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Navigating the HyFlex Horizon: Uncovering Successes and Hurdles in HyFlex Undergraduate Education

Naviguer dans l'horizon comodal : découvrir les réussites et les obstacles de l'enseignement comodal au premier cycle

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Abstract

Since the COVID-19 pandemic, the demand for flexible, online learning models has increased in postsecondary education. The HyFlex approach, where students can attend class online or in-person, has emerged as one popular option. However, there remains limited research on implementing HyFlex in non-lecture undergraduate learning environments. This study investigated the affordances and challenges of HyFlex in non-lecture settings through the lens of the Community of Inquiry framework. Using a participatory action research design, data were collected from instructor-researcher field notes, video debriefs, and student interviews. A thematic analysis revealed that flexibility is the main affordance of the HyFlex model. Significant challenges emerged with attaining mode neutrality and managing technological issues related to audio and video quality. Practical implications include providing institutional support in the form of enhanced technical infrastructure and training for instructors. Limitations to the study include a small sample size, demographic homogeneity, self-report data, and a limited focus on learning outcomes. Future research approaches are offered to address challenges in HyFlex design.

Keywords: higher education, hybrid, HyFlex, online learning, technology

Résumé

Depuis la pandémie de la COVID-19, la demande de formules d'apprentissage flexibles et en ligne a augmenté dans l'enseignement postsecondaire. L'approche comodale, où les étudiantes et étudiants peuvent assister aux cours en ligne ou en personne, est devenue une option populaire. Cependant, les recherches sur la mise en œuvre de cours comodaux non magistraux dans des environnements d'apprentissage de premier cycle restent limitées. Cette étude a examiné les avantages et les défis du comodal dans des contextes autres que les cours magistraux à travers le cadre de la communauté d'enquête. En utilisant une méthodologie de recherche-action participative, les données ont été recueillies à partir de notes de terrain de l'enseignant-chercheur, de comptes rendus vidéo et d'entretiens avec les étudiantes et étudiants. Une analyse thématique a révélé que la flexibilité est le principal avantage de la formule comodale. Des défis considérables ont émergé, notamment la neutralité des modalités et la gestion des problèmes techniques liés à la qualité audio et vidéo. Les implications pratiques incluent le soutien institutionnel sous forme d'infrastructures techniques améliorées et de formation pour les enseignantes et enseignants. Les limites de l'étude comprennent la petite taille de l'échantillon, l'homogénéité démographique, les données autodéclarées et une attention limitée portée aux résultats d'apprentissage. Des approches de recherche futures sont proposées pour relever les défis liés à la conception des formules comodales.

Mots-clés : enseignement supérieur, hybride, comodal, apprentissage en ligne, technologie

Introduction

In March 2020, education systems worldwide shifted to online learning, adopting what is now known as "pandemic pedagogy" (Barbour et al., 2020, p. 17). During this crisis, educators prioritized moving classes online over focusing on informed design and equitable access. Barbour et al. foresaw the post-pandemic "new normal" (2020, p. 12), suggesting that online learning adaptation would surpass pre-pandemic levels, requiring a more robust and flexible online infrastructure to support students.

Demand for online learning has increased markedly in postsecondary education (Coffey, 2023), with students favouring flexible learning options (Kohnke & Moorhouse, 2021). Higher education has moved past emergency remote teaching, offering more effective online practices and increased learning flexibility. The HyFlex model has gained popularity because it offers flexibility (Lightner & Lightner-Laws, 2024; Zitter, 2021), allowing students to choose how they participate in class—in-person, synchronously online, or asynchronously (Chen & Lai, 2024; Mahande et al., 2024). While HyFlex is relatively new to higher education (Beatty, 2019), it aligns with the global need for resilient, adaptable education systems (Homer-Dixon & Rockström, 2022; OECD, 2018).

Key benefits of a HyFlex model are its flexibility related to diverse needs and student control over their learning environment (Binnewies & Wang, 2019; Howell, 2022). Key challenges include maintaining motivation and self-regulation (Badiozaman et al., 2024; Howell, 2022), ensuring students in-person and online receive equitable learning experiences (O'Ceallaigh et al., 2023), managing

technical challenges (Gedera, 2023), and implementing effective pedagogical strategies (Howell et al., 2023).

Five gaps in HyFlex research include exploring pedagogical strategies (Howell et al., 2023), addressing technological challenges (Howell, 2022), understanding social dimensions (Shek et al., 2022), the absence of ongoing assessment (Magana et al., 2022), and examining the type and quality of support. Most HyFlex classes are lecture-based, involving passive delivery of information in-person or online (O'Ceallaigh et al., 2023). Limited research has been conducted on how HyFlex works in non-lecture-based classes with active, collaborative learning strategies. Furthermore, researchers have not thoroughly analyzed the technological challenges in HyFlex classrooms or how to address them (Howell, 2022). The social dimensions and developing community in HyFlex environments also require further exploration (Shek et al., 2022). Moreover, most HyFlex studies implement end-of-term surveys (Magana et al., 2022), and ongoing assessment of the HyFlex model throughout the semester might provide a deeper understanding of the process. Finally, while researchers recognize the value of support in HyFlex learning environments (Beatty, 2019; Romero-Hall & Ripine, 2021), limited attention has been devoted to understanding the required type and quality of support.

To address these research gaps, we designed and evaluated HyFlex courses that maximized student interaction and minimized passive lectures. Participatory action research (PAR) and design-based research (DBR) approaches were employed to understand the affordances and constraints of HyFlex learning. In addition, the Community of Inquiry (CoI) framework (Garrison et al., 1999) was used to help understand the social dynamics of HyFlex classrooms. Data were collected in four courses over two semesters to help understand the longer-term impact of HyFlex and how perspectives might change over time. Finally, a systematic support network in the design of the HyFlex classrooms was integrated. This study, therefore, analyzes the affordances and challenges encountered in non-lecture-based and constructivist HyFlex classrooms, focusing on pedagogical, technical, social, and support issues over two semesters.

Literature Review

Flexibility

Student demographics in higher education are complex, where work and family responsibilities pose a challenge to attending class in-person (Bower et al., 2015; Cumming et al., 2024b). The HyFlex model offers a flexible alternative to traditional, in-person instruction (Chen & Lai, 2024; Cheng, 2023; Cumming et al., 2024b). Students can choose in-person or online formats based on their various restrictions (Cheng, 2023; Cumming et al., 2024b; Kohnke & Moorhouse, 2021; Wong et al., 2023). Further, Cumming et al. (2024a) reported that higher education students could better balance studying, work, and family with the HyFlex format. Heilporn and Lakhal (2021) added that recordings of flexible synchronous sessions helped students keep pace with their classes when family or work commitments were particularly demanding. Additionally, several studies (Beatty, 2019; Binnewies & Wang, 2019; Heilporn & Lakhal, 2021; Howell, 2022) indicated that higher education students appreciated being able

to have agency over their schedules. Chen and Lai (2024) noted that the HyFlex model allows students to choose their preferred mode of learning. Finally, some evidence has suggested that the flexibility inherent in the HyFlex approach can increase enrollment (Beatty, 2019) and attendance (Cheng, 2023). However, Howell (2022) noted that some students take advantage of the choice of mode and do not attend class.

Limited research exists on the impact of flexibility specific to non-lecture-based HyFlex classrooms designed to solicit active student participation and collaboration. In a lecture-based class, there may be minimal difference between listening to a professor in-person or online. However, in an interactive and collaborative environment with extensive discussion, students attending online may be disadvantaged.

Mode Neutrality

Mode neutrality refers to students achieving comparable learning experiences regardless of the delivery mode in a HyFlex environment (Penrod, 2022; Zydney et al., 2018). Several studies have indicated that students preferred in-person to online classroom formats (Bower et al., 2015; Cumming et al., 2024b). Kohnke and Moorhouse (2021) noted that students preferred in-person teaching because they had more opportunities for social interaction. Cheng (2023) reported that in-person students receive more attention from instructors than online students.

On the other hand, several researchers have claimed that some students have better learning experiences online. For example, Butz et al. (2016) noted that online students were significantly less bored than in-person students. Romero-Hall and Vicentini (2017) observed that online students felt more comfortable responding honestly to questions because they felt less peer pressure and were more relaxed without the non-verbal cues typical in an in-person class. Kohnke and Moorhouse (2021) added that such students perceived online as better because they had more access to relevant resources and received immediate instructor feedback.

Several large-scale literature reviews have suggested that mode neutrality can be achieved in HyFlex classrooms, at least in theory. Key suggestions have included focusing on the principle of equivalency (Beatty, 2019; Howell, 2022), intentional course design (Chen & Lai, 2024; Cumming et al., 2024b), creating and designing multimodal supports (Cheng, 2023), leveraging peer interactions and the use of discipline-specific guidelines (Chen & Lai, 2024), purposeful and thoughtful use of technological tools (Wong et al., 2023), developing strong community connections (Cumming et al., 2024b), and establishing robust supports for students and faculty (Chen & Lai, 2024; Howell, 2022).

To date, limited research has focused on the impact of specific pedagogical approaches to achieve mode neutrality (Kim et al., 2014). Most HyFlex studies have not focused on pedagogy and defaulted to the lecture-based approach in traditional higher education classrooms (Chen & Lai, 2024). While several reviews noted that developing interactive HyFlex classrooms would help develop high-quality learning experiences (Chen & Lai, 2024; Cumming et al., 2024b; Wong et al., 2023), to our knowledge, no research has been conducted on establishing mode-neutrality in non-lecture-based HyFlex classrooms.

Technical Requirements

A HyFlex learning environment is highly dependent on smoothly functioning technology, including high-quality video and audio, a reliable Internet connection, a learning management system (LMS), software to share material and engage students, and devices to connect to the HyFlex classroom (Chen & Lai, 2024; Cheng, 2023; Cumming et al., 2024b; Howell, 2022; Wong et al., 2023). Problems in hardware and software components can derail a HyFlex classroom. For example, Cumming et al. (2024b) and Cheng (2023) reported that poor-quality audio and video were common and limited online student participation. Wong et al. (2023) added that unstable networks were frequently reported as challenging.

Numerous training and support issues have been identified in HyFlex environments, including instructors' limited digital proficiency (Chen & Lai, 2024; Cumming et al., 2024), lack of administrative and technical support (Li et al., 2020; Wong et al., 2023), need for training and practice in using HyFlex equipment (Abdelmalak & Parra, 2016; Howell et al., 2023), support for online students (Romero-Hall & Ripine, 2021; Wang et al., 2018), and instructor cognitive workload to address technical and student issues during class (Bower et al., 2015; Ramsey et al., 2016). These issues can undermine mode-neutrality and negatively influence the student learning experience, particularly for online students (Chan et al., 2022; Leijon & Lundgren, 2019; Raes et al., 2020).

While technological challenges and requirements have been well documented for lecture-based HyFlex classrooms, limited research has been conducted on technical requirement challenges in non-lecture-based HyFlex courses and whether these issues dissipate over time. It is conceivable that the planning and implementation of interactive HyFlex classrooms might magnify the scope and frequency of technological issues (Beatty, 2019; Chen & Lai, 2024).

Pedagogical Strategies

Planning, designing, and implementing HyFlex learning demands a significant shift in pedagogical strategies to adeptly navigate and negotiate online and in-person environments simultaneously (Bower et al., 2015; Raes et al., 2020; Zydney et al., 2018). These strategies need to address equity and alignment among online and in-person students in at least five areas: effective communication and interaction (Howell et al., 2023; Kolli et al., 2022), community building (Cheng, 2023; Cumming et al., 2024b), managing attention and social presence (Cumming et al., 2024b; Wong et al., 2023), providing adequate scaffolding and support, particularly for online students (Chen & Lai, 2024; Wong et al., 2023), and engagement (Cheng, 2023; Wong et al., 2023). Engagement is potentially difficult when an instructor uses interactive learning strategies requiring collaboration and discussion (Chen & Lai, 2024; Cumming et al., 2024b; Howell et al., 2023).

Researchers have suggested co-teaching as a viable approach to reduce the challenges of implementing these pedagogical strategies (Bower et al., 2015; Ramsey et al., 2016). In this approach, one instructor facilitates online while the other leads in-class. Divided attention is the common barrier to community-building, effective scaffolding, discussion, and increased engagement (Cumming et al., 2024b). To date, the impact of a second person on student learning has not been studied. To our

knowledge, research on pedagogical approaches and how they evolve over time in non-lecture-based HyFlex classrooms has not been studied.

Support for Instructors and Students

Instructors new to HyFlex often face high cognitive load maintaining mode neutrality, using advanced technology, and implementing new pedagogical strategies (Chan et al., 2022; Chen & Lai, 2024; Cumming et al., 2024b; Detyna et al., 2022). This extensive workload underscores the need for institutional support, professional development, and technological resources to address extensive cognitive demands (Beatty, 2019; Lightner & Lightner-Laws, 2024; Raes et al., 2020).

Institutions need to communicate precise technological requirements and expectations for HyFlex classrooms for both students and faculty (Ørngreen et al., 2015; Zydney et al., 2018). In addition, faculty training must provide dedicated resources to support pedagogical adjustments in course design, evaluation needs, and engagement strategies (Beatty, 2019; Heilporn & Lakhal, 2021; Wong et al., 2023). Finally, teaching assistants could provide critical support in HyFlex classroom implementation (Romero-Hall & Ripine, 2021; Wang et al., 2018). The role and impact of institutional support, faculty professional development, and teaching assistants have not been critically examined in non-lecture-based HyFlex classrooms.

Theoretical Framework

Previous research concerning the theory guiding HyFlex learning is limited (Howell et al., 2023). A theoretical framework for HyFlex classes must address both in-person and online formats. The Community of Inquiry (CoI) framework, developed by Garrison et al. (1999), has been widely used for analyzing asynchronous and synchronous learning and has in-person setting applications as well (Chen, 2022; Karaoglan-Yılmaz et al., 2023). The CoI consists of three interconnected elements: social presence, cognitive presence, and teaching presence (Garrison, 2016, 2024; Garrison et al., 1999).

Social presence enables participants to present themselves authentically, fostering emotional expression, open communication, and group cohesion (Garrison, 2016, 2024; Garrison et al., 1999). Cognitive presence involves constructing meaning through communication, supported by indicators such as problem recognition, exploration, integration, and resolution. Teaching presence encompasses designing and facilitating the learning experience, including content selection, activity design, and assessment. Key aspects include managing instruction, fostering understanding, and providing direct guidance on pacing, discussion, and addressing misconceptions. The CoI framework informed the design of our HyFlex classes and was used to analyze the data and discuss the findings.

Research Questions

Two research questions were addressed:

1. What affordances does a HyFlex format offer in a non-lecture learning environment using the Community of Inquiry (CoI) framework?

2. What challenges arise when implementing a HyFlex format in a non-lecture learning environment using the Community of Inquiry (CoI) framework?

Methodology

Research Design

This study followed a PAR approach, a collaborative method involving participants in all research stages to address real-world issues (Kemmis & McTaggart, 2005; McIntyre, 2008; Reason & Bradbury, 2008). The team designed, developed, and implemented a HyFlex structure for two undergraduate courses in Educational Studies spanning two semesters. Team activities included attending each other's classes, taking notes, providing technical help, and debriefing after each session to assess the format effectiveness. Before the 2023 fall term, we discussed anticipated challenges and promising practices from the literature we wanted to incorporate.

In addition to PAR, a design-based research (DBR) approach was used. This is an iterative, naturalistic research method involving an intervention (Barab & Squire, 2004). In our case, the intervention involved implementing the HyFlex structure. The collaborative and adaptive nature of DBR suited our undergraduate HyFlex classroom setting (McKenney & Reeves, 2018), and enabled us to observe the affordances and challenges of HyFlex classes over time. This offered a deeper understanding of their impact on teaching and learning.

Design-Based Research Procedure

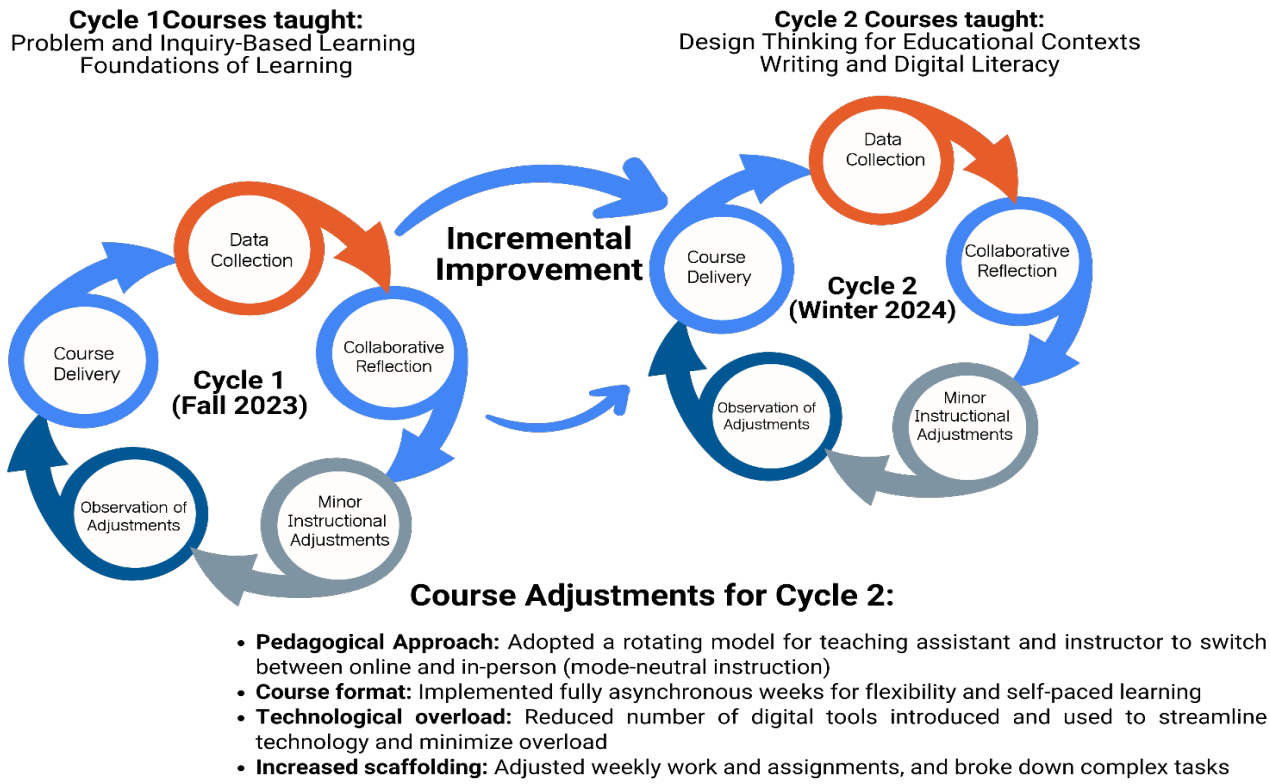
In fall 2023, the first research cycle with two required undergraduate Educational Studies courses was conducted. Enrollment ranged from 80 to 120 students. Throughout the semester, data were gathered and the team made small adjustments to the course structure, tools, and facilitation to meet classroom realities and student needs. For example, different audio input/output design options for lecture-based courses, were considered. The classroom background noise needed to be minimized and speech clarity and volume maximized to ensure that both in-person and online students could hear. We also experimented with fully separate (online and in-person) and mixed (online and in-person) student groups to encourage student engagement and community-building. We used different activities, such as chat waterfalls, inquiry-based activities, and gamification tools, to improve mode-neutrality and support collaborative knowledge-building and the three CoI presences (Garrison, 2016, 2024; Garrison et al., 1999). At the end of cycle one, the persistent issues were technological in nature, like ineffective two-way audio and insufficient video coverage of the in-person classroom, students, and instructor. These issues impacted mode-neutrality, especially for online students, which affected collaboration and community-building across modes and the development of the three CoI presences.

In winter 2024, a second cycle launched to implement changes based on challenges identified in our analysis from fall 2023. Improvements were made to move toward a mode-neutral learning environment and increase reliance on university technical support to reduce tech issues. Audio and video issues were targeted so students could easily collaborate on synchronous class activities. Also, in-person

instruction alternated between the instructor and teaching assistant (TA) each month. This change responded to online student feedback regarding reduced connection to the course instructor during synchronous sessions (teaching presence), and fully online and fully asynchronous weeks were added for broader insights connected to student engagement and cognitive presence. To support student engagement and learning (teaching and cognitive presences), technology tools were streamlined to reduce cognitive load and enhance scaffolding for weekly tasks and assignments.

Figure 1

Research Design Overview: Design-Based Research Component—Cycles 1 & 2



Course Design and Support

While most HyFlex courses use a lecture-based approach with minimal student interaction (Raes et al., 2020; Wong et al., 2023), this study employed a constructivist model. Courses were designed using a flipped classroom approach where students completed readings and self-paced activities asynchronously. Synchronous class time was used for group discussions and applied activities where students experienced teaching presence via the design and facilitation of asynchronous and synchronous learning activities. Social presence could be experienced through group activities (student groups were kept consistent) and cognitive presence experienced in both asynchronous activities, which required critical thinking, and synchronous activities, which required negotiation of ideas, critical thinking, and

knowledge application. Synchronous sessions were dedicated to collaborative activities (50%), reading reviews, and group discussion.

Previous research indicated a need for additional support in HyFlex classrooms (Beatty, 2019; Romero-Hall & Ripine, 2021). In this study, instructors received support from teaching assistants who helped facilitate and troubleshoot unexpected technical issues. Instructors also received support from our team through debriefing sessions focused on improving activities and materials. Technical support was available to manage persistent audio issues.

Participants

Participants included four students and four instructor-researchers who designed, taught, and studied the HyFlex courses. Student consent was obtained via a consent letter. Demographic data for the student (Table 1) and instructor-researcher (Table 2) participants were collected.

Table 1

Demographic Characteristics of Student Participants

Gender	Age range	Semester	Prior online educational experience
Female	Early 20s	Fall 2023	High school online courses from grades 10–12 (mix of fully online, blended, fully asynchronous and synchronous)
Male	Early 30s	Fall 2023	Two college diplomas (one completed online with a work-integrated learning model)
Male	Early 30s	Winter 2024	Online paramedic certification courses and 4 months of online undergraduate courses
Female	Late 30s	Fall 2023	Online undergraduate courses (16 months, 4 consecutive semesters)

Table 2

Demographic Characteristics of Instructor Participants

Gender	Age range	Prior teaching experience	
		In-person	Online
Female	Early 40s	12 years	10 years
Female	Early 50s	26 years	16 years
Female	Early 60s	27 years	8 years
Male	Early 60s	33 years	8 years

Data Collection and Analysis

Data were gathered from instructor-researcher field notes and debriefs throughout the semester and end-of-semester student interviews. Debriefs (10) and interviews (4) were conducted and transcribed via Zoom. Although the courses included first-year and advanced-entry students, only those with online learning experience participated in the interviews (Table 1) which were conducted by research team members not teaching the HyFlex courses that semester.

Data analysis involved qualitative deductive and inductive coding and thematic analysis (Miles et al., 2018). Focusing on HyFlex affordances and constraints, initial codes were deductive, while sub-codes emerged through multiple readings and were refined iteratively. To ensure multiple perspectives were considered and to ensure the reliability and accuracy of the findings, the key trends identified were based on themes that appear in the data across all formats and from multiple participants, i.e., debriefs, verbatim transcripts, and field notes from students and instructors. Findings and the data analysis process were based on direct quotes to support data interpretations and enable transferability. Key trends aligned with the literature included flexibility, technical issues, and pedagogical issues, e.g., disconnection, classroom support, instructor cognitive load, and mode neutrality. The final coding yielded two main themes: affordances (flexibility) and challenges (audio/video issues, mode neutrality, and classroom support).

Results and Discussion

Data analysis revealed two key themes: (a) flexibility as an affordance of HyFlex and (b) both technological and pedagogical challenges. Results are presented holistically and organized thematically without separation into iteration. Despite revising our approach between iterations, i.e., additional IT support and having the TA and instructor switch between online and in-person, similar challenges were experienced across semesters.

HyFlex Affordances

Flexibility

Flexibility is a key benefit of the HyFlex model (Beatty, 2019; Raes et al., 2020; Wong et al., 2023) and the results of this study align with the literature. In a debrief, one instructor-researcher observed that when students got sick, most opted to join online, and some expressed that “they actually like it.” Later, another instructor-researcher reported that a student attended online to avoid commuting in harsh winter weather. Additionally, an instructor-researcher noted that the flexibility to join online or in-person helped hesitant students gain confidence with online learning, reflecting that “students who were initially hesitant to go online, but who did as a result of being sick or home life commitments developed their confidence learning online and some of their tech skills.”

Student participants echoed this view of flexibility. One student noted that while she lived too far to switch modes, “a couple of … groupmates … switched if they were in the area … so that was pretty cool for them.” Despite mixed attendance, groups collaborated smoothly. Similarly, a student recounted

how a peer could join online: "They weren't able to make it into class physically, but they were able to log in on their computer." This flexibility allowed students to stay engaged and attend class in whatever capacity they were able to, offering students a low-stakes way to experience online learning.

HyFlex Challenges

The HyFlex format included both technological and pedagogical challenges. Technological challenges such as audio and video issues remained consistent in both semesters, regardless of increased IT support. After various testing, challenges with the audio and video system (inconsistent two-way audio with no ambient-noise filter and static video cameras without the ability to follow or focus on the speaker) remained unresolved with no viable solution. Pedagogical challenges included issues related to a mode-neutral student experience and the need for classroom support.

Audio Technical Issues

Audio issues were frequent and disruptive. One instructor-researcher described the situation midway through the semester:

> Back to [facilitating] in-person this week. … When I arrived, there were problems with the tech again—sound in particular. [Another instructor-researcher] and I spent 10 minutes troubleshooting the input/output sound issues and eventually had to settle for the output coming out of my computer.

This workaround proved ineffective as only students near the computer could hear online participants, forcing the instructor to mediate communication. She explained, "It became like teaching two classes at the same time because the tech didn't support a seamless integration. … It was exhausting." With only a 10-minute setup time before class, instructors often had to apply quick fixes, adding to the cognitive load in an already short 50-minute session.

Students also reported audio issues which disrupted class flow and information-sharing (Huang et al., 2017; Wang et al., 2018). Early on, a student noted that "if people would ask questions in class … you couldn't hear [the in-person students] online. … [The instructor] would have to … try to remember to repeat the question." Another student stated that online contributions were stifled: "[The online students speaking] doesn't really happen in the HyFlex … so you're only typing in the big group … [The TA] was the one listening to people [online] and checking the chat." Many audio issues experienced in the first semester could not be resolved by the second semester. One second semester student expressed similar frustration at needing a proxy to participate: "In all the other [fully online] classes, we'd be able to raise our hand and actually talk. … But in this [HyFlex class], we would have to just type our question. And then the TA would read our question for us." This student found the disconnect especially challenging during "question periods," though communication was smoother in online breakout rooms.

These technological challenges were consistent with, but more nuanced and prominent than, the issues identified in previous research into lecture-based HyFlex classrooms (Chan et al., 2022; Gillis & Krull, 2020; Raes et al., 2020). More frequent interactions among faculty and students in a non-lecture-

based classroom appeared to be exacerbated by technological challenges. Audio issues disrupted communication and formation of a sense of community between in-person and online students, forcing instructors and TAs to act as intermediaries which added to instructor cognitive load, consumed class time, and hindered a cohesive learning environment.

Video Technical Issues

Video technology issues disrupted both student learning experiences and instructor pedagogical practices. A student noted that the camera angle weakened her connection with the instructor:

> I did suggest to the instructor having the camera on the face because previously, it was like at the back, and they were this little—I couldn't see their face. I couldn't see their expression, so that was a challenge. They tried to move it up a little bit. I still didn't—I didn't feel it to be as personal like this [student referenced the fully online Zoom setting of the interview].

Even when adjusted, the camera setup limited how connected online students felt to both the instructor and the classroom environment, an issue less prominent in fully online environments.

An instructor-researcher shared:

> I kept moving away from the podium every time I wanted to explain something in detail to the [in-person] class. I can only imagine this is really disengaging for the online folks who periodically just see a blank screen when I move out of the frame. I find it difficult being in two places at once. Today, with the sound issues, I just opted to give instructions to the two groups separately so that I could be fully with one group and then fully with the other. For example, I first gave the online group instructions [ignoring the in-person students] at the beginning of class and left [the TA] to help them and then shifted attention to the in-person people and felt free to walk around the room while giving instructions.

Due to technology constraints, the instructor taught each group separately, which was exhausting and disruptive, hindering both community-building and the ability to establish teaching, social, and cognitive presences (Detyna et al., 2022; Garrison et al., 1999). A student described a limited view of the classroom:

> Something I actually always wondered in that class was, how big is this classroom? Because the [one] camera was always just up on the podium facing the professor. So, I don't know how difficult it might be, but like, even if there was a … any sort of TV that shows the … class and … another little camera that's pointing [at the instructor].

Like audio challenges, the video issues experienced were consistent with those described in previous HyFlex studies (Gillis & Krull, 2020; Leijon & Lundgren, 2019; Raes et al., 2020) and the technology configuration limited active learning approaches. Maintaining teaching and social presence was challenging because the camera could either zoom in on the instructor or show the whole class from the back (students appearing small and only visible from behind). These issues could be less problematic in lecture-based classes where instructors stayed at the front of the classroom and video was unidirectional from the instructor to students.

Pedagogical Issues: Mode-Neutrality

Although previous research (Howell, 2022; Mahande et al., 2024; Reed et al., 2008) suggests that achieving mode-neutrality can be challenging, limited detail has been offered regarding the dynamics of equality in the learning experience. Our results offer more detailed insight into the difficulties involved in achieving mode-neutrality in a non-lecture-based setting.

A student reported feeling a weak connection to the class and the instructor, especially due to the initial camera angle:

> [The course] started off at first like not feeling as personable. And then midway through the semester, [the instructor] changed the camera angle. So instead of having it like showing the entire class, [it showed her]. ... She changed it so that it was like right in front of the podium. So, I was like, ok, this is a lot better. I can, I know who she is. I got to see her face. Like I can see her expressions. So that was a lot better… [and] more helpful for me.

In this case, the video was limited in several ways, which restricted the goal of mode-neutrality. Unfortunately, switching the camera angle also impacted the instructor's pedagogical practice (i.e., she had to remain behind the podium), which the student recognized:

> I know [the instructor] is like pretty, actually stuck to the podium. So that was pretty hard for her to move around in the course. And which I think is difficult for her because I think she is one who likes to be animated and … you can't really do that [in a HyFlex setting].

The instructor's attempt to foster community by using a wide camera angle was ineffective, as online students could only see the backs of heads, reducing their sense of connection (Garrison et al., 1999; Garrison, 2024). Adjusting the camera to focus on the instructor at the podium improved teaching presence for some online students but restricted the instructor's movement and added cognitive strain (Detyna et al., 2022).

One instructor-researcher noted in her teaching evaluations, "When I was facilitating in the in-person setting, feedback reflected that the online students did not feel prioritized and vice versa when I was facilitating from the online setting." During two fully online weeks, feedback from instructor-researchers and students indicated these sessions were smoother, with increased engagement and learning. This may have been due to the undivided attention of the instructor, clear instructions, and combined support from both the instructor and TA. As one instructor-researcher reflected:

> When you're teaching [fully] online [and] you see something happening, you can give that hint right there, [and] when you're teaching in [the HyFlex format] ... you don't necessarily see all the things going on [in] the chat and you have to sort of think about—I got people [in-person], do I—what do I mention to the whole class?

One online student felt the imbalance, observing that the professor mainly supported in-person students while the TA became a proxy instructor for online students:

> The TA would be talking to us, and the professor would be talking to the class. That always made us seem kind of separate. And even when we're doing the exercises together, at the same time, it was like the TA was dealing with us, and the professor was dealing with [them].

This student also noted a limited online community in HyFlex compared to other online classes, saying:

> I actually feel like out of all the online classes I've taken, the online community aspect of it in the HyFlex was probably the least of them all. … That's probably just because [the professor is] trying to engage students that are right in front of them.

Overall, instructor cognitive strain combined with requiring the TA to act as proxy between the online and in-person delivery introduced challenges, despite changes made to bridge gaps, i.e., changing camera angles, instructors and TA trading off in-person and online. Students observed a divide between online and in-person delivery, and consequently experienced feelings of deprioritization and disconnectedness. However, feedback from two fully online weeks indicated that being together in one space led to a smoother, more engaging experience.

Pedagogical Issues: Classroom Support

In this study, support for instructors and students was a key focus. The instructor-researcher team facilitated debriefing sessions and provided moral support by helping with troubleshooting and planning after classes, with an aim to improving session design and course materials. Additionally, IT provided technical support with the sound system which had not been tested for large group discussion-based activities.

Teaching assistant support in the classroom was critical for students. They provided immediate technical support with the LMS (Canvas), Zoom, and Google tools as well as support to navigate group sign-ups, breakout rooms, and activity instructions, while instructors focused on in-person students. One student shared that TA assistance helped "not break the flow of the class. … [The instructor] wasn't bogged down by all these little interruptions, especially since the classes are so short." Another student remarked:

> I think the TAs were a godsend. [The TA] was so quick every time. If there was a question, she answered it right away. I actually got to know [the TA] quite well because I always—I'd get her to come in a breakout room [for clarification] ... And that was an important part—having that extra set of hands to kind of—cause the chat goes and sometimes you can easily miss something but [the TA] was on everything, every single time.

Educational Implications

This study aimed to address five gaps in previous research on HyFlex learning: (a) pedagogical strategies for learning, (b) technological challenges, (c) understanding social dimensions (connectedness to peers, instructors, and the learning space), (d) the absence of ongoing assessment, and (e) examining the value of technical and teaching support. Ongoing assessment and feedback offered the opportunity to address these challenges and uncover preliminary promising practices for a non-lecture-based HyFlex

classroom. Multiple interactive strategies used in a collaborative classroom appeared to magnify the challenges experienced by instructors and students. Audio and video challenges, for example, impacted social, teaching, and cognitive presences.

While it would be premature to offer unequivocal advice based on this study alone, future HyFlex educators should consider several preliminary implications. First, non-lecture-based HyFlex classrooms are viable but require extensive planning and support. Essential technology must effectively support the HyFlex environment to help maintain teaching, social, and cognitive presences. Dedicated teaching and technology support is also highly recommended to help maintain flow.

Limitations

This study has several limitations. First, the small sample size limits the generalizability of results. Second, the demographic homogeneity of participants may not reflect the unique challenges faced by more diverse students. Third, the reliance on self-reported data may be biased as participants' reflections could be influenced by memory recall or social desirability. Finally, this study focused on instructor and student perceptions but did not assess the actual impact of HyFlex on learning outcomes.

Future Research

Based on the results and limitations of the study, the following suggestions for future research are offered: (a) continue to use longitudinal, collaborative research, but expand the sample size to include a more diverse population; (b) expand the measurement of HyFlex impact to include specific learning strategies and outcomes; (c) modify and improve the quality of support for HyFlex classrooms to reduce the impact of technological issues; (d) explore the social development and connectedness of students more deeply; and (e) investigate equity and access issues related to HyFlex learning environments.

Conclusion

As global events and technological advancements continue to reshape educational landscapes, there is an ongoing need for adaptable and research-informed pedagogical practices. This study provides insights into the opportunities and challenges of undergraduate, non-lecture-based HyFlex learning, contributing to a growing body of innovative research on flexible learning environments. Our findings suggest that a collaborative learning environment is possible in a HyFlex structure, but that careful attention is needed on design and implementation in order to support social, teaching, and cognitive presences (Garrison, 2024; Garrison et al., 1999). Our recommendations for future research support the evolution of innovative learning in higher education to ensure higher education remains flexible and responsive to change.

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