

Teachers and Students Perceptions on Hybrid Learning in Informatics

Department: Challenges and Benefits

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ABSTRACT

Hybrid learning has been adopted by colleges and universities after the COVID-19 pandemic era. This study aims to investigate the challenges and benefits of hybrid learning in Informatics engineering department. Teachers and students' perceptions were gathered by semi-structured interview to gain deeper information. Five teachers and five students were selected from Informatics department. The data gathered from semi-structured interview showed that both teacher and students experienced some challenges and benefits, which are technological challenges, engagement strategies, support and training, and flexibility and autonomy. This study result could be a beneficial insight for further research regarding hybrid learning.

Keywords: Hybrid, perceptions, challenges, and benefits.

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1. INTRODUCTION

Following COVID-19 pandemic, many colleges and universities have adopted hybrid learning models, also known as blended learning, is a popular educational approach that combines offline and online learning activities (Graham, 2019). The integration of hybrid learning aims to enhance the educational experience by incorporating online resources and activities with face-to-face instruction, creating a more enriched and flexible approach (Dziuban et al., 2018; Dziuban et al., 2018). Particularly in the field of informatics, where technology plays a central role in both education and professional practice, the implementation of hybrid learning methods in informatics departments not only aligns with the technological framework but also results in a comprehensive and adaptable educational framework (Graham, 2019; Boelens et al., 2017; Halverson et al., 2014).

The implementation of hybrid learning, however, comes with its own set of challenges. Effective deployment of hybrid learning environments can be complicated by issues such as technological integration, engagement, and equitable access to resources (Halverson et al., 2014; Brown et al., 2015). It is essential for teachers to continually improve their technological proficiency and adapt to new tools and platforms to keep pace with the evolving educational landscape (Hrastinski, 2019). Moreover, hybrid learning environments require meticulous design and facilitation to foster active participation and collaboration among students (Vaughan, 2014; Martin & Bolliger, 2018). Despite these challenges, hybrid learning offers numerous advantages that can significantly enhance the educational experience.

Informatics departments in universities are tasked with preparing students for careers in dynamic and rapidly evolving fields such as computer science, information technology, and data science. Given the pace of technological advancements, it is crucial for these departments to employ teaching methods that not only convey current knowledge but also instill the ability to adapt to future innovations. By combining online resources and activities with in-person instruction, hybrid learning offers a comprehensive educational experience that can accommodate diverse learning styles and schedules. This flexibility is particularly beneficial in informatics, where students must keep up with the latest technological trends and tools (Boelens et al., 2017).

Despite its many advantages, the implementation of hybrid learning also presents several challenges. Effective deployment requires careful planning and a robust technological infrastructure to support both online and offline components. Issues such as technological integration, student engagement, and equitable access to resources must be addressed to ensure that all students benefit

from this approach (Halverson et al., 2014); (Brown et al., 2015). Educators must continuously update their skills and adapt to new tools and platforms to maintain the relevance and effectiveness of their teaching methods. Individual educators are ultimately accountable for using technology, and hence even when provided tools, they can choose how to use technology. (Johnson et al., 2016). Furthermore, hybrid learning environments require thoughtful design and facilitation to foster active participation and collaboration among students (Martin & Bolliger, 2018).

Understanding the perspectives of educators and students on hybrid learning is crucial for identifying and overcoming these challenges. Research indicates that both groups recognize the potential benefits of hybrid learning, such as increased flexibility and enhanced learning experiences. However, they also point out the need for adequate support and training to maximize these benefits (Boelens et al., 2017; Means et al., 2014). By gaining insight into these perspectives, educational institutions can develop more effective hybrid learning strategies that address the specific needs and preferences of their students and faculty (Bernard et al., 2014).

This study explores the perspectives of teachers in the informatics department on hybrid learning, focusing on the challenges they face and the benefits they experience (Boelens et al., 2017; Dziuban et al., 2018). By understanding these views, the research aims to identify strategies to improve hybrid learning environments (Bernard et al., 2014; Graham, 2019). Key research questions include identifying specific challenges and advantages recognized by teachers and students and how these insights can guide the development of more effective teaching-learning methods. The ultimate goal is to contribute to the ongoing discussion on hybrid learning in informatics education and provide practical suggestions for its enhancement (Halverson et al., 2014; Brown et al., 2015).

Students appreciate the flexibility of hybrid learning, which allows them to access course materials and participate in classes from any location. This flexibility is particularly beneficial for students balancing education with other responsibilities, such as work or family commitments. The ability to access lectures and assignments online enables students to create their own schedules and learn at their own pace, which can lead to better time management and reduced stress (Riaz et al., 2023). Additionally, hybrid learning environments often incorporate asynchronous components, providing students the opportunity to review materials multiple times for better comprehension and retention (Raes, 2022).

Moreover, the convenience of hybrid learning can facilitate participation for students with disabilities or those living in remote areas, thereby promoting inclusivity and accessibility in education (Detyna et al., 2023 ; (Umiyati, 2022). For instance, students who might have physical disabilities that make commuting difficult can benefit greatly from the ability to attend classes online. Similarly, those living in geographically isolated regions can access quality education without the need to relocate. This inclusivity extends to diverse learning styles as well, as students can choose the environment that best suits their individual needs, whether that be the focused environment of their home or the interactive setting of the classroom (Detyna et al., 2023).

Hybrid learning enables students to learn at their own pace and revisit online materials as needed, promoting a more personalized learning experience (Raes, 2022). This approach caters to diverse learning styles and paces, allowing students to take control of their learning journey. Students who may need more time to understand a concept can review recorded lectures or supplementary materials multiple times, ensuring they grasp the content fully before moving on. Conversely, students who quickly understand the material can proceed without waiting for the entire class to catch up, thereby maximizing their learning efficiency (Raes, 2022; Detyna et al., 2023).

Additionally, hybrid learning environments provide students with the flexibility to manage their study schedules around other commitments such as part-time jobs, internships, or family responsibilities. This flexibility is especially crucial for adult learners or non-traditional students who juggle multiple roles (Riaz et al., 2023). The ability to revisit online materials at any time also supports continuous learning and retention, as students can periodically review past lessons to reinforce their knowledge, which is particularly beneficial for subjects that build on previously learned concepts (Shail, 2019).

Similar to teachers, students face technological challenges, including poor internet connectivity and lack of access to necessary devices, which can hinder their ability to fully participate in hybrid learning (Riaz et al., 2023). For many students, unreliable internet access means frequent disruptions during live classes, which can result in missed information and decreased engagement. These disruptions are particularly challenging during synchronous sessions, where real-time interaction is crucial for understanding and participation (Detyna et al., 2023).

Moreover, the digital divide exacerbates educational inequalities. Students from lower socioeconomic backgrounds may not have access to high-quality devices such as laptops or tablets,

relying instead on smartphones that are not ideal for extended learning activities (Alhusban, 2022). This lack of access to appropriate technology can affect their ability to complete assignments, participate in discussions, and fully engage with digital learning materials (Brisse et al., 2022). Additionally, students with limited technological skills may find it difficult to navigate online platforms, further impeding their learning experience (Riaz et al., 2023).

2. METHOD

The study employs a qualitative research design to explore teachers' perceptions of hybrid learning, chosen for its ability to provide in-depth understanding of participants' experiences. The participants, selected through purposive sampling, include five teachers and five informatics students with experience in hybrid learning to ensure diverse insights and theme saturation. Five teachers who interviewed should be divided into two groups: IT and non-IT teachers in informatics study program. Five students were selected from several classes to be interviewed to gain deeper perspectives.

Data collected using semi-structured interviews designed to elicit detailed responses about their experiences and perceptions. Recruitment occurred through school networks, professional organizations, and social media, with interviews conducted via video conferencing to ensure accessibility. Informed consent obtained, emphasizing participants' rights and confidentiality.

Data analysis involved transcription of interviews, followed by thematic analysis, including familiarization with the data, initial coding, theme development, review and refinement, and final theme definition and naming, supported by direct quotes from the interviews. Ethical considerations include protecting participants' identities, ensuring voluntary participation, and secure data storage. All participants were assigned individual codes to ensure clarity and accuracy in reporting. For example, (T1) and (S1) refer to (teacher 1) and (student 1), respectively. All qualitative data were analyzed using thematic coding to identify and analyze themes in the dataset. The table below shows the demographics of the participants.

Table 1. Participants' demographic.

No	Participant	Gender	Age	Status
1	Teacher 1	F	>30	IT Teacher
2	Teacher 2	M	>30	Non-IT Teacher
3	Teacher 3	M	>30	Non-IT Teacher
4	Teacher 4	F	>30	IT Teacher
5	Teacher 5	M	>40	IT Teacher
6	Student 1	M	20-30	IT Student
7	Student 2	M	20-30	IT Student
8	Student 3	F	>30	IT Student
9	Student 4	F	20-30	IT Student
10	Student 5	M	20-30	IT Student

3. RESULT AND DISCUSSION

Result

Semi-structured interview was administered to gather the information regarding teachers and students' perceptions of hybrid learning. The qualitative data from interviews provided deeper insights into the survey results. Thematic analysis revealed several key themes:

Table 2. Key characteristic of teachers' and students' perceptions : challenges

No	Code Categories	Indicators Challenges	Frequencies
1	Technological Challenges	Difficulties with internet connectivity	8 (both)
		Not-user friendly platforms	7 (both)
2	Engagement Strategies	The need for innovative engagement strategies	5 (teachers)
		Interactive elements were highlighted	8 (both)
3	Support and Training	The need for professional development	4 (teachers)
		The need for support in using LMS	5 (both)

Table 3. Key characteristic of teachers' and students' perceptions : benefits

No	Code Categories	Indicators Benefits	Frequencies
1	Flexibility and Autonomy	Valued the ability to manage time Allowed to experiment teaching method	9 (both) 3 (teachers)

Table 2 and Table 3 presents the results of semi-structured interview that was manually coded into four categories using thematic analysis, including technological challenges, engagement strategies, flexibility and autonomy, and support and training. A more detailed explanation is provided below in discussion.

Discussion

Technological Challenges

Both teachers highlighted significant issues related to the internet connectivity, a problem that severely hindered their ability to participate fully in the online components of hybrid courses. These connectivity issues were often exacerbated in regions with poor infrastructure, where reliable internet access is not guaranteed (Martin & Bolliger, 2018). One of them stated:

"Internet connectivity has been a significant challenge during hybrid learning. During live lectures, frequent connection drops disrupt the session and make it hard to keep students engaged. This often leads to important parts of the lecture being missed, requiring me to repeat sections, which is inefficient. Uploading large files, such as recorded lectures or multimedia content, is also problematic due to slow and unreliable internet. To mitigate these issues, I have started pre-recording lectures and uploading them in advance. Additionally, I provide downloadable resources to ensure students have access to the necessary materials regardless of their internet stability. While these strategies help, the persistent connectivity issues remain a major obstacle." (T1)

"These connectivity issues have significantly impacted my learning experience. I often find myself struggling to keep up with the class due to missed information during live sessions. I also spend a lot of time waiting for materials to download or videos to buffer, which reduces the time I have for studying and completing assignments. To cope, I rely heavily on lecture notes and other resources provided by the teacher, but this is not always sufficient." (S4)

One of solution to address the challenges of internet connectivity in hybrid learning is to design effective online courses by recording them using tools such as Zoom or Loom. Recording lectures and instructional materials ensures that students can access these resources at their convenience, accommodating varying schedules and mitigating the impact of unstable internet connections (Brown et al., 2015; Nkomo & Daniel, 2022). This approach also allows for consistent delivery of course content, ensuring that all students receive the same information regardless of when they access the material. Additionally, the duration of these recorded courses should be carefully considered. Shorter, more concise modules can enhance engagement and make it easier for students to retain information, particularly in an online setting where attention spans can be shorter (Gamage et al., 2022). By breaking down content into manageable segments, educators can facilitate better understanding and retention. This strategy not only addresses the distraction of internet connectivity issues but also promotes a more flexible and effective learning environment.

Both of them also reported that learning management systems (LMS) and other online educational platforms were often not user-friendly, creating barriers to their effective utilization (Moorhouse, 2020). Teachers found themselves spending considerable time troubleshooting technical problems and guiding students through the use of these systems, detracting from the time available for actual instruction and interaction (Martin & Bolliger, 2018). Some teacher and student stated:

"I find that many of the LMS and online educational platforms we use are not very user-friendly. The interfaces are often cluttered and difficult to navigate, which can be frustrating when trying to set up courses or upload materials." (T1)

"The navigation is not straightforward, and it often takes a lot of time to find the information or resources I need." (S5)

One of the primary solutions is to provide comprehensive training and professional development for educators. According to recent studies, ongoing training can significantly improve teachers' proficiency with LMS and other digital tools, reducing the time spent troubleshooting and increasing their confidence in using these platforms effectively (Kintu et al., 2017). Institutions should invest in regular workshops and personalized coaching sessions that focus on the practical use of LMS features and troubleshooting common issues.

According to (Al-Sharidah, 2022), targeted training programs help teachers develop the necessary skills to effectively navigate and utilize these platforms, thereby reducing the time spent troubleshooting technical issues and increasing the time available for actual instruction and interaction (Al-Sharidah, 2022; Dervishi & Vrapic, 2022). LMS platforms should include interactive tutorials and help guides that provide step-by-step instructions on using various features. These resources can help users find immediate solutions to common problems and enhance their overall experience with the platform. According to (Sedivy, 2011) integrating such support materials within the LMS can empower users to troubleshoot issues independently, reducing the reliance on external support.

Engagement Strategies

Teachers emphasized the necessity of innovative engagement strategies to keep students motivated and engaged. They highlighted the importance of integrating interactive elements such as quizzes, discussion forums, and group projects, which were particularly noted for their effectiveness in maintaining student interest and participation. There is a teacher stated:

"I've faced several challenges while teaching hybrid learning classes. One major issue is maintaining consistent student engagement, especially for those attending remotely. Many students seem to struggle with distractions at home, leading to lower participation. Additionally, internet connectivity problems are frequent, causing disruptions during live sessions and making it difficult for students to keep up with the lecture. Another significant challenge is the lack of real-time interaction and immediate feedback, which are more easily managed in a traditional classroom setting." (T5)

Innovative engagement strategies, such as incorporating interactive multimedia content and collaborative tools, are crucial in maintaining student motivation and participation in a hybrid setting that can enhance student engagement and learning outcomes (Boelens et al., 2017; Martin & Bolliger, 2018; Bawa, 2020; Hew et al., 2016). Moreover, ensuring robust technological infrastructure is essential to mitigate connectivity issues and provide equitable access to learning resources, which is a significant concern in hybrid learning environments (Van Nuland et al., 2020). Timely feedback mechanisms, such as real-time assessments and immediate responses to student inquiries, are also vital in helping students understand and correct their mistakes promptly, thereby improving their learning outcomes (Kuo et al., 2014). Addressing these aspects through comprehensive support and continuous professional development for educators can significantly enhance the hybrid learning experience (Trust & Whalen, 2020).

Interactive elements such as quizzes not only serve as a tool for assessment but also as a means to stimulate active learning and immediate feedback, which can reinforce understanding and retention of course material. Discussion forums provide a platform for students to engage in meaningful dialogue, share ideas, and collaborate on problem-solving, which can foster a sense of community and enhance critical thinking skills. Group projects, on the other hand, encourage teamwork and the development of interpersonal skills, as well as the application of theoretical knowledge to practical scenarios (Dumford & Miller, 2018).

Furthermore, the integration of gamification elements, such as leaderboards and badges, has been shown to significantly boost student engagement by introducing a competitive element to learning. Gamification can make learning more enjoyable and can motivate students to participate more actively (Subhash & Cudney, 2018). Additionally, the use of multimedia resources, including videos, podcasts, and interactive simulations, can cater to various learning styles and make complex concepts more accessible and understandable (Vaughan, 2014). Recent studies have also highlighted the importance of personalized learning paths facilitated by adaptive learning technologies. These technologies use algorithms to tailor educational content to the individual needs and pace of each student, thus providing a more personalized and effective learning experience (Bishop & Verleger, 2013). This approach not only helps in maintaining student engagement but also ensures that each student can achieve their full potential by receiving the right level of challenge and support.

Moreover, the incorporation of real-world applications and problem-based learning scenarios in hybrid learning environments can make the learning experience more relevant and engaging for students. By connecting theoretical knowledge with practical applications, students can see the value and implications of what they are learning in real-world contexts, which can significantly enhance their motivation and engagement (Raes, 2022). So, innovative engagement strategies are essential for maintaining student interest and participation in hybrid learning environments. By incorporating interactive elements, gamification, multimedia resources, adaptive learning technologies, and real-world applications, educators can create a dynamic and interactive learning environment that not only enhances student engagement but also improves learning outcomes. These strategies are crucial for fostering a sense of community, promoting active learning, and ensuring that students are well-prepared

for real-world challenges.

Support and Training

There was a clear need expressed by teachers for ongoing professional development to effectively integrate technology into their teaching practices. The rapid evolution of educational technology necessitates continuous learning and adaptation on the part of educators to ensure that they are utilizing the most effective and up-to-date tools available. Teachers reported that without proper training, the implementation of hybrid learning can be overwhelming and less effective. Professional development programs that focus on the pedagogical use of technology, instructional design for online learning, and strategies for engaging students in a hybrid environment are essential (Hrastinski, 2019). One of teacher stated:

"One of the main challenges I face with hybrid learning is the lack of adequate support and training to effectively manage this new teaching format. The shift to hybrid learning has required me to adopt various new technologies and teaching methods, which I was not fully prepared for. This lack of preparation has led to a significant amount of time spent on figuring out how to use these tools, often during live sessions, which disrupts the flow of teaching and detracts from the learning experience." (T3)

Teachers also emphasized the importance of training that goes beyond basic technical skills. Effective professional development should include training on how to design and deliver hybrid courses that are pedagogically sound and engaging. This includes understanding how to use digital tools to create interactive and collaborative learning experiences, how to assess student learning in an online environment, and how to provide meaningful feedback using digital platforms. Additionally, teachers highlighted the need for ongoing support and resources, such as access to instructional designers and technology specialists who can assist with course development and troubleshooting (Means et al., 2014; Vaughan, 2014)

Similarly, students indicated a need for more support in using learning management systems (LMS) and other digital tools. Many students reported feeling unprepared to navigate the technological aspects of hybrid learning, which can lead to disengagement. Providing comprehensive orientation programs for new students that include training on how to use the LMS, access online resources, and participate in virtual classes can help alleviate these issues. Ongoing technical support and readily available help desks are also critical for assisting students with any technological challenges they encounter throughout their courses (Graham, 2019; Dziuban et al., 2018)

Furthermore, the effectiveness of hybrid learning environments is significantly enhanced when both teachers and students are proficient in using the available technologies. This proficiency can be achieved through targeted training programs that address the specific needs of each group. For example, workshops and webinars tailored to teachers might focus on advanced features of educational software, innovative teaching strategies, and methods for fostering online student engagement. For students, training sessions might cover efficient study habits in a hybrid setting, tips for effective online communication, and strategies for self-regulated learning (Boelens et al., 2017 ; Halverson et al., 2014)

One of teacher stated:

"I believe structured training programs focused on the use of educational technology would be highly beneficial. This could include workshops on how to use specific software, webinars on best practices for hybrid teaching, and one-on-one support sessions to address individual concerns. Ongoing professional development and access to a support network where I can share experiences and solutions with other educators would also be valuable." (T4)

Recent studies also suggest that peer support networks can play a vital role in the successful implementation of hybrid learning. For teachers, professional learning communities (PLCs) provide a platform to share best practices, discuss challenges, and collaborate on developing new instructional strategies. For students, peer tutoring programs and study groups can offer additional support and foster a collaborative learning environment. Encouraging the formation of these networks can help create a supportive community that enhances the overall learning experience (Vaughan, 2014; Martin & Bolliger, 2018).

Therefore, the necessity for ongoing support and training is paramount in maximizing the potential of hybrid learning environments. Ensuring that teachers have access to continuous professional development and resources, and that students receive adequate training and technical support, are critical steps in fostering effective hybrid learning. By addressing these needs, educational institutions can create more engaging, efficient, and equitable learning experiences for all participants.

Flexibility and Autonomy

The flexibility offered by hybrid learning was highly valued by both teachers and students, emerging as one of the most appreciated aspects of this educational approach. Students particularly appreciated the ability to manage their time and learn at their own pace, which allowed for a more personalized learning experience. This flexibility enabled students to balance their academic responsibilities with personal and professional commitments, making education more accessible to a diverse student population, including those who may be working part-time or have family obligations (Graham, 2019;Hrastinski, 2019).

Hybrid learning's structure allows students to revisit course materials, engage with multimedia content, and complete assignments at their own convenience, which can enhance understanding and retention. This self-paced learning environment supports different learning styles and paces, thereby accommodating students who may need more time to grasp complex concepts or those who prefer to move quickly through familiar material. The ability to tailor learning schedules according to individual needs can significantly reduce stress and improve overall academic performance (Dziuban et al., 2018; Halverson et al., 2014). One of student stated:

"The availability of recorded lectures means I can learn at times that suit me best, whether early in the morning or late at night. This flexibility is crucial as I juggle my coursework with part-time work and other personal responsibilities. The autonomy to pause, replay, and review lecture materials at my own pace has significantly improved my comprehension of complex topics." (S5)

Teachers, on the other hand, noted that hybrid learning provided opportunities to experiment with different teaching methods, enhancing their pedagogical practices and potentially improving student learning experiences. The hybrid model encourages educators to blend traditional lectures with innovative online tools and interactive activities, fostering a more engaging and dynamic classroom environment. For example, teachers can utilize flipped classroom techniques, where students first engage with new content online and then apply their knowledge through interactive activities during face-to-face sessions. This approach not only promotes active learning but also allows teachers to identify and address learning gaps more effectively (Boelens et al., 2017 ; (Vaughan, 2014). One of teacher stated:

"Hybrid learning has allowed me to manage my teaching responsibilities with much greater flexibility. I can record lectures and upload them for students to view at their convenience, which means I am not tied to a specific class time. This flexibility has given me the autonomy to explore and integrate various educational technologies and resources into my teaching. For example, I use interactive tools and multimedia content to create a more engaging and dynamic learning environment." (T2)

Moreover, the flexibility of hybrid learning environments supports continuous professional development for educators. By incorporating various digital tools and resources, teachers can stay updated with the latest technological advancements and teaching strategies, thereby enhancing their instructional skills. The ability to adapt and integrate different educational technologies enables teachers to provide more diverse and effective learning experiences, ultimately benefiting student outcomes (Means et al., 2014).

Recent research has also highlighted the benefits of hybrid learning in fostering autonomy and self-regulation among students. By providing a structure that supports independent learning, hybrid models encourage students to take greater responsibility for their educational progress. This autonomy not only builds critical time-management and organizational skills but also prepares students for lifelong learning and adaptability in their future careers(Subhash & Cudney, 2018; Martin & Bolliger, 2018).

Therefore, the flexibility and autonomy afforded by hybrid learning are highly valued by both teachers and students. For students, the ability to manage their time and learn at their own pace leads to a more personalized and effective educational experience. For teachers, the opportunity to experiment with various teaching methods and continuously develop their skills enhances their pedagogical practices. The hybrid learning model thus represents a significant advancement in educational strategies, promoting a more adaptable, engaging, and inclusive learning environment. Discussion is the most important part of the entire contents of scientific articles. The objectives of the discussion are: answering research problems, interpreting findings, integrating findings from research into existing sets of knowledge and composing new theories or modifying existing theories.

4. CONCLUSION

Hybrid learning offers significant benefits, including flexibility and personalized learning experiences for students and teachers. Students can learn at their own pace, revisiting online materials to enhance comprehension and retention (autonomy learning). This flexibility is especially beneficial for those balancing education with other responsibilities such as work. However, both students and teachers face challenges such as poor internet connectivity and not-user friendly platform, which hinder participation and engagement. Furthermore, the necessity of engagement strategies by the teacher to keep students' engagement. To maximize the effectiveness of hybrid learning, educational institutions must provide adequate training, and support to overcome these barriers.

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