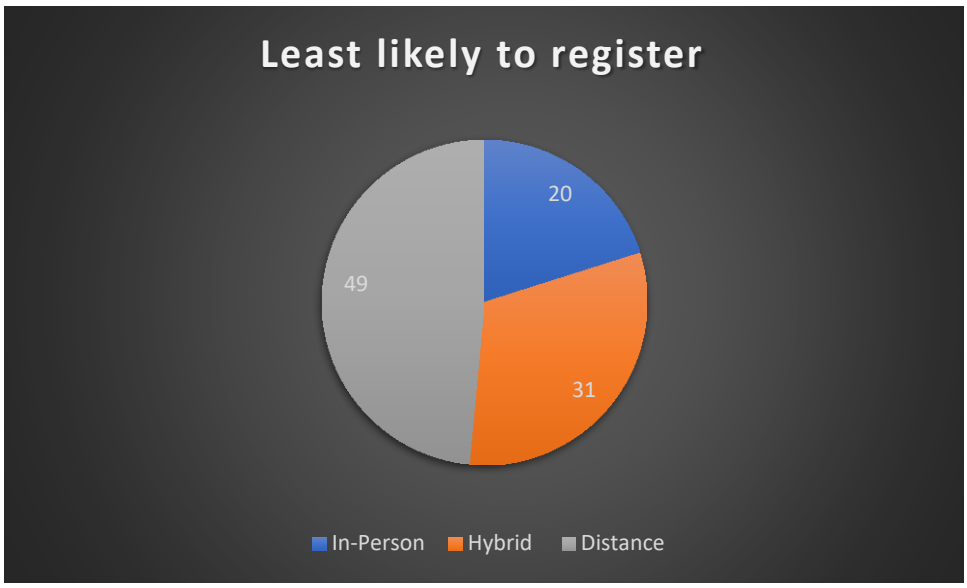


Figure 21: Least Likely to Register in Future

About 49% of students in the data pool would least likely register for a distance course in the future. Most of the students prefer to register for the in-person and hyflex classes.

In-Person	**Hyflex**
Difficult to schedule multiple in-person courses	Less enthusiasm of teachers
Too stressful to manage with part-time jobs	Need more structure
Not best for introverts	More freedom but can't

	achieve all learning goals
Not ideal in severe situations	Need more experience
Consumes lot of time traveling	Less interactions
No flexibility	Difficult to adjust to
Little freedom	Get distracted due to other students attending via online
	Too messy

Table 18: Demotivators of Learning Modes (Hyflex vs. In-Person)

Distance	**Hyflex**
No motivation	Less enthusiasm of teachers
Lack of structure	Need more structure
Difficult to learn effectively	More freedom but can't achieve all learning goals
Makes me lazy	Need more experience
Prefer interactions	Less interactions
Subject to internet restrictions	Difficult to adjust to
Lack of self-control	Get distracted due to other students attending via online

Difficult understanding concepts	Too messy
Not efficient	
Difficult to engage or clear doubts with professor	
No sort of interactions	

Table 19: Demotivators of Learning Modes (Distance vs. Hyflex)

The only reason why some students don't prefer in-person classes is because of their personal preferences like being an introvert etc. And other reasons include managing work and studies at the same time.

A few interesting factors can be noticed with respect to the hyflex learning mode. Some students are still not experienced in hyflex learning which leaves them confused about the new learning mode. Since not all of them are experienced with it, students find it hard to adjust and adapt soon. Students may need time to understand the mode and get used to it. Some students find it hard to concentrate when two different student groups are present in the same class. And some students believe that the hyflex course design must need more structure to make it successful learning in the future.

One of the main reasons why students don't prefer distance learning mode is because of the lack of interactions and motivation. When there is no teacher component in a class, students tend to feel less motivated to attend classes or learn on time.

Students also feel it is very difficult to understand the concepts without a teacher's help. And most importantly, students feel it's challenging to get hold of the professor in a distance course to seek help.

Some students feel that the lack of motivation in distance learning makes them feel lazy in completing tasks assigned to them. Some students with no self-control find it challenging to complete distance courses. Most students prefer some interaction in their day-to-day learning to make it more effective. And the main reason why some students prefer distance is because of the flexibility it offers.

3.8 Discussions

The research aimed to discover the impact of the learning modes and experiential learning on the four core principles, thereby affecting student success. The study also aimed to understand if and how students perceive success in different learning modes. The survey conducted gave many insights that are crucial for future framework development. Below are the key takeaways from the survey concerning the research questions:

3.8.1 Do students perceive a higher level of satisfaction and self-efficacy in hyflex courses compared to distance and in-person learning modes?

Study 2 compared hyflex learning settings with in-person and distance learning modes. It was evident from the results that student success (satisfaction and self-efficacy) is impacted by the learning modes and the four core principles. Equivalency, accessibility, and reusability impact the students' perceived success in hyflex courses. Learner choice affects the student's self-efficacy as it depends on their personal choices.

Almost 45% of students in the data population are satisfied with the hyflex course and will choose to enroll in a hyflex course in the future. Implementing a hyflex course can be challenging as it has to address many concerns in the student and teachers group. The students are not used to the new learning mode and need time to adapt to the hyflex settings. At the same

time, teachers also need space and support in developing a structured hyflex course that addresses all the student's concerns.

Still, some students feel that hyflex courses are not efficient, and they feel distracted by the complex settings. A few students mentioned in the survey that they are still unsure what and how hyflex courses work.

The results indicate that the four core principles impact the student's success. The students feel satisfied and successful when introduced to a learning setting following the four principles. Following the four principles can help the teaching community build a better model of the hyflex course by addressing the difficulties faced by students.

The main reason why students preferred in-person is because of the interaction and the learning experience offered. In a hyflex setting, the four principles form a strong baseline to develop a learning mode that offers flexibility (as in the distance), engagement/interactions, and learning experience (as in in-person).

The learner choice provides students the flexibility they need by allowing them to make wise decisions and choose where they learn. Students can learn both in-classroom and online without any interruptions. Equivalency, accessibility, and reusability principles ensure that students perceive equal learning experiences regardless of their choice.

Therefore, a hyflex without the four principles would be the same as a distance or an in-person course. Hyflex will be more successful in the future only if students and teachers clearly understand the implementation of hyflex setting and use the four principles in developing a strong course design.

3.8.2 Does experiential learning play a positive role in determining student success?

Experiential learning had a positive role in determining student success. The results indicate that implementing experiential learning in a day-to-day class helps achieve a higher level of learner choice, equivalency, accessibility, and reusability, thereby affecting the students' success.

Experiential learning is a practical concept that has been implemented mostly in traditional in-person classes. Most distance courses lack this factor which is also one of the reasons why students prefer in-person classes. Some students stated in the survey that, providing a better learning experience is one of the reasons why they choose a preferred learning mode.

Implementing experiential learning in a hyflex setting can be challenging. But if the four principles are followed, it can be achieved. While designing an experiential learning component, teachers must ensure that students have equivalent learning opportunities and access to participation and resources. This directly affects perceived equivalency, accessibility, and reusability in hyflex courses. Experiential learning also plays a critical role in determining the learner choice of students. Students will decide how they would like to learn based on the experience component which is offered in the classes.

The results also support the above statements. Experiential learning has a significant, positive, and high impact on equivalency and accessibility. Implementing experiential learning components will help design a structure that will ensure an equal learning environment for students. Teachers try to provide the same practical experience to all the students present and try to ensure that everyone participates equally. For example, implementing a lab or group discussion/case studies for grades in a course will ensure that all students participate equally in the class, indirectly impacting their learning success.

Overall, experiential learning has a positive impact on the four core principles thereby affecting student success. Regardless of the learning mode, implementing experiential learning can help students have a better learning experience and gain more practical knowledge, which is also preferred by the learning community.

3.9 Conclusion

The study tried to analyze student satisfaction and ASE in hyflex, distance and in-person learning modes while implementing the hyflex core principles. The study also tried to analyze if experiential learning impacted student success.

The quantitative results indicate that most of the hypotheses were supported. Experiential learning had a significant, positive, and high impact on the hyflex core principles, thereby affecting the student's success in a learning mode.

The results also indicate that students in in-person and hyflex courses perceive an almost equal level of satisfaction. The results also indicate that students are more satisfied with the hybrid compared to distance courses. The results prove that the hyflex mode is a successful learning mode and can be used to its best in the future to develop a more successful alternative.

The study also revealed the fact that the hyflex mode can be treated as two individual modes: hyflex online & hyflex in-classroom. When comparing distance with hyflex, the learning mode doesn't play a mediating effect on student satisfaction and ASE, indicating that there are still some misconceptions about hyflex and distance learning modes. This study has practically contributed by addressing the concerns of the student community and presenting their perspective on the hybrid course's success.

Research in the hyflex field is still ongoing as it isn't established completely. Still, the teaching and student communities are unsure of the hyflex structure and implementation. The study provides a theoretical understanding of the hyflex structure and its implementation following the hyflex core principles. The study also makes several contributions to the theory and practice.

The study contributes theoretically by proving that experiential learning plays a crucial role in determining student success in the learning modes. The study provides results indicating and supporting the hypotheses. The study also adds to the theory that the hyflex principles help develop a strong course structure that enables to better student learning experiences.

This study has practically contributed by addressing the concerns of the student community and presenting their perspective on the hyflex course's success. The most commonly regarded factor is that hyflex provides a better alternative, but students are still unsure of its structure. This provides a framework for future research to build on models on how to implement and learn in a hyflex setting.

3.10 Limitation & Future Work

Although this study contributes novel exploration to existing literature and offers additional insights into the topics of experiential learning and student success in different learning modes, several limitations and future research directions must be noted.

In anticipation of the potential concerns of common method bias, I incorporated numerous approaches to decrease these threats as advised by Podsakoff, MacKenzie, Lee, and Podsakoff (2003). Participants were given methodologically distinct measurement tools (e.g., open-ended questions, Likert scales, scales); unique Likert scales throughout (e.g., 1-5, 1-7) to avoid commonalities in scale end-points; participant anonymity was protected to reduce evaluation

anxiety; and scale items were improved to ensure that ambiguous or unfamiliar terms were defined and phrasing was simple and specific.

Nevertheless, a longitudinal approach would offer greater insight and nuance into the participants' opinions. Future studies should incorporate multi-source, longitudinal data collecting if possible.

Data acquired outside of an anonymous survey context is sensitive to a lack of environmental control and increased unwanted participant behavior (e.g., participants surveying while engaging in another activity) (Chandler, Mueller, & Paolacci, 2014). However, I double-checked components of data quality (for example, duplicate replies, open-ended questions, advanced time measures, length of survey responses, and straight-lining effect) to reduce these risks as much as feasible.

Another limitation of the study is that the participants were randomly assigned to the group. Even though more than half the population was assigned to the group they had prior experience with, the randomization could affect the results. Not a lot of students have experienced the hyflex courses as defined in this study.

Future researchers should analyze the student's perspective of hyflex from a data pool consisting of students experienced in hyflex classes. Additionally, future research could explore why students perceive distance and hyflex courses to be similar.

Future research could also build on this result by analyzing if and how to implement hyflex courses and how students can effectively participate in them. Additionally, future research on teaching designs can help the universities and teaching community build a successful student learning model.

Chapter 5: Thesis Conclusion

The thesis aimed to understand hyflex learning from both the teachers' and students' perspectives. The thesis also tried to unveil the complications involved in hyflex learning and how to make it a successful learning mode in the future.

Study 1 focused on analyzing the challenges faced by the teaching community in hyflex classes. The results indicate that even when hyflex offers many benefits, teachers are unsure of how to implement it successfully. The most important challenge is managing the two student groups simultaneously in a class. Study 2 compared student satisfaction in different learning modes (Distance vs. Hyflex vs. In-Person). It revealed the factors and student thoughts on their preferences and unveiled the challenges faced by the learning community. This is a key contribution that allows future researchers to build a better course design by addressing the concerns of both the student groups in a hyflex class.

The thesis provides a strong contribution theoretically and practically to literature. We conclude that the hyflex course has huge benefits that can be extracted to its best only if both the teaching community and learning communities' challenges are addressed. Also, we believe that we must consider the students in a hyflex class as two student groups and design courses that ensure both the student groups receive equal learning success. The thesis also provides a key about the impact of experiential learning on student success which can be used to build successful and more efficient learning in the future.

Chapter 6: References

1. Gagnon, K., Young, B., Bachman, T., Longbottom, T., Severin, R., & Walker, M. J. (2020). Doctor of physical therapy education in a hyflex learning environment: reimagining the possibilities and navigating a "new normal". *Physical][\Therapy*, *100*(8), 1268-1277.
2. Gaimaro, A., & Lomellini, A. (2021). Designing innovative faculty development initiatives through the lens of the adult learner. In *Research Anthology on Adult Education and the Development of Lifelong Learners* (pp. 331-349). IGI Global.
3. Banas, E. J., & Emory, W. F. (1998). History and issues of distance learning. *Public Administration Quarterly*, 365-383.
4. Al-Arimi, A. M. A. K. (2014). Distance learning. *Procedia-Social and Behavioral Sciences*, *152*, 82-88.
5. Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same?. *The Internet and higher education*, *14*(2), 129-135.
6. Berg, G. A., & Simonson, M. (2002). Why distance learning. *Higher education administrative practices*, 208.
7. Valentine, D. (2002). Distance learning: Promises, problems, and possibilities. *Online journal of distance learning administration*, *5*(3), 1-11.
8. Harner, M., et al. (2000). Measuring the effect of distance education on the learning experience: Teaching accounting via Picturetel. *International Journal of Instructional Media, 27* (1), 37-50.

9. Ajayi, I. H., Iahad, N. A., Ahmad, N., & Yusof, A. F. (2017, July). A conceptual model for flipped classroom: influence on continuance use intention. In 2017 International Conference on Research and Innovation in Information Systems (ICRIIS) (pp. 1-6). IEEE.
10. Allo, M. D. G. (2020). Is the online learning good in the midst of Covid-19 Pandemic? The case of EFL learners. Jurnal Sinestesia, 10(1), 1-10.
11. Arbaugh, J. B. (2007). An empirical verification of the community of inquiry framework. Journal of Asynchronous Learning Networks, 11(1), 73-85.
12. Bahasoan, A. N., Ayuandiani, W., Mukhram, M., & Rahmat, A. (2020). Effectiveness of online learning in pandemic COVID-19. International journal of science, technology & management, 1(2), 100-106.
13. Boelens, R., Voet, M., & De Wever, B. (2018). The design of blended learning in response to student diversity in higher education: Instructors' views and use of differentiated instruction in blended learning. Computers & Education, 120, 197-212
14. Chen, C. C., & Jones, K. T. (2007). Blended learning vs. traditional classroom settings: Assessing effectiveness and student perceptions in an MBA accounting course. Journal of educators online, 4(1), n1.
15. De Beaufort, L. (2016). Developing learner autonomy: Factors affecting students' satisfaction an independent learning module.
16. Elliott, K. M. (2002). Key determinants of student satisfaction. Journal of College Student Retention: Research, Theory & Practice, 4(3), 271-279.

17. Furió, D., Juan, M. C., Seguí, I., & Vivó, R. (2015). Mobile learning vs. traditional classroom lessons: a comparative study. Journal of Computer Assisted Learning, 31(3), 189-201.
18. Gray, J. A., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. International Journal of Educational Leadership Preparation, 11(1), n1.
19. Gulbahar, Y., & Madran, R. O. (2009). Communication and Collaboration, Satisfaction, Equity, and Autonomy in Blended Learning Environments: A Case from Turkey. International review of research in open and distance learning, 10(2), n2.
20. Günes, S., & Alagözlü, N. (2020). The Interrelationship between Learner Autonomy, Motivation and Academic Success in Asynchronous Distance Learning and Blended Learning Environments. Novitas-ROYAL (Research on Youth and Language), 14(2), 1-15.
21. Hannay, M., & Newvine, T. (2006). Perceptions of distance learning: A comparison of online and traditional learning. Journal of online learning and teaching, 2(1), 1-11.
22. Hashemian, M., & Soureshjani, K. H. (2011). The interrelationship of autonomy, motivation, and academic performance of Persian L2 learners in distance education contexts. Theory and Practice in Language Studies, 1(4), 319-326.
23. Joo, Y. J., So, H. J., & Kim, N. H. (2018). Examination of relationships among students' self-determination, technology acceptance, satisfaction, and continuance intention to use K-MOOCs. Computers & Education, 122, 260-272.

24. Khotimah, K. (2020, December). Exploring Online Learning Experiences During the Covid-19 Pandemic. In International Joint Conference on Arts and Humanities (IJCAH 2020) (pp. 68-72). Atlantis Press.
25. Lee, J., & Choi, H. (2019). Rethinking the flipped learning pre-class: Its influence on the success of flipped learning and related factors. British Journal of Educational Technology, 50(2), 934-945.
26. Li, Z., Tsai, M. H., Tao, J., & Lorentz, C. (2014). Switching to blended learning: The impact on students' academic performance. Journal of Nursing Education and Practice, 4(3), 245.
27. Lin, O. (2008). Student views of hyflex learning: A one-year exploratory study. Journal of Computing in Teacher Education, 25(2), 57-66.
28. Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. Pakistan journal of medical sciences, 36(COVID19-S4), S27.
29. Muljana, P. S., & Luo, T. (2019). Factors contributing to student retention in online learning and recommended strategies for improvement: A systematic literature review. Journal of Information Technology Education: Research, 18.
30. Nazarenko, A. L. (2015). Blended learning vs. traditional learning: What works?(a case study research). Procedia-Social and Behavioral Sciences, 200, 77-82.
31. Ni, A. Y. (2013). Comparing the effectiveness of classroom and online learning: Teaching research methods. Journal of Public Affairs Education, 19(2), 199-215.

32. Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. Journal of Asynchronous learning networks, 6(1), 21-40.

33. Raes, A., Vanneste, P., Pieters, M., Windey, I., Van Den Noortgate, W., & Depaepe, F. (2020). Learning and instruction in the hyflex virtual classroom: An investigation of students' engagement and the effect of quizzes. Computers & Education, 143, 103682.

34. Ross, B., & Gage, K. (2006). Global perspectives on blending learning. The Handbook of Blended Learning; Bonk, JC, Graham, RC, Eds, 155-168.

35. Styron Jr, R. (2010). Student satisfaction and persistence: Factors vital to student retention. Research in Higher Education Journal, 6, 1.

36. Wargadinata, W., Maimunah, I., Eva, D., & Rofiq, Z. (2020). Student's responses on learning in the early COVID-19 pandemic. Tadris: Journal of Education and Teacher Training, 5(1), 141-153.

37. Zhang, D., Zhao, J. L., Zhou, L., & Nunamaker Jr, J. F. (2004). Can e-learning replace classroom learning?. Communications of the ACM, 47(5), 75-79.

38. Alavi, M., Yoo, Y., & Vogel, D. R. (1997). Using information technology to add value to management education. *Academy of management Journal*, *40*(6), 1310-1333.

39. Geertshuis, S., Jung, M., & Cooper-Thomas, H. (2014). Preparing Students for Higher Education: The Role of Proactivity. *International Journal of Teaching and Learning in Higher Education*, *26*(2), 157-169.

40. Arbaugh, J. B. (2000). Virtual classroom characteristics and student satisfaction with internet-based MBA courses. *Journal of management education*, *24*(1), 32-54.

41. Miller, A. N., Sellnow, D. D., & Strawser, M. G. (2021). Pandemic pedagogy challenges and opportunities: Instruction communication in remote, HyFlex, and BlendFlex courses. *Communication Education*, *70*(2), 202-204.

42. Beatty, B. J. (2019). Hyflex-flexible course design. *Implementing studentdirected hyflex classes. Provo, Utah: EdTech Books*.

43. Kyei-Blankson, L., Godwyll, F., Nur-Awaleh, M., & Keengwe, J. (2011, March). The New Blend: When students are given the option to choose. In *Society for information technology & teacher education international conference* (pp. 433-436). Association for the Advancement of Computing in Education (AACE).

44. Brown, K., Davis, M., Elrod, C., Hill, E., & Jordan, D. D. (2020). Coaching initiative for beginning teachers (BT): lessons learned from one district's BT support program. *Journal of Organizational & Educational Leadership*, *6*(2), 2.

45. Cesinger, T. (2017). *The Phenomenon of the Hyflex Classroom* (Doctoral dissertation, Concordia University (Oregon)).

46. Qi, Y. (2008). Analysis on application of hyflex teaching mode in higher education. *Hyflex learning: A new frontier*, 151-160.

47. McNeil, A. M. (2016). *Supporting principal professional practice through evaluative feedback: One district's implementation of the Massachusetts Model System for*

Educator Evaluation to support the growth and development of principals (Doctoral dissertation, Boston College).

48. Rubio, F., & Thoms, J. (2014). Hyflex language teaching and learning: Exploring theoretical, pedagogical and curricular issues.

49. Leslie, C. A. (2014). Hyflex by Choice: Increasing Engagement in a High Enrollment Course. *Hyflex Pedagogy*.

50. Amoroso, C. (2014). Hyflex by Choice. Increasing Engagement in a High Enrollment Course. Hyflex Pedagogy, 20 May. https://hyflexpedagogy.org/hyflex-choice-increasing-engagement-high-enrollment-course/. Accessed 14 November 2021.

51. Beatty, B. J. (2007). Hyflex classes with flexible participation options – If you build it , how will they come? Paper presented at the 2007 Association for Educational Communications and Technology Annual Convention (October). Anaheim, CA: Association for Educational Communications and Technology. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.457.495&rep=rep1&type=pdf. Accessed 14 November 2021.

52. Beatty, B. J. (2019). *Hyflex-Flexible Course Design: Implementing student-directed hyflex classes*. EdTech Books.

53. Aroles, J., Mitev, N., & de Vaujany, F. X. (2019). Mapping themes in the study of new work practices. *New Technology, Work and Employment*, *34*(3), 285-299.

54. Pressley, T. (2021). Factors contributing to teacher burnout during COVID-19. *Educational Researcher*, *50*(5), 325-327.

55. Armellini, A., Teixeira Antunes, V., & Howe, R. (2021). Student perspectives on learning experiences in a higher education active blended learning context. *TechTrends*, *65*(4), 433-443.

56. Ahlgren, R., Häkkinen, S., & Eskola, A. (2020). Success factors for hyflex teaching. In *INTED2020 Proceedings: 14th International Technology, Education and Development Conference March 2nd-4th, 2020, Valencia, Spain*. International Association of Technology Education and Development.

57. Bülow, M. W. (2022). Designing synchronous hyflex learning spaces: Challenges and opportunities. *Hyflex Learning Spaces*, 135-163.

58. Overton, S. (2022, October). Engagement challenges in a hyflex classroom: Reflections of a higher education tutor. In *European Conference on e-Learning* (Vol. 21, No. 1, pp. 331-337).

59. Shamir-Inbal, T., & Blau, I. (2021). Facilitating emergency remote K-12 teaching in computing-enhanced virtual learning environments during COVID-19 pandemic-blessing or curse?. *Journal of Educational Computing Research*, *59*(7), 1243-1271.

60. Smith, J., & Schreder, K. (2020). Are they paying attention, or are they shoe-shopping? Evidence from online learning. *International Journal of Multidisciplinary Perspectives in Higher Education*, *5*(1), 200-209.

61. Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of distance education*, *15*(1), 7-23.

62. Anderson, T., Liam, R., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context.

63. Lala, G. (2014). The emergence and development of the technology acceptance model (TAM). *Marketing from Information to Decision*, (7), 149-160.

64. Banas, E. J., & Emory, W. F. (1998). History and issues of distance learning. *Public Administration Quarterly*, 365-383.

65. McCarthy, M. (2010). Experiential learning theory: From theory to practice. *Journal of Business & Economics Research (JBER)*, *8*(5).

66. Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2014). Experiential learning theory: Previous research and new directions. In *Perspectives on thinking, learning, and cognitive styles* (pp. 227-248). Routledge.

67. Van den Brande, L. (1993). *Flexible and distance learning*. John Wiley & Sons, Inc..

68. Hilliam, R., & Williams, G. (2019). Academic and pastoral teams working in partnership to support distance learning students according to curriculum area. *Higher Education Pedagogies*, *4*(1), 32-40.

69. Bakach, B. (2021). *Investigating the HyFlex Modality: Students' Satisfaction and Impact on Learning* (Doctoral dissertation).

70. Hannay, M., & Newvine, T. (2006). Perceptions of distance learning: A comparison of online and traditional learning. *Journal of online learning and teaching*, *2*(1), 1-11.

71. Bandura, A. (2012). "Social cognitive theory," in *Handbook of Theories of Social Psychology*, Vol. 1, eds P. M. Van Lange, A. W. Kruglanski, and E. Higgins (Thousand Oaks, CA: Sage Publications Ltd), 349–373.

72. Weerasinghe, I. S., & Fernando, R. L. (2017). Students' satisfaction in higher education. *American journal of educational research*, *5*(5), 533-539.

73. Chen, C. C., & Jones, K. T. (2007). Blended learning vs. traditional classroom settings: Assessing effectiveness and student perceptions in an MBA accounting course. *Journal of educators online*, *4*(1), n1.

74. Halasa, S., Abusalim, N., Rayyan, M., Constantino, R. E., Nassar, O., Amre, H., ... & Qadri, I. (2020). Comparing student achievement in traditional learning with a combination of blended and flipped learning. *Nursing Open*, *7*(4), 1129-1138.

75. Gray, J. A., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation*, *11*(1), n1.

76. Bayrak, F., & ALTUN, A. (2020). Development of online course satisfaction scale. *Turkish Online Journal of Distance Education*, *21*(4), 110-123.

77. Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual review of psychology*, *53*(1), 109-132.

78. Ullman, J. B., & Bentler, P. M. (2012). Structural equation modeling. *Handbook of Psychology, Second Edition*, *2*.

79. Mustafa, M. B., Nordin, M. B., & Razzaq, A. B. A. (2020). Structural equation modelling using AMOS: Confirmatory factor analysis for taskload of special education integration program teachers. *Univers. J. Educ. Res*, *8*(1), 127-133.

80. Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of educational research*, *99*(6), 323-338.

81. Schreiber, J., Nora, A., Stage, F., Barlow, L., & King, J. (2006). Confirmatory factor analyses and structural equations modeling: an introduction and review. *Journal of Educational Research*, *99*(6).

82. Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and psychological measurement*, *73*(6), 913-934.

83. Muenjohn, N., & Armstrong, A. (2008). Evaluating the structural validity of the multifactor leadership questionnaire (MLQ), capturing the leadership factors of transformational-transactional leadership. *Contemporary management research*, *4*(1).

84. Kline, R. B. (1998). Structural equation modeling. *New York: Guilford*.

85. Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics.

86. Huang, J., & Phongsatha, T. (2022). Factors influencing the acceptance of blended learning by early childhood undergraduate students. *Scholar: Human Sciences*, *14*(2), 678-678.

87. Carlback, J., & Wong, A. (2018). A study on factors influencing acceptance of using mobile electronic identification applications in Sweden. *Bachelor's Degree Project Thesis, Jönköping University Jönköping International Business School Business Administration Department International Management Programme, Jönköping*.

88. Shadfar, S., & Malekmohammadi, I. (2013). Application of Structural Equation Modeling (SEM) in restructuring state intervention strategies toward paddy production development. *International Journal of Academic Research in Business and Social Sciences*, *3*(12), 576.

89. Cudeck, R. (1993). of Assessing Model Fit. *Testing structural equation models*, *154*, 136.

90. Chinda, T., Techapreechawong, S., & Teeraprasert, S. (2012, September). An investigation of relationships between employees' safety and productivity. In *Proceedings of the 3rd International Conference on Engineering, Project and Production Management (EPPM2012)* (pp. 10-11).

91. Akkuş, A. (2019). Developing a scale to measure students' attitudes toward science. *International Journal of Assessment Tools in Education*, *6*(4), 706-720.

92. Huang, J., & Phongsatha, T. (2022). Factors influencing the acceptance of blended learning by early childhood undergraduate students. *Scholar: Human Sciences*, *14*(2), 678-678.

93. Kaya, Ç., & Altınkurt, Y. (2018). Role of psychological and structural empowerment in the relationship between teachers' psychological capital and their levels of burnout. *Egitim ve Bilim*, *43*(193).

94. Vassallo, M., & Saba, A. (2015). Does Money for Grocery Expenditure Sway Italian Consumers' Motivational Values in Predicting Attitude towards Eco-Sustainable Food Products?. *Contemporary Management Research*, *11*(1).

95. Irvine, V. (2009, June). The emergence of choice in "multi-access" learning environments: Transferring locus of control of course access to the learner. In *EdMedia+ Innovate Learning* (pp. 746-752). Association for the Advancement of Computing in Education (AACE).

96. Irvine, V., Code, J., & Richards, L. (2013). Realigning higher education for the 21st century learner through multi-access learning. *Journal of Online Learning and Teaching*, *9*(2), 172.

97. Beatty, B., Littlefield, C. M., Miller, J. B., Rhoads, D., Shurance, M., Shaffer, D., & Beers, M. (2016). Hyflex flexible course and program design: Models for student-directed hyflexs. *Blog post] Retrieved from http://www. drbrianbeatty. com/wordpress*.

98. Traxler, J. (2018). Distance learning—Predictions and possibilities. *Education sciences*, *8*(1), 35.

99. Hannay, M., & Newvine, T. (2006). Perceptions of distance learning: A comparison of online and traditional learning. *Journal of online learning and teaching*, *2*(1), 1-11.

100. Wheatley, B., & Greer, E. (1995). Interactive television: A new delivery system for a traditional reading course. *Journal of Technology and Teacher Education*, *3*(4), 343-350.

101. Meyer, K. A. (2002). *Quality in Distance Education: Focus on On-Line Learning. ASHE-ERIC Higher Education Report. Jossey-Bass Higher and Adult Education Series*. Jossey-Bass, 989 Market Street, San Francisco, CA 94103-1741.

102. Ali, A., & Ahmad, I. (2011). Key factors for determining student satisfaction in distance learning courses: A study of Allama Iqbal Open University. Contemporary Educational Technology, 2(2), 118-134.

103. Bothma, F., & Monteith, J. D. (2004). Self-regulated learning as a prerequisite for successful distance learning. South African Journal of Education, 24(2), 141-147.

104. Bijeesh, N. A. (2017). Advantages and disadvantages of distance learning. India Education.

105. Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education*, *75*, 185-195.

106. Frey, B., Faul, A. C., & Hirsch, A. (2018). Students' perception of hybrid courses: An exploration of learning outcomes, motivation, and satisfaction. Journal of Computer Assisted Learning, 34(3), 256-266.

107. Abdelmalak, M. M. M., & Parra, J. L. (2016). Expanding learning opportunities for graduate students with HyFlex course design. International Journal of Online Pedagogy and Course Design (IJOPCD), 6(4), 19-37.

108. Barker, J. (2015). Benefits of hybrid classes in community colleges.

109. Bărbuceanu, C. D. (2022). HyFlex-Rethinking Courses in On-line Teaching. Revista de Științe Politice. Revue des Sciences Politiques, (73), 241-247.

110. Schatzberg, W. E. (2021). A First Semester General Chemistry Flipped Remote Classroom: Advantages and Disadvantages. In Advances in Online Chemistry Education (pp. 35-44). American Chemical Society.

111. Guidry, K. (2022). Hyflex Courses: A" Flex" or a Flop?. Journal of Instructional Pedagogies, 27.

112. Lieberman, M. (2018). “Introducing a new(-ish) learning mode: blendflex/hyflex.” Inside Higher Ed. https://www.insidehighered.com/digitallearning/article/2018/01/24/blendflex-lets-students-toggle-between-online-or-face-face

113. Kohnke, L., & Moorhouse, B. L. (2021). Adopting HyFlex in higher education in response to COVID-19: students’ perspectives. Open Learning: The Journal of Open, Distance and e-Learning, 36(3), 231-244.

114.

115. De Beaufort, L. (2016). Developing learner autonomy: Factors affecting students’ satisfaction an independent learning module.