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# Students' Learning Experiences in a Hyflex Learning Environment

**Nurul Amirah Mohd Razali**
Faculty of Educational Sciences and Technology, Universiti Teknologi Malaysia, Malaysia, *nurul.amirah@graduate.utm.my*

**Zaidatun Tasir**
Corresponding author, Faculty of Educational Sciences and Technology, Universiti Teknologi Malaysia, Malaysia, *p-zaida@utm.my*

Hybrid flexible (HyFlex) learning, which integrates in-person and online formats, offers flexibility and adaptability to diverse learning styles, positively influencing academic performance, student retention, and attitudes toward teaching. Despite its benefits, limited research exists on students' experiences within this framework. This study investigated postgraduate students' learning experiences in HyFlex environments, focusing on course content, technology effectiveness, learning modes, and instructor roles. It aimed to identify effective teaching practices and gather student suggestions for improving interaction and collaboration. Using a survey-based quantitative approach, data from 76 postgraduate students were analysed through descriptive and thematic methods. Findings revealed positive learning experiences, with effective teaching practices including clear communication, interactive engagement, knowledgeable instructors, flexible learning modes, and varied methods. Suggestions for improvement emphasized enhancing both technical and pedagogical aspects. This study underscores HyFlex's potential to deliver engaging educational experiences and provides actionable insights for optimizing its implementation, contributing to the expanding field of HyFlex education research.

Keywords: HyFlex learning, online learning, face-to-face learning, student interaction, teaching methods, hybrid flexible (HyFlex)

## INTRODUCTION

HyFlex learning is an innovative approach that combines face-to-face and online instruction, allowing students to choose their preferred mode of participation (Beatty, 2014; Malczyk, 2019). This model has gained popularity and significance (Eduljee et al., 2022) in education due to its flexibility and student-centred approach, effectively addressing the diverse needs of students in today's digital era. The term "HyFlex" combines "hybrid" and "flexible" (Raes et al., 2020), highlighting its design to integrate the strengths of hybrid learning; combining face-to-face and online education (Nuruddin, 2024); within a flexible framework.

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Students can choose to attend classes in person, participate online, or engage in a combination of both (Kyei-Blankson et al., 2014). This flexibility not only accommodates various learning preferences but also ensures continuity and accessibility, especially during challenging situations like global pandemics (Lakhal et al., 2017; Zhu et al., 2021).

As educational institutions aim to provide more flexible and inclusive learning opportunities, the HyFlex model has attracted significant attention from researchers and educators. A growing body of literature explores various aspects of HyFlex learning, including implementation strategies, its impact on student engagement and learning outcomes, instructional design considerations, and the role of technology in facilitating effective learning experiences.

Today, young people juggle multiple responsibilities, such as being students, workers, young leaders, or job seekers. This multifaceted life can complicate their learning process. HyFlex offers an ideal solution by providing multiple learning options that accommodate their diverse needs (Miller & Baham, 2018). The model's integration of "hybrid" and "flexibility" allows students to choose when and how they engage with their coursework, enhancing their learning experience (Beatty, 2012; Keiper et al., 2021; Raman et al., 2021).

Despite its growing popularity and clear benefits, HyFlex learning remains in its early stages, and significant research gaps persist. Few in-depth studies address students' learning experiences within the HyFlex model. Much of the existing literature discusses the model theoretically without offering detailed, practical frameworks for real-world implementation and improvement (Wong et al., 2023; Howell, 2022). Current research tends to be general and lacks specific, actionable guidance for educators (Chan et al., 2022; Howell, 2022).

There is a need to analyse students' learning experiences in HyFlex learning, as well as the aspects of HyFlex teaching that effectively support learners. Accordingly, the objectives of this study are as follows:

1. To examine students' learning experiences in HyFlex learning.
2. To analyse the aspects of HyFlex teaching that effectively assist learners.
3. To gather suggestions for improving interaction and collaboration among participants in HyFlex learning environments.

This study employed a quantitative research method, using a questionnaire to collect the relevant data. The findings contribute to and expand the existing body of knowledge on the implementation of HyFlex learning in higher education.

## LITERATURE REVIEW

### Previous Research on HyFlex Learning

A scientometric analysis by Eduljee et al. (2022) revealed significant growth in research on HyFlex learning, with 1,453 studies published between 1989 and 2021. Accordingly, this study conducted a comprehensive review of prior research on HyFlex learning in higher education to identify the outcomes of implementing the model. Table 1 provides the analysis grid of the reviewed studies.

Table1
Analysis grid

| No. | Authors (year) | Brief info | Findings |
|---|---|---|---|
| 1. | Amirova et al. (2023) | Examined the impact of HyFlex learning on preservice teachers' success. | HyFlex improves academic achievement and fosters positive attitudes. |
| 2. | Athens (2023) | Investigated self-regulation, motivation, and outcomes in HyFlex classrooms. | High pass rates, low withdrawal rates, and positive student performance. |
| 3. | Chen (2022) | Focused on designing online discussions for HyFlex learning. | Highlighted the importance of well-designed online platforms for deeper engagement. |
| 4. | Cumming et al. (2024) | Investigated HyFlex delivery in postgraduate courses. | Identified challenges in instructor management and gaps in the literature on HyFlex benefits. |
| 5. | Detyna & Koch (2023) | Explored student perceptions of HyFlex learning in higher education. | Varying engagement levels and challenges in maintaining fairness across modes. |
| 6. | Gedera (2023) | Analysed teaching and learning experiences in HyFlex spaces. | Emphasised the need for foundational knowledge and support for instructors. |
| 7. | Howell (2022) | Reviewed the promise of flexibility in HyFlex models. | Highlighted the potential for increased accessibility and student satisfaction. |
| 8. | Naidoo et al. (2023) | Studied the effects of HyFlex on undergraduate activity levels. | HyFlex supports active learning and engagement. |
| 9. | Ndlovu & Merisi (2023) | Investigated HyFlex as a modality for meaningful engagement in South Africa. | HyFlex enhances epistemological access and engagement. |
| 10. | O'Ceallaigh et al. (2022) | Explored the role of HyFlex in blended learning environments. | Highlighted the importance of social presence and interaction in HyFlex settings. |
| 11. | Mahande and Abdal (2023) | Designed interaction models for HyFlex classrooms. | Identified benefits and challenges in implementing active learning strategies. |
| 12. | Wong et al. (2023) | Conducted a longitudinal analysis of HyFlex research and practice. | HyFlex supports flexibility but requires robust technological infrastructure. |

Research supports the positive impact of HyFlex on higher education. Studies indicate that this model improves academic achievement, fosters positive attitudes toward teaching, and enhances student retention (Amirova et al., 2023). Furthermore, Athens (2023) found that students generally perform well in HyFlex courses, reflected in high pass rates and low withdrawal rates. However, the successful implementation of HyFlex learning is not without its challenges.

One significant issue is the lack of sufficient support for educators. Gedera (2023) notes that many instructors struggle with the complexities of HyFlex teaching due to insufficient foundational knowledge. Additionally, student engagement can vary across different instructional modes, leading to feelings of disconnection (Detyna & Koch, 2023). Cumming et al. (2024) highlight a gap in the literature regarding the overall benefits of HyFlex learning for students and its viability for instructors.

Technology plays a critical role in the HyFlex model, with the potential to both enhance and hinder the educational experience. Chen (2022) suggests that well-designed online platforms can foster deep-er engagement and improve academic performance. Conversely, Amiruddin et al. (2023) emphasize the importance of students' technological proficiency, noting that those with greater technology skills tend to have a more favourable view of HyFlex learning. This underscores the necessity for robust technical support and training for both students and instructors.

Another significant challenge is maintaining fairness across participation modes. Mahande and Abdal (2023) emphasize the difficulties in implementing active learning strategies consistently in both in-person and online settings. This discrepancy in students' learning experiences calls for further re-search.

To address these complexities and challenges, it is essential to adopt a theoretical framework that guides the design and facilitation of learning experiences in HyFlex environments. The Community of Inquiry (CoI) framework offers a robust model for creating meaningful and engaging learning environments, integrating cognitive, social, and teaching presences (Garrison et al., 2010). By applying the CoI framework in HyFlex settings, educators can ensure consistency and quality in active learning while effectively addressing the specific needs and challenges associated with multi-modal instruction. The CoI framework's focus on cognitive, social, and teaching presences offers a structured approach to addressing challenges such as engagement, fairness, and instructor support, thereby improving the overall effectiveness of HyFlex learning (Garrison et al., 2010).

**Theories Supporting HyFlex Learning**

*Four Key Pillars of HyFlex Learning*

The HyFlex learning model integrates face-to-face and online modalities, offering unique opportunities to enhance educational experiences. It is built on four key pillars: learner choice, equivalency, reusability, and accessibility (Beatty, 2019). These principles enable students to choose their preferred learning mode while ensuring that all participants receive equivalent learning experiences. This adaptability is essential in today's unpredictable educational landscape, accommodating diverse learning styles and personal challenges (Ndlovu & Merisi, 2022).

The first pillar, *Learner Choice*, highlights the flexibility for students to select their preferred mode of participation—whether face-to-face, online, or a combination of both—based on their individual needs and circumstances. This flexibility empowers students to take control of their learning experience, fostering autonomy and motivation. For instance, students balancing work and studies may opt for online participation for convenience, while others who value in-person interaction may choose face-to-face sessions. However, this flexibility also poses challenges for instructors, who must ensure that all students, regardless of their chosen mode, remain equally engaged and supported (Beatty, 2019).

The second pillar, *Equivalency*, ensures that all students, irrespective of their mode of participation, receive equivalent learning experiences and achieve the same learning outcomes. This principle is vital for maintaining fairness and inclusivity in HyFlex

learning environments. For example, instructors may use recorded lectures, shared discussion boards, and collaborative tools to ensure that online students have the same access to course content and peer interactions as face-to-face students. However, achieving equivalency can be challenging, as technological limitations or differences in participation modes may create disparities in engagement and learning experiences (Mahande & Abdal, 2023).

The third pillar, *Reusability*, focuses on designing course materials and activities that can be reused across different learning modes without significant modification. This approach reduces instructors' workload and ensures consistency in course delivery. For instance, a recorded lecture can serve both online students and as a supplementary resource for face-to-face participants. Similarly, discussion prompts or quizzes can be shared across all modes. While reusability is efficient, it requires careful planning to ensure that materials are engaging and effective for all students, regardless of their mode of participation (Raes et al., 2020).

Finally, the fourth pillar, *Accessibility*, ensures that all students, regardless of their physical location or technological capabilities, can access course materials and participate in learning activities. This principle is crucial for creating an inclusive learning environment that accommodates students with diverse needs, including those with disabilities or limited access to technology. For example, providing captions for recorded lectures, ensuring compatibility with assistive technologies, and offering offline access to course materials are ways to enhance accessibility. However, accessibility can be hindered by technological barriers, such as unreliable internet connections or lack of access to devices, requiring instructors to design inclusive and adaptable materials (Ndlovu & Merisi, 2022).

In summary, the Four Key Pillars of HyFlex Learning—Learner Choice, Equivalency, Reusability, and Accessibility—work together to create a flexible and inclusive learning environment. While these principles offer significant benefits, they also present challenges that require careful planning and implementation to ensure the success of HyFlex learning environments.

*Community of Inquiry Framework*

The Community of Inquiry (CoI) framework, developed by Garrison et al. (1999; 2009; 2010), provides a useful lens through which to understand and design effective online and blended learning environments, such as HyFlex. The framework is built on three core elements: cognitive presence, social presence, and teaching presence, which collectively foster meaningful and engaging learning experiences (Garrison et al., 2010). This makes CoI particularly relevant for HyFlex environments, where multiple modes of learning converge (Castellanos-Reyes, 2020; Olmos-Gómez et al., 2020).

In HyFlex environments, cognitive presence is supported through a combination of synchronous and asynchronous activities, such as live discussions and recorded lectures, which allow students to reflect and engage at their own pace (Garrison, 2016). Social presence is fostered through collaborative tools, such as shared discussion boards and group projects, which connect online and face-to-face participants (Castellanos-Reyes, 2020). Teaching presence is particularly critical in HyFlex, as instructors must actively

manage interactions across both modes, ensuring that all students feel equally supported and engaged (Garrison et al., 2010; Kozan & Caskurlu, 2018).

Technology plays a pivotal role in supporting the CoI framework in HyFlex learning (Heilporn & Lakhal, 2020). For instance, cognitive presence is enhanced through the use of learning management systems (LMS), which allow students to engage in asynchronous discussions and access course materials at their convenience. Social presence is fostered through video conferencing tools, which enable real-time interaction between online and face-to-face participants (Olmos-Gómez et al., 2020). Teaching presence is supported by analytics tools, which help instructors monitor student progress and engagement, allowing for timely interventions (Garrison, 2016; Castellanos-Reyes, 2020).

Despite its strengths, implementing the CoI framework in HyFlex learning is not without challenges. One challenge is maintaining social presence for online students, who may feel disconnected from their face-to-face peers (Stenbom, 2018). Similarly, instructors may struggle to balance teaching presence across both modes, as managing interactions in a hybrid environment requires significant effort and planning (Kozan & Caskurlu, 2018). Ensuring cognitive presence can also be challenging, particularly when students switch between online and face-to-face modes, as this may disrupt the continuity of their learning experience (Garrison, 2016).

In this study, the CoI framework was instrumental in designing and evaluating the HyFlex learning environment. Teaching presence was facilitated by an experienced instructor who actively engaged both online and face-to-face students. Cognitive presence was fostered through activities that encouraged critical reflection, such as constructing theoretical frameworks. Social presence was promoted through peer interactions, both in synchronous sessions and asynchronous discussions. These elements collectively contributed to a meaningful and engaging learning experience, highlighting the relevance of the CoI framework in HyFlex settings (Garrison et al., 2010; Castellanos-Reyes, 2020).

**Research Questions**

This study aimed to address the following research questions:

1. What are students' learning experiences in HyFlex learning with respect to course content, technology effectiveness, learning modes, and the instructor's role?
2. What aspects of teaching in HyFlex learning do students find most effective?
3. What suggestions do students have for improving interaction and collaboration among participants in HyFlex learning environments?

## METHOD

This study employed a quantitative research approach with a survey research design. A self-developed questionnaire was used to assess students' learning experiences and was distributed via Google Forms. The target population included postgraduate students who had participated in a short course at a Malaysian university.

The questionnaire was divided into three sections:

1. Part A: Background of Respondents

This section collected demographic and background information about the participants.

2. Part B: Students' Learning Experiences

This section included 11 questions rated on a 5-point ordinal scale. The questions focused on various aspects of students' learning experiences, such as course content, technology effectiveness, learning modes, and the instructor's role (see Table 1 and Appendix A).

3. Part C: Open-Ended Questions

This section aimed to gather qualitative data on effective teaching strategies in HyFlex learning and suggestions for improvements.

Table 2
Students' learning experience questions

| No. | Dimensions | Numbers of Questions |
|---|---|---|
| 1. | Course Content, Organization, and Learning Engagement | 3 |
| 2. | Technology Effectiveness & Course Learning Environment | 2 |
| 3. | Learning Mode Impact | 3 |
| 4. | Instructor Roles | 3 |
| | Total | 11 |

The content validity of the questionnaire was assessed by an experienced online researcher, whose feedback was incorporated into the revision of the items. The internal consistency of the questionnaire, indicated by a Cronbach's alpha of 0.891, demonstrates high reliability.

The sampling strategy used in this study was convenience sampling. The sample consisted of 76 voluntary participants, including 63 PhD's students and 13 master's students, who participated in both online and in-person short courses.

Quantitative data were analysed descriptively using percentages, frequencies, and cross-tabulations through SPSS version 29 and Microsoft Excel. The qualitative data from the open-ended questions were analysed using thematic analysis based on Braun and Clarke's (2006) steps, where each response was coded, grouped into categories, and ultimately organized into specific themes. The analysis process involved:

1. Cleaning and organizing the data.
2. Conducting descriptive statistical analysis.
3. Performing cross-tabulation analysis.
4. Analysing qualitative data using thematic analysis.
5. Interpreting the results.
6. Drawing conclusions and discussing implications.

Bar and pie charts were used to visualize the findings.

The HyFlex learning environment utilized the Webex synchronous tool, enabling both face-to-face (f2f) and online participants to engage in the classroom session. The classroom was arranged in a round table setting, with face-to-face students grouped together while online students joined remotely from various locations, both within and

outside Malaysia. With the students' consent, the course session was recorded for future reference.

The scope of the short course was "Developing a Theoretical Framework of Research." The delivery was based on the three elements of the Community of Inquiry (CoI) framework—teaching presence, cognitive presence, and social presence—as described by Garrison et al. (2016). To ensure effective teaching presence, the session was led by an experienced instructor specializing in Research Methodology and Educational Technology, who has over 29 years of expertise. An assistant instructor was also present to support online learners by addressing their questions.

Social presence was fostered through frequent question-and-answer sessions conducted via Chat in Webex, and students could raise their hands either in Webex or in the classroom during the course. Cognitive presence was addressed indirectly through learning activities that required students to con-struct their theoretical framework for their research.

*Potential Biases*

In our study on students' learning experiences in a HyFlex environment, several potential biases were identified that could influence the accuracy of our findings. To address these biases, we implemented specific strategies to ensure the reliability and validity of our results.

One key concern was selection bias, stemming from the use of convenience sampling, which may limit the generalisability of our findings as the sample may not fully represent the broader population. To mitigate this, we ensured that our sample included a diverse group of students from different academic levels and backgrounds, thereby enhancing the representativeness of our data.

Information bias was another consideration, which we addressed by employing a validated questionnaire. The questionnaire was piloted with a small group of participants to ensure clarity and relevance, minimising the risk of misinformation.

Additionally, to avoid confirmation bias, we applied predefined criteria for analysing both quantitative and qualitative data, ensuring an objective and evidence-based approach. These strategies collectively helped us to manage potential biases and strengthen the credibility of our study.

*Research Ethics Practices*

We adhered to several ethical practices to maintain the integrity of our study. The name of the university was anonymised to protect the institution's identity and uphold confidentiality, respecting the privacy of both the institution and the participants.

Participants were fully informed about the purpose of the study, their rights, and the voluntary nature of their participation. This ensured they understood what they were agreeing to and that they could withdraw at any time without consequences. To safeguard participants' personal information, all data collected were anonymised and

stored securely to prevent unauthorised access, thereby maintaining the integrity of the data.

Furthermore, the study was designed to minimise any potential harm to participants. The questionnaire and data collection methods were non-invasive, ensuring that participants were not subjected to any form of distress or discomfort.

By addressing potential biases and adhering to these ethical practices, we aimed to ensure the credibility and trustworthiness of our study. These measures not only enhanced the validity of our research but also contributed to maintaining the integrity of academic inquiry.

## FINDINGS AND DISCUSSION

### Students' Background

From the survey, 82.7% of the participants were PhD students, while 17.3% were Master's students. Regarding their mode of attendance for the short course, Figure 1 illustrates the distribution of students based on their chosen participation mode (online, face-to-face, or both).

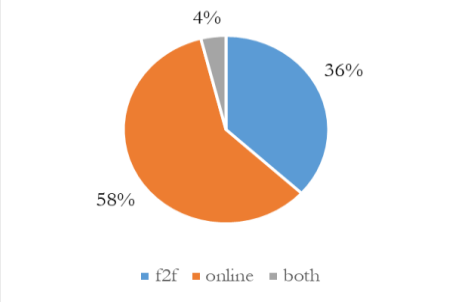


Figure 1
Distribution of student attendance mode

Based on Figure 1, most students attended the course online, followed by those participating face-to-face and in both modes. This distribution underscores the flexibility and student autonomy inherent in the HyFlex model, where learners can choose their preferred mode of participation (Beatty, 2019).

The predominant choice of online participation suggests that students appreciate the convenience and flexibility of virtual learning environments. Online participation allows students to engage with course material from any location, accommodating various schedules and personal commitments (Mishra & Singh, 2024; Lujan & DiCarlo, 2024). This mode can be particularly advantageous for those balancing multiple responsibilities or who prefer the comfort of learning from home.

The notable number of students attending face-to-face indicates that, despite the popularity of online options, there remains a strong preference for in-person learning. Many students value direct interaction with instructors and peers, the immediacy of

feedback, and the structured environment that face-to-face classes provide (Garrison & Vaughan, 2008; Mahande & Abdal, 2022). This mode can enhance engagement and motivation for those who thrive in a traditional classroom setting. The smaller group of students using both modes reflects the flexible nature of the HyFlex approach. These students likely appreciate the option to switch between online and in-person attendance based on their needs and circumstances. This hybrid approach offers a balanced solution, allowing for adaptability in learning preferences while maintaining the benefits of both modes.

Overall, these findings underscore the importance of offering multiple participation modes to cater to diverse student needs. The flexibility of the HyFlex model supports personalized learning experiences, accommodating varying preferences and situations, which can lead to improved student satisfaction and engagement (Beatty, 2019).

**Students' Learning Experiences in HyFlex Learning**

*Content and Structure*

Regarding students' learning experiences with the content and structure of the HyFlex Learning short course, a significant majority reported that the content was either "very clear" or "clear" (94%). Only a small percentage (5%) found the content to be neutral or unclear, as illustrated in Figure 2. This high level of clarity can be attributed to the instructor's expertise in online learning and the careful design of the course content to cater effectively to both online and face-to-face participants. Beatty (2019) emphasizes that the success of the HyFlex model relies heavily on the thoughtful design of instructional content. Garrison and Vaughan (2008) similarly found that a well-defined learning approach positively impacts student attention in HyFlex settings.

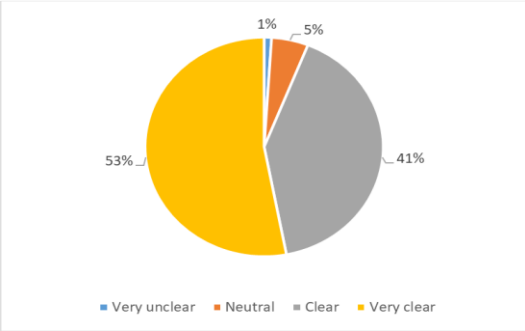


Figure 2
Learning experience with the course content

The survey also revealed that 94.8% of students agreed or strongly agreed that the course was well-structured and organized (see Figure 3). Notably, these students also reported that the course content was clear. This correlation suggests that clarity in content is closely linked to the course's organization and structure. Effective instructional design in a HyFlex learning environment must address both con-ten clarity and organization. Garrison and Vaughan (2008) support this by highlighting the

im-portance of a well-structured approach in instructional design. Additionally, Means et al. (2009) emphasize that information design, which includes both content clarity and structure, is crucial for effective online learning.

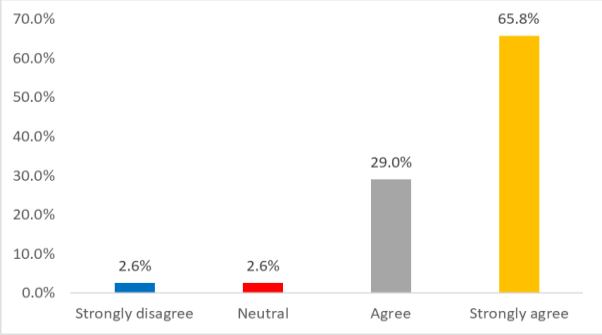


Figure 3
Course structure and organization

Beyond clarity and organization, students found the course to be engaging, with 92% indicating high levels of engagement, while only a minority were disengaged (3%) or neutral (5%), as shown in Figure 4. This high level of engagement is likely related to the clarity and organization of the course content, highlighting a strong correlation between well-structured content and student involvement. Mineshima-Lowe et al. (2024) emphasized the role of content clarity in maintaining student interest. Yingyi et al. (2024) and Nelson et al. (2022) further support this, finding that clear and well-organized content enhances student engagement in HyFlex learning.

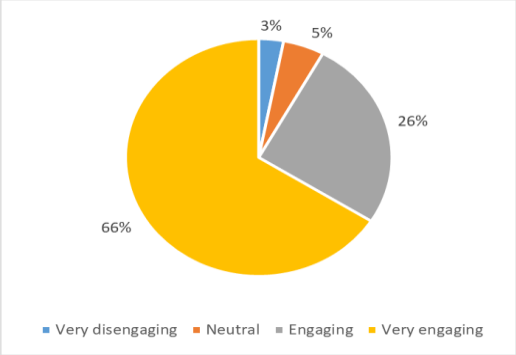


Figure 4
Students' engagement

This study also explored the relationship between students' engagement levels and their mode of attendance. Table 3 provides a cross-tabulation analysis, illustrating how engagement levels differ across online, face-to-face, and hybrid modes of participation.

Table 3
Students' engagement levels questions

| Engagement Level | Online | Face-to-face (Offline) | Both (hybrid) | Total |
|---|---|---|---|---|
| Very Engaging | 31 (40.8%) | 16 (21.1%) | 3 (3.9%) | 50 (65.8%) |
| Engaging | 11 (14.5%) | 9 (11.8%) | - | 20 (26.3%) |
| Neutral | 2 (2.6%) | 2 (2.6%) | - | 4 (5.3%) |
| Disengaging | - | - | - | - |
| Very Disengaging | 1 (1.3%) | 1 (1.3%) | - | 2 (2.6%) |
| Total | 45 (59.2%) | 28 (36.8%) | 3 (3.9%) | 76 (100%) |

Based on Table 3, 92% of the students who reported being engaged in the course primarily participated online (55.3%), followed by face-to-face participation (32.9%) and participation in both modes (3.9%). This suggests that, regardless of their chosen mode of participation, students found the learning environment to be either very engaging or engaging. The high engagement levels observed may be attributed to the expertise of the instructor, supported by an assistant facilitator, which likely contributed to creating an effective and interactive learning experience.

An interesting finding from the study is that only students who participated exclusively online or face-to-face reported feeling neutral or very disengaged. This indicates that, while the majority of students found the learning experience engaging, a small group felt indifferent, potentially due to personal preferences or external factors influencing their participation.

These findings underscore the importance of designing HyFlex courses that actively foster engagement across all modes of participation. Ensuring that students in both online and face-to-face settings feel equally supported and involved is critical to maximising the effectiveness of the HyFlex model.

*Technology Effectiveness and Course Environment*

In addition to course content and structure, technology effectiveness and the course environment are crucial components of HyFlex learning. The survey findings indicated that most students found the use of technology—such as slides, videos, and online tools like chat—to be either "very effective" (61.8%) or "effective" (34.2%) in supporting their HyFlex learning experience, as shown in Figure 5. This aligns with Beatty's (2019) findings, which noted that technological tools are essential for delivering and supporting clear and well-structured course content. These results suggest that both well-designed content and the effective use of technological tools are key factors contributing to the success of HyFlex learning.

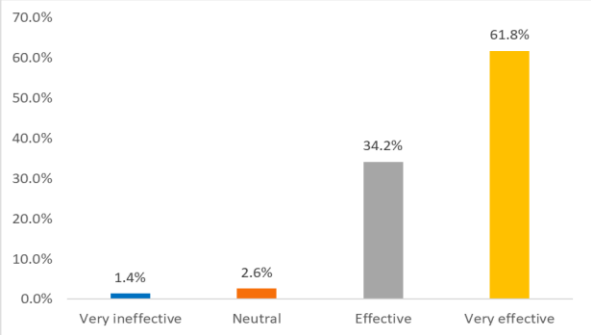


Figure 5
Technology effectiveness

Moreover, the course learning environment plays a significant role in supporting HyFlex learning. The majority of students agreed that the learning environment was inclusive and effectively supported both online and face-to-face participants, as shown in Figure 6. While creating a suitable learning environment for both modes is vital, it is often overlooked by instructors. Cumming et al. (2024) identified split instructor attention as a challenge in HyFlex learning that can affect students' self-efficacy. Raes et al. (2020) further emphasized that this oversight can impact the effectiveness of HyFlex learning, highlighting the need for an inclusive and well-prepared learning environment.

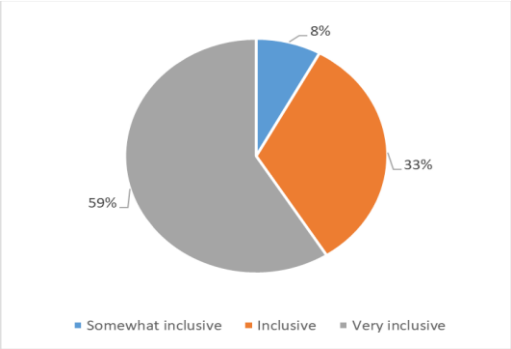


Figure 6
Course learning environment

*Learning Mode Impact*

Since HyFlex learning incorporates both offline (face-to-face) and online modes, it is crucial to examine how these modes impact students' learning experiences. This study investigated three aspects: students' comfort with the learning modes, the effect of mixed modes on their learning experiences, and the influence of peers from both modes on their participation.

The findings revealed that a significant majority of students felt either "comfortable" (28.9%) or "very comfortable" (67.1%) participating in the course through a mixture of modes (see Table 2). This indicates that students are adapting well to this flexible learning approach, suggesting that the integration of multiple modes supports their learning preferences and needs. According to Beatty (2019), this adaptability to HyFlex learning modes reflects a broader acceptance of new learning methods in the 21st century.

The study also explored the relationship between the mode of attendance and students' comfort levels in HyFlex learning. Table 2 presents the distribution of students' comfort levels across different modes of attendance in the HyFlex learning environment.

Table 4
Students' learning experience questions

| Mode of Attendance<br>Comfort Level | Online | Face-to-face (Offline) | Both (hybrid) | Total |
|---|---|---|---|---|
| Very Comfortable | 32 (42.1%) | 17 (22.4%) | 2 (2.6%) | 51 (67.1%) |
| Comfortable | 12 (15.8%) | 9 (11.8%) | 1 (1.3%) | 22 (28.9%) |
| Neutral | 1 (1.3%) | 1 (1.3%) | - | 2 (2.6%) |
| Uncomfortable | - | - | - | - |
| Very Uncomfortable | - | 1 (1.3%) | - | 1 (1.3%) |
| Total | 45 (59.2%) | 28 (36.8%) | 3 (3.9%) | 76 (100%) |

The data shows that most students felt "very comfortable" or "comfortable" with their respective learning modes. Specifically, 42.1% of students attending online classes felt "very comfortable," and 15.8% found the online mode "comfortable." Similarly, among those attending face-to-face classes, 22.4% reported feeling "very comfortable," while 11.8% felt "comfortable." Interestingly, students using both online and face-to-face modes also reported high levels of comfort. This indicates that students who engaged in either mode online, face-to-face, or both experienced high levels of comfort.

The low percentages of students feeling "neutral," "uncomfortable," or "very uncomfortable" across all modes suggest that, overall, students adapt well to the HyFlex learning environment. The minimal discomfort reported, particularly in the online and face-to-face modes, underscores the general acceptance and positive reception of these learning modes. This pattern indicates that students are comfortable with their primary mode of attendance whether online, face-to-face, or a combination of both in HyFlex learning. The findings highlight the effectiveness of the HyFlex model in accommodating diverse learning preferences and aligning well with students' needs. When students feel comfortable in their learning environment, it fosters social and emotional connections with each other and the instructor, reflecting the social presence element of the Community of Inquiry (CoI) framework by Garrison (2016).

Regarding the impact of the mixture of learning modes on students' experiences, the survey results indicate a strong positive response. Specifically, 93.5% of students reported experiencing a significant or very significant impact from the mixed learning modes (see Figure 7). This suggests that the flexibility offered by the HyFlex model is largely perceived as beneficial, enhancing the overall learning experience for most participants.

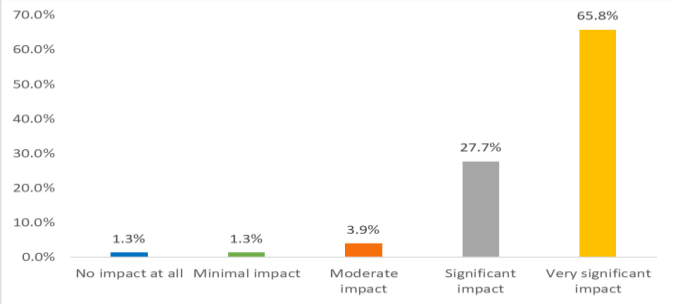


Figure 7
Mixed mode impact

However, a small number of students (two) who participated exclusively in either face-to-face or online modes felt minimal or no impact. Their feedback points to potential areas for improvement in the HyFlex setup, such as reducing class sizes and incorporating teaching assistants to boost the effectiveness of the mixed learning modes.

Harfitt and Tsui (2015) found that students were more motivated and engaged in smaller classes. Although their study was theoretical, this finding remains relevant for HyFlex environments. Barnes et al. (2021) similarly highlighted the advantages of having teaching assistants, noting that their ability to address basic questions received positive feedback from both instructors and students. Adopting similar strategies could enhance the effectiveness of future Hyflex courses. In larger classes, teaching assistants can help manage the complexities of integrating multiple learning modes, fostering a more cohesive and supportive learning environment.

In terms of peer influence on student participation in HyFlex learning, 84.2% of students felt that peers increased their participation (see Figure 8). The presence of peers, whether online or face-to-face, had a positive impact on their involvement in learning. Binnewies and Wang (2019) emphasized that peer support in HyFlex learning helps address challenges related to student equity and engagement. Specifically, peers attending face-to-face sessions can assist instructors by facilitating interactions with online students through chat and messages.

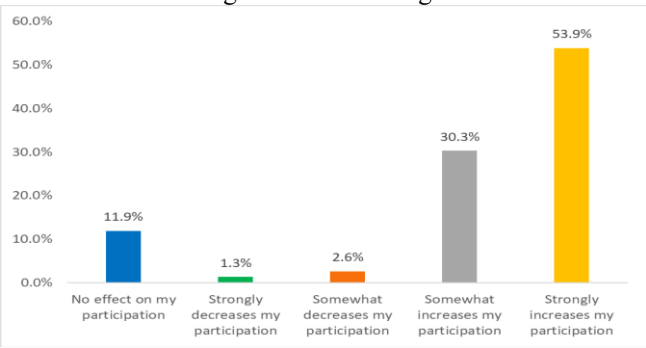


Figure 8
The influence of peers

*Instructor Roles*

Instructor roles in HyFlex learning are crucial and may require specialized training for effective management. This study found that 96.1% of students felt the instructor managed the needs of both face-to-face and online students well (see Figure 9). Effective instructor roles significantly contribute to the teaching presence within the Community of Inquiry (CoI) framework (Garrison, 2016), which can be particularly promising in HyFlex learning environments.

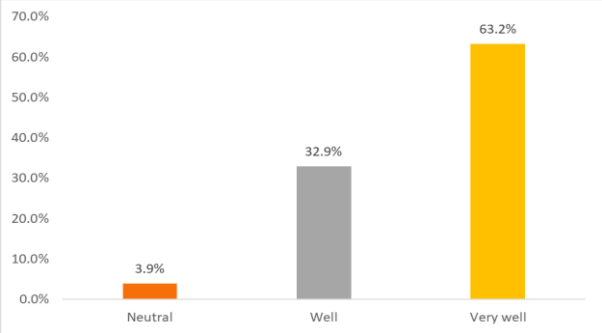


Figure 9
Instructor management of HyFlex learning

Open-ended responses provided additional insights. For example, Student 20 appreciated the instructor's openness and her facilitation of sharing sessions between online and offline learners. Student 31 highlighted the instructor's engaging approach with both groups:

> Student 20: "… the instructor is open and mixed the sharing with the online learners…"
>
> Student 31: "The way the instructor is so engaging with the online and face-to-face students…"

This positive feedback can be attributed to the instructor's extensive experience and knowledge of the course content, enabling her to engage all students effectively.

Despite some concerns from a few students about minimal impact from mixed modes, overall feedback on the instructor's performance was overwhelmingly positive. Nearly all students (97.4%, as shown in Figure 10) agreed that the instructor effectively facilitated interaction between face-to-face and online participants. Ensuring that no student, particularly those attending online, feels isolated is crucial in a HyFlex environment. The instructor's ability to integrate both modes successfully is a key factor in the effectiveness of the HyFlex learning model (Beatty, 2019), and it reflects the importance of teaching presence as described by Garrison (2016). In HyFlex learning, instructors must act as facilitators who bridge discussions and interactions between offline and online students.

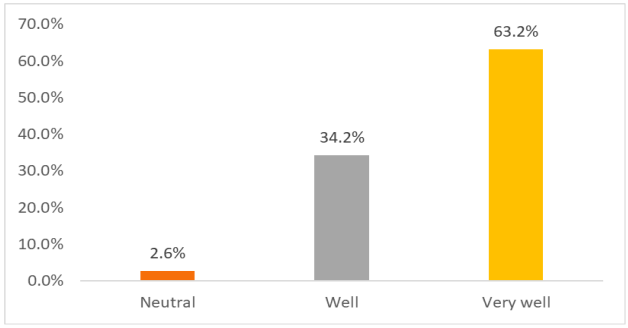


Figure 10
Instructor's performance

The study also highlighted the importance of additional support in HyFlex learning. The session was supported by an assistant, and 94.7% of students found the presence of the assistant helpful (see Figure 11). The assistant played a critical role in managing questions from online students via chat. This need for additional support aligns with findings from Bower et al. (2015), which emphasize the challenges of managing both offline and online learners simultaneously. According to Raes et al. (2020), having a second instructor to address questions from both groups can prevent online students from feeling isolated and ensure that face-to-face students see comments or questions from their online peers.

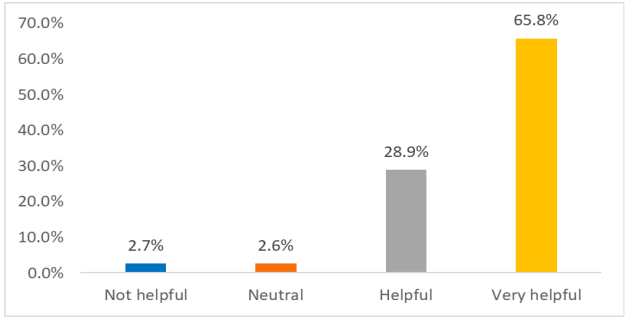


Figure 11
Assistance presence

In summary, the instructor's role in HyFlex learning primarily involves facilitating interactions and discussions among both face-to-face and online students. Effective class management is essential to ensure that all students feel involved. Additionally, having an assistant instructor is highly encouraged to support the smooth functioning of HyFlex sessions.

**Aspects of Teaching in Hyflex Learning That Effective**

This study also explored students' experiences regarding the aspects of teaching in HyFlex learning that they found effective. Table 3 presents the codes and themes derived from their responses.

Table 5
Aspects of effective teaching in HyFlex learning

| No. | Example of Responses | Codes | Themes |
|---|---|---|---|
| 1. | "The framework research Area was well explained" | Content | Information |
| 2. | "information and interaction" | Content | Information |
| 3. | "Link sharing" | Teaching Tool | Information |
| 4. | "the template made me rethink the elements of conceptual framework, very helpful." | Activity Sheet | Information |
| 5. | "Elicit and template for theoretical framework" | Activity Sheet<br>Teaching Tool | Information<br>Information |
| 6. | "the slides and also the instructor explanation explanations" | Teaching Tool<br>Instructor | Information<br>Instructor |
| 7. | "experienced & knowledgeable presenter" | Instructor | Instructor |
| 8. | "The way the instructor is so engaging with the online and face to face student" | Instructor<br>Interaction | Instructor<br>Interaction |
| 9. | "open minded discuss and mixed online sharing experiences" | Discussion and Sharing | Interaction |
| 10. | "Face-to-face" | Offline | Learning Mode |
| 11. | "Blended learning" | Mixed-mode | Learning Mode |
| 12. | "Demonstration with clear explanation" | Explanation | Teaching Method |
| 13. | "Question and Answer" | Question Technique | Teaching Method |
| 14. | "Demonstrating how to draw a TF diagram" | Demonstration | Teaching Method |
| 15. | "Give many examples" | Example | Teaching Method |
| 16. | "Hands-on activities" | Hands-on | Teaching Method |
| 17. | "Hands-on practices" | Hands-on | Teaching Method |
| 18. | "Clear explanation" | Explanation | Teaching Method |
| 19. | "Illustration and comments with examples, especially what is good and not good." | Illustrations and Example | Teaching Method |
| 20. | "Discussion" | Discussion | Teaching Method |
| 21. | "Very clear explanation with very good examples" | Explanation and example | Teaching Method |
| 22. | "Using examples let us know what Theoretical and Conceptual Framework are" | Example | Teaching Method |

Based on the thematic analysis in Table 3, five key aspects of effective teaching in HyFlex learning emerged (see figure 12):

1. **Information**: Effective teaching involves clear and comprehensive content presentation. Responses highlighted the importance of well-explained frameworks, useful teaching tools, and activity sheets that aid in understanding complex concepts.

2. **Interaction**: Engaging interactions between the instructor and students, as well as among students themselves, are crucial. Effective HyFlex teaching fosters meaningful exchanges, whether through open discussions, mixed online and face-to-face sharing, or interactive sessions.

3. **Instructor**: The role of the instructor is pivotal in HyFlex learning. Positive feedback emphasized the instructor's expertise, engagement with both online and face-to-face students, and ability to manage the learning environment effectively.

4. **Learning Mode**: The flexibility of learning modes, including face-to-face and blended learning, enhances the effectiveness of HyFlex teaching. Students appreciate the ability to choose or combine learning modes based on their preferences and needs.

5. **Teaching Method**: Diverse teaching methods contribute to effective HyFlex learning. Techniques such as hands-on activities, clear explanations, demonstrations, and the use of examples are valued by students for their role in reinforcing and clarifying learning.

In summary, effective teaching in HyFlex learning is characterized by clear information delivery, interactive engagement, knowledgeable instructors, flexible learning modes, and varied teaching methods. These aspects collectively contribute to an enhanced learning experience in a HyFlex environment. This finding aligns with previous research on HyFlex learning, such as studies conducted by Beatty (2019) and Leijon and Lundgren (2019). According to Beatty (2019), the success of HyFlex learning depends on factors such as the instructor's skills and knowledge in managing both online and offline learners, instructional design, and teaching strategies. Additionally, Leijon and Lundgren (2019) emphasized the importance of student interactions in HyFlex learning. Furthermore, the learning mode plays a crucial role in the effectiveness of HyFlex education.

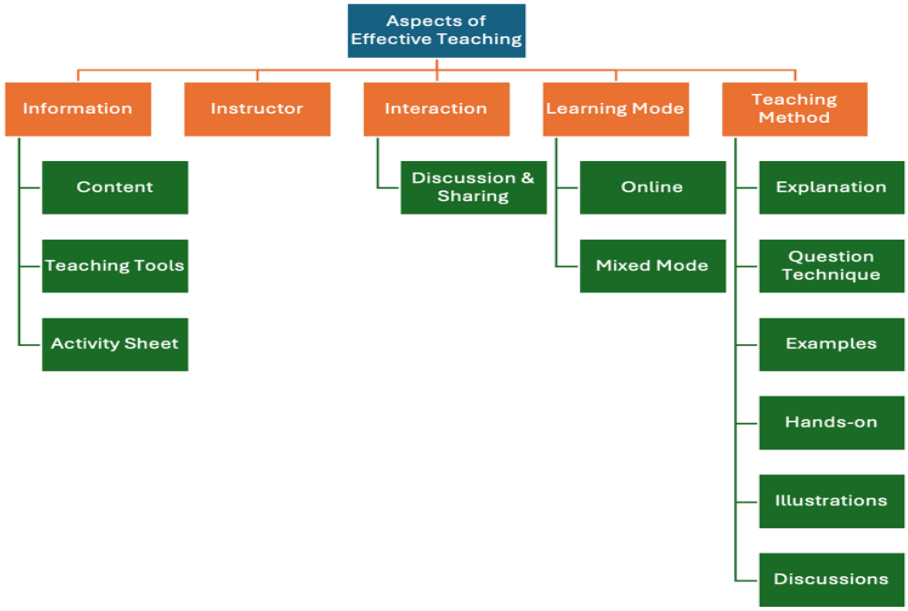


Figure 12
Aspects of effective teaching in HyFlex learning

*Suggestions for Improving Interaction and Collaboration among Participants in HyFlex Learning*

The study also revealed several students' suggestions for enhancing interaction and collaboration between online and offline participants in a HyFlex learning environment. Table 4 summarizes these suggestions.

Table 6
Suggestions to improve interaction and collaboration

| No. | Example of Responses | Codes | Themes |
|---|---|---|---|
| 1. | "active and positive participation" | Active Participation | Approach |
| 2. | "Providing templates prior to the webinar for students to use during the workshop would be very helpful." | Flipped Learning | Approach |
| 3. | "Smaller group" | Group Size | Approach |
| 4. | "Add more time" | Time | Duration |
| 5. | "Using good system" | System | Technical |
| 6. | "An extra camera showing the students attending in person" | Additional Camera | Technical |
| 7. | "probably the angle of the camera" | Camera Angle | Technical |
| 8. | "Maybe the instructor can wear portable microphone … when she moves from side to other side." | Portable Microphone | Technical |

The suggestions provided by students emphasize the need for both technical and pedagogical improvements to enhance interaction and collaboration in HyFlex learning environments. The key details of these suggestions are as follows (see Table 4 and Figure 13):

**1. Approach**: **Active Participation and Engagement**

Encouraging active and positive participation, along with providing resources like templates before workshops, were recommended to improve engagement and collaboration (e.g., Suggestions 1, 2, 3). Additionally, smaller group sizes can enhance individual participation and collaboration. These strategies can better prepare students for discussions and improve the overall learning experience.

**2. Duration**: **Time**

Increasing the duration of sessions was another suggestion (e.g., Suggestion 4). Allocating more time can facilitate deeper discussions and more meaningful interactions.

**3. Technical Aspects**: **System and Equipment**

Students recommended using reliable systems and additional equipment, such as extra cameras and portable microphones, to improve the quality of the online and offline interaction (e.g., Suggestions 5, 6, 7, 8). These technical improvements are crucial for ensuring clear communication and minimizing disruptions during the sessions.

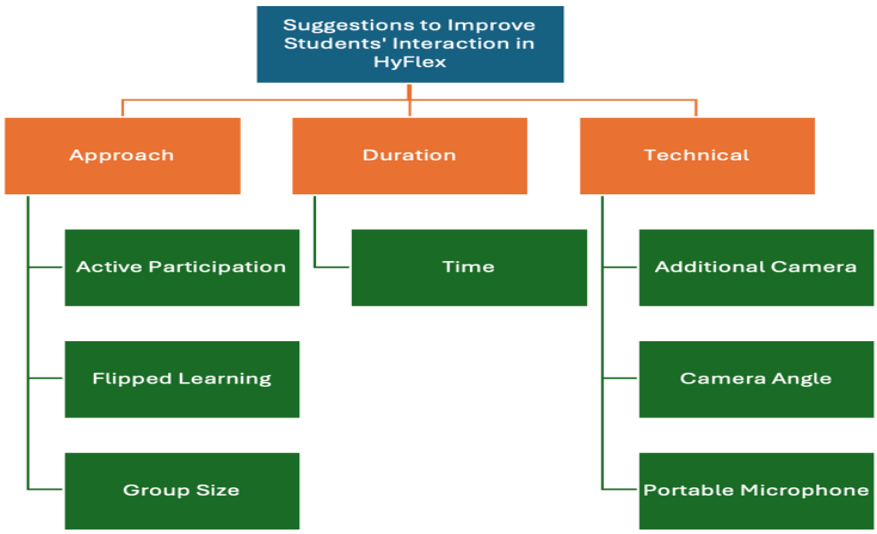


Figure 13
Suggestions for improving students' interaction in HyFlex learning

One online student highlighted a specific challenge: she was unable to hear the voices of face-to-face (f2f) participants, which limited her engagement. She suggested that an assistant could help by typing questions in the chat or announcing Q&A sessions, addressing the difficulties the instructor faced in managing a HyFlex class.

Student 72: "… I couldn't hear the voices of the F2F class students' questions because it wasn't like they wrote on chat. An assistant could help write on chat or announce Q&A. The instructor alone is challenging in managing a hybrid class."

Beatty (2019) emphasizes the necessity of adequate systems and equipment for effective interaction in HyFlex learning environments. This sentiment is echoed by Athens (2023), whose study revealed that students were dissatisfied with the technological performance of HyFlex classrooms, highlighting the urgent need to address these technical aspects. Additionally, Cumming et al. (2024) pointed out that challenges such as inadequate technology infrastructure further complicate the HyFlex model. Considering these challenges, a student in this study suggested that portable microphones could serve as an effective solution to enhance communication and engagement among participants.

Beyond the technical aspects, Raes et al. (2020) stressed the importance of incorporating specific activities to promote interaction between online and in-person participants. Activities like active learning, collaborative exercises, and group discussions are essential for fostering engagement. Careful planning of these activities before the class is crucial for their successful implementation.

Overall, these suggestions underscore the need for both technical improvements and well-considered instructional strategies to enhance interaction and collaboration in a HyFlex learning environment. By addressing these areas, a more cohesive and engaging learning experience can be achieved for all participants.

## CONCLUSION AND SUGGESTIONS

This study highlights the overall positive impact of HyFlex learning environments on students' educational experiences, emphasizing the flexibility and adaptability of the model in accommodating diverse learning preferences. Students reported high levels of comfort and satisfaction with both the course content and the technology used, indicating that the integration of face-to-face and online modes is generally effective. However, challenges persist, particularly in managing interactions between online and offline participants, which calls for improvements in technical setups and instructional strategies to enhance engagement and collaboration.

To optimize HyFlex learning, the study underscores the need for technical enhancements, such as advanced systems, additional cameras, and portable microphones, alongside pedagogical strategies like extended session durations, smaller group sizes, and active participation techniques. These findings align with prior research, which emphasizes the importance of instructor expertise, clear communication, and interactive teaching methods. By addressing these areas for improvement, HyFlex learning environments can better support a cohesive and engaging educational experience, fostering effective interaction and collaboration among all participants.

Additionally, this study reinforces the importance of teaching presence and social presence as outlined in the Community of Inquiry (CoI) framework (Garrison, 2016). Positive feedback regarding instructor engagement and the facilitation of interactions between face-to-face and online participants highlights the significance of these elements in creating a supportive and engaging learning environment. While the study did not delve deeply into cognitive presence, it did address general learning experiences, which were reported to positively impact students' overall educational outcomes.

The findings of this study carry significant implications for future policies and practices in HyFlex learning. Higher education institutions can utilise these insights to develop robust policies that support the effective implementation of HyFlex models. Practitioners are encouraged to upskill and reskill in managing learners across both offline and online modes, with an emphasis on fostering balanced and meaningful interactions.

Policymakers should consider establishing minimum teaching and learning competencies required for both educators and learners before promoting the widespread adoption of HyFlex models. Additionally, leaders in higher education are urged to provide institutional support, such as training programmes, technological resources, and infrastructure, while also recognising and rewarding educators who adopt and excel in this innovative approach.

By addressing these recommendations, HyFlex learning environments can evolve into more inclusive, effective, and sustainable educational models, ultimately benefiting

both educators and learners while setting a strong foundation for future educational practices.

## LIMITATIONS

This study has several limitations that should be acknowledged. Firstly, it focused exclusively on postgraduate students, whose learning needs and experiences may differ significantly from those of undergraduate students, particularly Gen Z learners, who tend to be more tech-savvy and familiar with digital tools and collaborative technologies. The findings might vary if conducted with a younger demographic, potentially offering different insights into the effectiveness of HyFlex learning. Secondly, the study concentrated on a single subject area—Research Methodology—which may not fully represent the varied impacts of HyFlex learning across different disciplines. Subjects requiring hands-on or highly interactive learning approaches, such as laboratory-based courses or creative arts, may present unique challenges and opportunities within the HyFlex format.

Additionally, the study did not account for potential confounding variables, such as students' prior knowledge and skills, learning preferences (face-to-face or online), motivation levels, and technological proficiency. These factors could have influenced their engagement and participation in HyFlex learning environments, potentially affecting the outcomes. Future research should consider these variables to provide more robust and generalisable findings.

To address these limitations, further research could explore HyFlex learning environments with undergraduate students to investigate how their technological familiarity and preferences shape their learning experiences. Examining HyFlex models in other subject areas, especially those with strong practical or experiential components, could provide deeper insights into how different disciplines adapt to this format. Future studies should aim to control for confounding variables, such as prior knowledge, motivation, and technological skills, to produce more reliable and accurate data on the effectiveness of HyFlex learning.

By adopting these approaches, future research can expand on the findings of this study, offering a broader understanding of how HyFlex learning can be optimized to meet the diverse needs of different student populations and academic disciplines. While this study serves as an important starting point, it highlights the need for continued exploration into the dynamics of HyFlex learning to maximize its potential in higher education.

## ACKNOWLEDGMENT

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## APPENDIX A

### HyFlex/Hybrid Learning Workshop Experience

Please submit feedback regarding the workshop you have just completed, including feedback on workshop structure, content, and instructor.

**Instructions:**

**Please tick (✓) the box that best represents your response for each question.**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Name (optional) | | | | | |
| 2. | Programme Enrolled | PhD | | Master's | | |
| 3. | Mode of Attendance | Face-to-face | | Online | Both | |
| 4. | How clear and understandable do you find the workshop content? | Very unclear | Unclear | Neutral | Clear | Very clear |
| 5. | How engaging do you find the workshops? | Very disengaging | Disengaging | Neutral | Engaging | Very engaging |
| 6. | The hybrid workshop is well-structured and organised | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
| 7. | How effective is the use of technology (e.g., slides, videos, online tools) during the workshops? | Very ineffective | Ineffective | Neutral | Effective | Very effective |
| 8. | How comfortable do you feel participating in workshop discussions (both online and face-to-face)? | Very uncomfortable | Uncomfortable | Neutral | Comfortable | Very comfortable |
| 9. | In your opinion, to what extent does the mixture of online and face-to-face students impact your learning experience? | No impact at all | Minimal impact | Moderate impact | Significant impact | Very significant impact |
| 10. | How well do you feel the instructor integrates both Webex online and face-to-face students into the workshop activities? | Very poorly | Poorly | Neutral | Well | Very well |
| 11. | How does the attendance mode of your peers (online or face-to-face) influence your participation in the workshop? | Strongly decreases my participation | Somewhat decreases my participation | No effect on my participation | Somewhat increases my participation | Strongly increases my participation |
| 12. | How helpful is the presence of the assistant facilitator on Webex online? | Very unhelpful | Not helpful | Neutral | Helpful | Very helpful |
| 13. | To what extent do you perceive the workshop environment as inclusive for both online and face-to-face students? | Not inclusive at all | Not inclusive | Somewhat inclusive | Inclusive | Very Inclusive |
| 14. | How well do you feel the instructor manages the needs of both face-to-face and online students? | Very poorly | Poorly | Neutral | Well | Very well |
| 15. | What aspects of the teaching do you find most effective? | | | | | |
| 16. | What suggestions do you have for improving interaction and collaboration between online and face-to-face students? | | | | | |