Reflections - Remote Teaching Patterns in a Hybrid Teaching Context

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Abstract

Our essay critically examines the intricate interplay between established remote teaching patterns and the evolving dynamics of hybrid teaching, marking the shift from fully remote to a blended educational model. Drawing on the 2022 publication, "From Classroom to Online Education – An Educator's Insights," this paper reevaluates previously identified patterns within the context of the evolving complexities of teaching. A noteworthy challenging task in this landscape is the management of hybrid models, where classroom and remote teaching intersect during scheduled class hours, surpassing the difficulties encountered during the initial Covid lockdown period.

During the Fall 2022 to Spring 2024 timeframe, the primary researcher, directed her attention to applying existing patterns. This evaluation is grounded in narratives drawn from her teaching experiences, shedding light on the practical implications and effectiveness of these patterns in the evolving educational landscape.

To establish a comprehensive framework, our paper provides precise definitions for key terms such as asynchronous, synchronous, hybrid/blended, flipped, and HyFlex. These definitions serve as a foundational pillar, ensuring a shared understanding as the primary researcher assesses the applicability of existing patterns, abstaining from actively seeking new ones.

In essence, "Reflections – Remote Teaching Patterns in a Hybrid Teaching Context" not only functions as a personal narrative of the primary researcher's experiences but also contributes profound insights to the broader discourse on the future of education. It encapsulates pivotal themes, including adaptability, resilience, and the continual pursuit of effective teaching strategies within the context of a rapidly evolving educational landscape. This paper assesses and examines selected educational paradigms. We include survey findings from a recent survey of 213 students in our aim to verify the patterns.

CCS Concepts

• **Applied computing** → **E-learning**; • **General and reference** → **General conference proceedings**.

Keywords

Distance learning, educational technology, learning management system, online education/teaching, patterns, student engagement

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1 Introduction

The goal of this paper is to improve selected remote teaching patterns, using a survey which relates to the same patterns describing the characteristics of the student population, and their contributions to current trends.

As of this writing, in the Spring of 2024, we are still trying to return to 'normal' face-to-face classroom interaction. It is becoming increasingly clear to educators that this is not happening. Students and teachers have learned to appreciate the freedom of remote learning/teaching, while educational institutions have developed varying degrees of acceptance of a new model that incorporates virtual learning models. We find ourselves navigating an increasingly challenging reality compared to the Covid lockdown period. As educators, we are tasked with managing predominantly hybrid teaching models that blend classroom and remote instruction, often concurrently during class hours. Teaching sessions with a mix of students physically present and others accessing remotely present the most formidable struggle we have encountered in our extensive careers. Definitions and explanations of teaching models involving remote education may vary depending on the source. In our work, we are using the following terminology:

- `Asynchronous`: The order sequence of teachers posting the readings, videos, and other materials online before the class period, and students respond to essay prompts, problems, quizzes, etc., by a given due date/time. [26]
- `Synchronous`: A learning event where the learner and educator are in the same place at the same time. [5] This can be in a face-to-face classroom or a web conferencing application.
- `Hybrid/Blended`: Blended Learning, also referred to as 'Hybrid Learning,' combines traditional face-to-face classroom instruction with online learning. [16]
- `Flipped`: A pedagogical classroom model in which the typical lecture and homework elements of a course are reversed. Short video lectures are viewed by students at home before the class session, while in-class time is devoted to exercises, projects, or discussions. [10]
- `HyFlex`: The hybrid flexible, or HyFlex course format is an instructional approach that combines face-to-face (F2F) and online learning. Each class session and learning activity is offered in-person, synchronously online, and asynchronously online. [11]

We reviewed some of the literature regarding learning environments research. HyFlex came about due to the pandemic. There is an existing literature review about this approach [7]. We are also interested in student perspectives. We have a collection of student data to add to the verification of the study. Our research has only been the opinion of the educator and faculty until now. Moreover, it warrants acknowledgment that this paper stems from a comprehensive survey undertaken amongst educators, garnering a corpus of 213 responses collected from students across the college and the tri-state New York City area.

The structure of this paper unfolds as follows: it begins with an introduction, followed by the evaluation and analysis of selected emerging educational paradigms, focusing on the original 15 patterns. The discourse then shifts to anticipate future trends and challenges. Subsequently, an exploration of the primary investigator's latest teaching encounters, further reinforced through a survey report. Finally, it culminates in a comprehensive discussion and summary. Appendix A contains the survey questions. Appendix B contains the recommendations.

2 Evaluation and Analysis of Emerging Educational Paradigms vs Patterns

As education systems continue to evolve in response to technological advancements and shifting pedagogical paradigms, the need for innovative approaches to teaching and learning becomes increasingly apparent. In the context of remote teaching within a hybrid educational environment, educators face unique hurdles that demand creative solutions to engage students effectively and promote meaningful learning experiences. In this section, we undertake a comprehensive evaluation and analysis of 8 selected emerging educational paradigms identified through an in-depth exploration. Each with their own distinctive features and recommendations, offer valuable insights into the future direction of education in a digitally driven world. Detailed explanations of each model are provided in Appendix B, [see Figure 4], enriching our understanding of the strategies and considerations essential for navigating the complexities of hybrid teaching environments, however Table 1: Selected Emerging Educational Paradigms has a concise listing.

2.1 Pattern for Engagement and Interaction

The patterns for engagement and interaction focus on creating a community of trust within the virtual class to enable students to collaborate, promote students' active participation in a class, and foster a conducive environment for the learning process.

Personal Introductions

Personal introductions serve as a cornerstone for building a sense of community in virtual classrooms. By facilitating initial connections between educators and students, this pattern fosters engagement and collaboration throughout the semester. Through the sharing of teaching experiences and recommendations, educators can leverage personal introductions to establish rapport and create a supportive learning environment conducive to student success.

Class Buddy

The class buddy pattern promotes peer-to-peer interaction and support by assigning each student a partner or small group for the duration of the semester. While offering opportunities for collaboration and shared learning experiences, implementing this pattern requires careful consideration of group dynamics and individual student needs. By sharing teaching experiences and recommendations, educators can effectively integrate class buddies into their courses to enhance student engagement and academic performance.

Discussion Board

Utilizing discussion boards encourages active participation and critical thinking among students by providing a platform for asynchronous communication. By sharing insights and reflections on course topics, students engage in meaningful dialogue and collaborative learning experiences. Educators can optimize the use

Table 1: Selected Emerging Educational Paradigms

Learning Paradigms - Patterns Description
Project-Based Learning (PBL) - Grown-up Student Engage in real-world projects that require critical thinking, problem-solving, and collaboration. PBL encourages active learning and allows students to explore topics deeply.
Flipped Classroom - Structured For Self-Study Learn foundational concepts through self-paced activities outside of class, such as watching videos or reading texts. Classroom time is then dedicated to interactive discussions, collaborative activities, and application of knowledge.
Personalized Learning - Unique Questions and Answers Tailor instructions to individual student needs and interests is the focus of personalized learning; often utilizes adaptive learning technologies and flexible pacing to accommodate diverse learning styles and abilities.
Experiential Learning - Class Buddy Emphasize hands-on experiences, such as internships, fieldwork, simulations, and service-learning projects; Learners actively engage with the material in authentic contexts, deepening their understanding and skills.
Online Learning - Discussion Board Online education platforms offer flexible learning opportunities, allowing students to access course materials and interact with instructors and peers remotely; can accommodate diverse schedules and preferences for asynchronous or synchronous learning.
Competency-Based Education (CBE) - Daily Learning Logs Focus on mastering specific competencies or skills rather than completing traditional courses or credits. Students' progress at their own pace, demonstrating proficiency through assessments aligned with learning objectives.
Blended Learning - Embracing the Mobile Device Combining traditional face-to-face instruction with online components, combines the advantages of both modalities. It offers flexibility, personalized learning experiences, and opportunities for student collaboration and engagement.
Inquiry-Based Learning - Writing To Learn Encourages questions, investigating topics, and comprehending through exploration and discovery. This fosters critical thinking, and problem-solving skills.

of discussion boards by providing clear guidelines and facilitating structured discussions that promote deeper engagement and knowledge acquisition.

Writing to Learn

Integrating writing activities into class sessions enhances student comprehension and retention of course material. By prompting students to articulate their thoughts and ideas through written expression, this pattern promotes deeper understanding and reflection. Educators can leverage writing to learn activities to reinforce key concepts, encourage critical thinking, and foster meta-cognitive skills development among students.

Daily Learning Logs

Daily learning logs provide a low-pressure mechanism for students to engage with course content regularly. By prompting students to reflect on their learning experiences and document their progress, this pattern promotes self-directed learning and accountability. Educators can incorporate daily learning logs into their courses to encourage consistent engagement and facilitate ongoing self-assessment and reflection.

Getting out of the Void

The pattern of getting out of the void emphasizes the importance of verbal interaction and visual contact in virtual learning environments. By incorporating opportunities for synchronous communication and encouraging camera usage during online sessions, educators can enhance student engagement and connection. Implementing this pattern requires initiative-taking measures to address technological barriers and promote active participation in virtual classrooms.

Grown-up Student

Treating students as responsible adults empowers them to take ownership of their learning journey and academic success. By establishing clear expectations and boundaries, educators foster a culture of accountability and self-directed learning. Through the sharing of teaching experiences and recommendations, educators can effectively support students in navigating their educational experiences and developing essential life skills.

2.2 Patterns for Course Design

The patterns for course design deal with creating classes that are tailored to online teaching and interactions.

Embracing the Virtual Class

Embracing the virtual class involves designing online courses that leverage the unique affordances of digital technology. By creating interactive and engaging learning experiences tailored to the online medium, educators can maximize student engagement and learning outcomes. Educators can optimize the design of virtual classes by incorporating real-world applications, clear communication channels, and structured course materials that support student learning and success.

Structured for Self-Study

Structuring online courses for self-study enhances student autonomy and agency in the learning process. By organizing course content in a clear and accessible manner, educators empower students to navigate their learning journey independently. Educators can design self-study-friendly courses by providing informative headings, clear instructions, and accessible resources that support student comprehension and engagement.

Interactive Learning

Integrating interactive learning activities into online courses promotes student engagement and active participation. By leveraging interactive learning systems and tools, educators can create dynamic and immersive learning experiences that stimulate student curiosity and collaboration. Educators can enhance the effectiveness of interactive learning by incorporating real-world scenarios, case studies, and multimedia resources that facilitate exploration and discovery.

2.3 Patterns for Secure Exams

Creating exams that can be administered online requires serious considerations to avoid or at least reduce the possibility of cheating. When combined, the patterns in this chapter make it difficult to cheat on exams.

Unique Questions and Answers

Designing exams with unique questions and answers helps maintain academic integrity and prevent cheating in online assessments. By creating custom exam content tailored to each student, educators ensure fairness and validity in the assessment process. Educators can enhance exam security by leveraging question banks, randomization features, and proctoring tools that deter cheating and uphold academic standards.

On-Camera Exams

Using cameras during online exams provides visual oversight and monitoring of student behaviour to prevent cheating. By requiring students to turn on their cameras during exams, educators can verify student identities and deter academic dishonesty. Educators can implement on-camera exams effectively by establishing clear guidelines, communicating expectations, and addressing student privacy concerns to maintain trust and integrity in the process.

Exam Schedule

Scheduling online exams strategically ensures fairness and minimizes opportunities for cheating. By setting reasonable time limits and adhering to a one-time event schedule, educators create a controlled testing environment that promotes academic honesty and integrity. Educators can optimize exam schedules by considering factors such as cognitive load, fatigue, and student accessibility to online resources. By implementing thoughtful exam scheduling practices, educators can mitigate potential challenges and enhance the overall testing experience for students.

2.4 Patterns for Technology

Teaching in a virtual setting requires some level of digital technology to enable communication and access to the learning material. The patterns in this section are helpful when choosing and using these tools.

Embracing the Mobile Device

Designing courses that accommodate mobile devices facilitates accessibility and flexibility for students with diverse learning needs. By optimizing course materials and activities for mobile consumption, educators ensure equitable access to learning resources across various devices. Educators can embrace mobile learning by selecting compatible digital tools, designing responsive course content, and fostering a mobile-friendly learning environment that empowers students to engage anytime, anywhere. [22]

A Proper Tool is Half the Job Done

Selecting appropriate digital tools is essential for effective online teaching and learning. By choosing tools that align with instructional goals and support user needs, educators enhance the overall learning experience for both students and instructors. Educators can identify suitable digital tools by evaluating their functionality, usability, and compatibility with course objectives. By leveraging technology effectively, educators can streamline course delivery, facilitate collaboration, and enrich learning experiences in virtual classrooms.

Broader educational models encompass diverse approaches to teaching and learning that extend beyond traditional methods. These models often prioritize student-centered learning, interdisciplinary approaches, and the integration of technology.

These broader educational models reflect the evolving landscape of education, focusing on diverse learners' needs and preparing students for success in a rapidly changing world.

3 Exploration of Technological Integration and Innovation

In the future, education will likely change significantly due to cutting-edge technologies. Technological innovations such as the Internet of Things (IoT) and Artificial Intelligence (AI) have the power to drastically alter the traditional educational experience.

We imagine that future schools will not require drapes or blinds thanks to sun-smart glass windows. Smart glass goes from transparent to opaque due to electric current. It's a great window treatment because it's like having blinds or curtains built right into the glass. Classrooms will be equipped with air conditioning as summer temperatures rise. But these areas ought to be cleaner, more effective, and sustainable, with built-in air purifiers that remove dust and other impurities from the air.

Today's classrooms and homes routinely use 3D printing technology. Thanks to its ability to turn abstract concepts into concrete models, 3D printers have become an essential teaching tool. Students can manipulate objects physically for enhanced visual perception, information processing, and cognitive learning [19].

AI can adjust course materials to match each student's individual needs and learning preferences by looking at student data and customizing the learning experience. Students can receive instant feedback from AI-powered tutoring programs, which can aid in their understanding of difficult material. To provide more targeted interventions, AI can assist teachers in identifying the areas in which students may need additional help.

Intelligent tutoring systems have been around for decades, but AI will make it easier. Applications for immersive learning environments will get better as AI develops. Virtual objects superimposed on the actual world will create augmented reality on interactive whiteboards. The human body has more than 7 trillion nerves. Your nervous system is made up of all these nerves. Consider your nerves as the electrical wiring system of your body. Nerves are the electrical wiring of your body, carrying signals from your brain, spinal cord, and other parts of your body [28]. Students could learn about these 7 trillion nerves easily with improved technological advances in the future.

With the use of augmented reality (AR) and virtual reality (VR) technologies, educators can design immersive learning environments where students can interact with difficult concepts in a virtual setting, explore historical sites, and mimic scientific experiments. For instance, students could use AR to dissect virtual organisms in biology class to improve their understanding of anatomy and physiology, or they could visit ancient civilizations in VR to bring history to life.

AI is becoming more widely accessible - like the recent launch of ChatGPT which can generate sophisticated paragraphs from writing prompts and write computer programs. The pandemic has

brought remote learning into the limelight. It is predicted that the global population will be 9.8 billion by 2050 and 90% to have the internet by then, classrooms can be shared with external students, supplying learning opportunities to home students, and allowing for larger class sizes. With more students, teachers will have to rely on AI automation for certain aspects (registration and grades). The grade book in the Learning Management Systems (LMS) will become more sophisticated. This will allow better service to students and allow teachers to focus on teaching.

It is very unlikely the internet will disappear any time soon. But it will change. We are already seeing hard drive storage being replaced by virtual clouds. In-progress documents are accessible from multiple sources (devices) and any location and the trend toward greater connectivity will continue. Highspeed networks are here to stay, 5G may disappear. More data-intensive applications and services as time goes on.

The use of Internet of Things technology will be widespread, with more devices and applications connected to the Internet, enabling greater automation and control over the school environment. Outside the classroom, you might see robot cleaners tidying the halls while lessons are in session. With a few exceptions, homework assignments will be mostly online. From downloading the assignment to giving it remotely, students will be able to see their coursework, see the percentage completed, and track overall assessment. Instant notifications will alert students to deadline extensions, feedback, and grades. Teachers will be able to better track progress, and address issues as they arise.

The main researcher is looking forward to the integration of the metaverse into school settings. The metaverse refers to a collective virtual shared space, typically created by the convergence of virtual reality (VR), augmented reality (AR), the internet, and other emerging technologies. It's envisioned as an immersive digital environment where users can interact with each other and digital objects in real-time, often blurring the lines between the physical and virtual worlds. It's often described as the next evolution of the internet, offering new possibilities for socializing, entertainment, education, work, and commerce. Literature in the future will allow students to have recommended reading right at their fingertips. You can already do this with e-readers. Digital literacy will improve, reducing reliance on paper production. The paper used will be eco-friendly, either recycled or made from fast-growing plants like bamboo. The main researcher plans to continue improving courses and to write a follow-up paper on the student perspective.

Blockchain technology has the potential to verify academic credentials securely and conveniently. This can reduce the likelihood of academic fraud and simplify the process of verifying qualifications for both employers and educational institutions.

As educational technology becomes more advanced, security measures will need to keep pace. This includes robust cybersecurity protocols to protect sensitive student data and ensure the integrity of online exams. As AI becomes more integrated into education, there will be a need for ethical guidelines and considerations. Educators and policymakers may need to address issues related to bias, privacy, and the responsible use of AI in the learning environment.

Table 2: Technological Innovations

Innovation	Description
Technology Integration	Leveraging tools as video conferencing platforms, interactive whiteboards, and Learning Management Systems (LMS), facilitate seamless communication and collaboration between in-person and remote students, to deliver interactive lessons, share resources, and facilitate group discussions, bridging the gap between physical and virtual classrooms.
Flexible Instructional Design	Enable educators to create flexible learning experiences that accommodate diverse learning modalities and preferences. Techniques such as flipped classroom models, asynchronous learning activities, and multimedia content creation empower educators to deliver dynamic, engaging lessons tailored to both in-person and remote learners.
Assessment and Feedback Tools	Allow educators to effectively evaluate student learning outcomes and provide timely, personalized feedback. Online assessment platforms, digital grading tools, and adaptive learning technologies support educators in monitoring student progress, identifying areas for improvement, and offering targeted interventions, regardless of students' physical location.
Professional Development Opportunities	Grant educators' access to training, resources, and best practices for effective hybrid teaching. Online workshops, webinars, and virtual communities of practice provide opportunities for educators to collaborate, share insights, and learn from one another, enhancing their pedagogical skills and confidence in navigating hybrid learning environments.
Student Engagement Strategies	Help educators foster active participation and meaningful interactions among in-person and remote students. Techniques such as gamification, collaborative learning activities, and virtual simulations create immersive learning experiences that captivate students' interest and promote social connections, regardless of their physical presence in the classroom.
Supportive Learning Environments	Prioritize students' social-emotional well-being and academic success in hybrid teaching environments. Virtual counseling services, online peer support groups, and digital wellness resources provide students with access to holistic support services and resources that promote resilience, self-care, and positive mental health outcomes. By leveraging these innovations, educators can overcome the challenges associated with hybrid teaching environments and create dynamic, inclusive learning experiences that empower all students to succeed, whether they are learning in-person or remotely.

Innovations in education can address the challenges faced by educators in hybrid teaching environments by providing tools, strategies, and resources to enhance teaching effectiveness and student engagement. See Table 2: Technological Innovations below.

4 Anticipation of Future Trends and Challenges

Educational institutions may have remained largely static in their methods, structures, and curriculums, over the last 100 years. First, it was blackboards and chalk. Then whiteboards and dry wipe pens, overhead projectors, and acetate. Now we have interactive whiteboards. We had cathode ray televisions wheeled into classrooms to flatscreen do-it-all-yourself screens. Students are divided by age and the set curriculum is divided by subject. We have innovative technology grown from the pandemic, e.g., "Zoom." The teaching model will remain the same but adapt to our evolving world. The net-zero deadline is upon us by 2050, green technology will be embedded in our classrooms. Recycling will be second nature, there will be a ban on individual-use plastics in schools. This will include plates, trays, bowls, cups, and food containers. Schools may also have vertical farming as a teaching aid and sustainable resource for the local community.

Technology-driven leaps forward in education have been gradual and practical. When entering the classroom, teachers might implement bio-metric scanning for students to check in. Educators will be able to collate attendance data automatically, populate perfect attendance records, and more easily track patterns of tardiness. There is a new tool in the LMS called "Quickly Attendance," which is a long way off as it allows taking attendance over and over in each session but does not wipe out the old record. So, if taking attendance three times as students are walking in late, some may have three absences potentially.

5 The Main Researcher's Latest Experiences

Entering the world of remote education in March 2020, the expectation was a one-way street. The plan was to leverage established teaching methods in a remote setting. While the work-from-home transition wasn't universally positive for educators, many, like the main researcher, discovered its productivity benefits. Freed from commuting burdens, teachers gained valuable time to focus on grading, lesson planning, and even embarking on research projects. The return to in-person learning has been a politicized issue across all the schools where classes are held. Before the pandemic, online education was not seriously considered. Now, however, school officials have mandated a mix of learning modalities, wanting classes to be conducted in these various formats. The reality at the local level, however, presents a different picture. Teaching across several colleges in New York City has provided the main researcher with a unique opportunity to experience a diversity of college administrations, tooling, and classes. This firsthand exposure has fostered a comparative lens, allowing for the analysis of the distinct models and approaches employed by each institution, along with their inherent strengths and weaknesses. Table 3 shows a summary of the scenarios we encountered in the last two semesters.

Table 3: Mary Tedeschi's Assignments (Fall '23 & Spring '24)

Institution	Classes	Teaching Model
CityTech	Introduction to Computer Security, undergraduate	Fully Face to Face
Pace University	Database, graduate level System Development, graduate level	Hybrid and Face to Face
St. John's University	Operations Systems, undergraduate Math (Algebra, Trigonometry), Programming Languages	Async remote (never saw the students)

Throughout all the classes taught by the educator, a recurring image emerged: accommodating remote students in courses originally designed for in-person attendance. While some students valued the return to physical classrooms for social interaction, there was persistent pressure for the teacher to enable remote access. Reasons for this request were valid, ranging from necessary quarantines for sick students to the convenience of avoiding commutes. As a result, all the teacher's classes ultimately included remote students for at least part of the semester. The current power imbalance favoring students over teachers should not be disregarded. Teachers can face potential consequences, including job security risks, from student complaints lodged with the administration. Here are some specific challenges encountered:

- For the math classes at St. John's University in Spring 2024, two textbooks and ZyBooks (an interactive tool) were utilized. The students consistently requested extensions for assignments, prompting schedule changes and the allowance of extensions on ZyBooks through May 3 (end of study day).
- During the spring semester of 2024 at CityTech, the educator's top student relocated to Saudi Arabia in March. Both parties were eager for him to remain in the class, leading to the initiation of Zoom classes to accommodate him. However, this opened the Zoom option to other students, altering the classroom dynamics negatively. Despite efforts to accommodate students while maintaining course objectives, challenges persisted.
- Teaching at Pace University involved a database course for graduate students. Originally following a hybrid model, it transitioned to a HyFlex model with weekly meetings for 5 weeks. While Pace mandates the lecturer's presence in the classroom, students have the option to participate remotely. Situations arose where the educator found themselves as the sole individual in the classroom with 31 remote participants. Pace University named their version of hybrid as web-assisted.
- As for the tooling experience, it is very clear when it is NOT working out. To have remote students when this is not planned for by the college leaves the educator in a difficult position. Even when remote teaching (a hybrid or HyFlex model) is planned for, the facilities often lack the most basic technology and the IT departments are not up to par in supporting the educators with server capacity, microphones, speakers in the rooms, etc. Here are some examples:
  - Teaching Operating Systems asynchronously at St. John's University proved challenging due to delays in sorting

out student access to teaching materials. The technology department's procedures were cumbersome, lacking a suitable directory structure or access control for both students and teachers. Significant intervention and support were required from the teacher to resolve these issues. Additionally, a student in Rome, Italy, faced connection issues, and the teacher could not view student work on the college server. A class project failed due to the server's inability to support multi-user remote access.

- CityTech was ill-equipped to support hybrid classes, lacking the necessary infrastructure for Zoom integration. The classroom's limitations meant the teacher had to resort to using personal devices, such as an iPhone, such as a microphone. Background noise during Zoom calls further complicated the situation.
- At Pace University, the remote learning format presented a distinct challenge. Inadequate audio equipment in the classroom hindered communication with remote students, and the absence of technical support left the educator without assistance in resolving the issue.

6 Survey Report

The "Survey Report" is a comprehensive examination of perceptions surrounding online and on-campus learning environments [see Appendix A: Survey Questions]. In this report, we delve into the preferences, challenges, and perceptions of 213 individuals, all students except for two teachers, to uncover insights into the dynamic landscape of modern education. Through meticulous analysis, we aim to provide valuable insights into the comparative strengths and limitations of remote and traditional learning methods. These findings contribute to ongoing discussions aimed at optimizing educational experiences in an ever-evolving educational landscape.

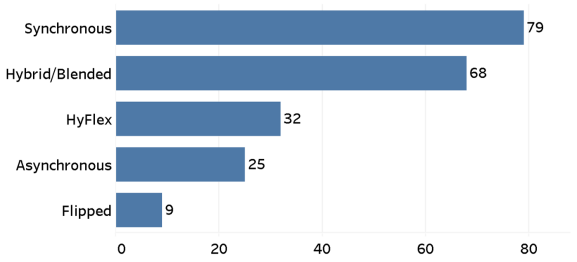

Figure 1: Learning Environment found more engaging

In Figure 1, based on responses from 213 participants, the most engaging learning environment, as perceived by students, is hybrid/blended learning, with 68 out of 213 respondents (approximately 32.2%) expressing a preference for this mode. Following closely behind is synchronous learning, with 79 out of 213 respondents (approximately 37.7%) favoring real-time online instruction. Asynchronous learning, offering self-paced online activities, was preferred by 24 out of 213 respondents (approximately 11.1%). Flipped learning, featuring prerecorded lectures, received the preference of 9 out of 213 respondents (approximately 4.0%), while Hyflex, providing flexible choices between online and in-person instruction, was favored by 32 out of 213 respondents (approximately 15.1%). These findings highlight the diverse preferences among students regarding the structure and format of their learning experiences, underscoring the importance of offering a range of options to accommodate varying learning styles and needs.

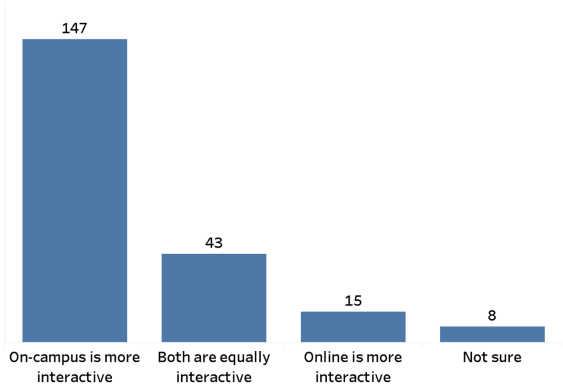

Figure 2: Engagement of online vs on-campus interaction

In Figure 2, derived from responses from 213 individuals, 147 respondents favored on-campus learning for its perceived interactivity, citing the presence of face-to-face interaction with instructors and classmates. Approximately 15 individuals expressed a preference for online learning, considering it to offer a more interactive experience. Around 8 respondents were uncertain about the comparative interactivity of the two learning environments. Moreover, approximately 43 participants believed that both online and on-campus learning were equally interactive. These findings underscore the subjective nature of perceptions regarding interaction and collaboration in different educational settings.

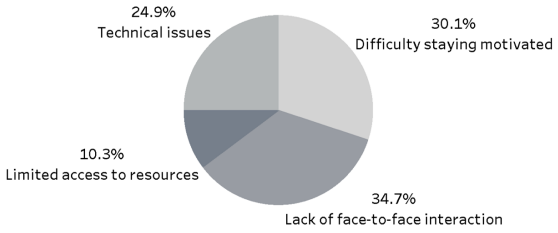

Figure 3: Top four challenges of online learning

Figure 3 illustrates the top four challenges of online learning through a pie chart, with lack of interaction being the foremost concern, accounting for 34.7% of the obstacles. This stems from reduced face-to-face contact with instructors and peers, leading to feelings of isolation and impacting motivation. Technical difficulties follow closely behind at 29.4%, highlighting the importance of reliable technology and internet connectivity. Students grappling with equipment or connectivity issues may struggle to complete coursework effectively. Additionally, staying motivated proves challenging

for 30.1% of learners, as the absence of a traditional classroom structure demands strong self-discipline and time management skills. Finally, limited access to resources, comprising 10.3% of the challenges, further complicates the learning process, as online students may lack access to libraries, labs, or in-person tutoring, hindering their ability to fully comprehend concepts. These challenges collectively underscore the need for proactive measures to support online learners, such as fostering virtual interactions, providing technical support, and ensuring equitable access to resources.

Drawing from our survey findings, we suggest integrating recommendations for further research or areas of inquiry into the report. These suggestions can offer valuable direction for future studies and investigations, aiming to address the identified challenges and elevate the overall quality of educational experiences for students. Our original target was 300-500 students to include in our survey.

7 Discussion

Learning styles vary, and successful models like HyFlex acknowledge this by offering flexible access to course materials and synchronous sessions. However, maintaining consistent content delivery and assessment standards across all modalities remains paramount for ensuring learning equity. Departments will retain control over modality options, and reliable video conferencing tools like Zoom will still be necessary. As the educational landscape evolves, the potential of HyFlex and the integration of AI warrant further exploration., 84% of America's undergraduates were found to have had some or all their classes moved to online-only instruction during spring 2020. Trends in higher education suggest the market will be $400 billion by 2026 [6] [30].

The style of active learning is becoming more desired as opposed to lectures [14]. Students forget talks that are dull and overcomplicated. The mind remembers facts that are meaningful and presented clearly. Students who actively take part in the learning process recall the information studied due to their higher level of engagement. The definition of active learning is "an approach to instruction that involves actively engaging students with the course material through discussions, problem-solving, case studies, role plays, and other methods." More examples would be group projects and debates. The goal of active learning is to appeal to student's interests for them to learn on a higher level. Applying knowledge rather than listening to lectures is a great enhancement to the future of higher education.

While video conferencing platforms like Zoom can facilitate online learning, fostering deeper student engagement requires educators to explore diverse teaching methods, such as active learning approaches. A recent study by Inside Higher Ed and College Pulse supports this notion, suggesting that experimentation with instructional styles significantly improves academic success. Effective engagement strategies remain vital across all learning environments, including traditional classrooms, asynchronous online settings, and synchronous sessions. However, a concerning number of institutions assume teachers possess these classroom interaction skills inherently, neglecting the need for professional development. Thankfully, many institutions offer valuable programs to enhance online teaching skills, including certifications for both asynchronous and synchronous modalities.

While HyFlex may seem like a new concept due to its increased use during the pandemic, it has been around the world for some time. This method offers a more structured approach to coursework, allowing students to engage with the material before class, during class (or online in place of attending), or after class. One example is a weekly 50-question quiz following a chapter assignment. To ensure student success in this flexible environment, faculty will need to clearly outline a reference sheet structure within the syllabus. One real question is if HyFlex is what the school wants or what the students want. School-driven means they may want to open remotely to students who would never be able to physically join the class. Should the class size be large or small, by design? If it is a required class, supply context by illustrating how knowledge of the subject may be useful in your life outside of class today or in the future.

Another model not talked about is Hyfield [24]. Is that going to be important in the future? A goal is to increase student retention by student participation flexibility. A student mentioned that if she were called on in an online class, she would never put on her camera or microphone again. She has since graduated from undergraduate studies and is attending law school. She just did not want to be called on in an online setting. Increase enrollment by appealing to students' desires to control the aspects of their learning environments. Prepare for business continuity in case of a natural disaster. HyFlex was first introduced in Fall 2015 before the pandemic and what if we have a bad Omicron Virus in 2 years? [13] Are we ready to handle it? What will happen to enrollment in face-to-face courses if online is available? Is HyFlex a better solution?

8 Summary

As for business as usual, the education system has not returned to the old model of classroom teaching. Before COVID-19, the main researcher was only familiar with the traditional model of education since remote education was discouraged by educators at the universities where they worked. Hodges' article describes emergency remote teaching (ERT) as a temporary method to provide access and instructional support during emergencies and crises. Partial return to the classroom has occurred, but a significant element of remote teaching remains [17]. Currently, the primary investigator is teaching the following Asynchronous and Synchronous models, as well as hybrids/combinations like HyFlex. In many ways, these hybrid models are more challenging than a pure virtual solution, especially because now teachers must deal with classes where some students are remote, and some are in the classroom simultaneously.

This essay investigates the continued relevance of fifteen educational patterns identified in previous work [31] during the period of exclusive remote learning. By drawing on the firsthand experiences of educators, including the main researcher's own, and anchoring the analysis in the realities of the Fall Semester of 2022, the essay explores how these patterns hold up – or fall short – in the current educational landscape. A future work will be a refinement of the original patterns, comparing new experiences to old patterns. What

is the impact in 20 years, especially when 'black swans', unexpected global events, seem to occur more frequently?

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Appendix A: Survey Questions

Demographic Information:

(1) What is your age?
(2) What is your gender?
(3) What is your current academic level (e.g., undergraduate, graduate)?
(4) What is your field of study?

Learning Preferences and Experiences:

(1) Do you prefer online or on-campus learning? Why?
(2) Which type of learning environment do you find to be more engaging?
(3) Which type of learning do you find to be more convenient for your schedule and lifestyle?
(4) How do you feel about the level of interaction and collaboration with instructors and classmates in online versus on-campus learning?
(5) Do you feel that you achieve better academic results through online or on-campus learning?
(6) How comfortable are you with online learning?
(7) What do you find most challenging about online learning? (Select all that apply)
- Technical difficulties
- Lack of face-to-face interaction
- Difficulty staying motivated
- Limited access to resources
- Other (please specify)

(8) Do you feel you have access to the resources and support you need for online learning?
(9) How would you rate the quality of online instruction compared to in-person instruction?
(10) How often do you communicate with your instructors during online classes?
(11) How does your experience with online learning compare to your experience with on-campus learning?
(12) How do you think online and on-campus learning can complement each other to improve your learning experience?
(13) What do you like most about online learning?
(14) What strategies do you use to stay motivated and engaged during online classes?
(15) What suggestions do you have to improve the online or on-campus learning experience?

Appendix B: The Patterns

This appendix focuses on two impacting remote teaching patterns within a hybrid learning environment: "Grown-up Student" and "A Proper Tool Is Half the Job Done." The applicability of each pattern will be discussed, followed by a deeper exploration of their implications for successful hybrid instruction. See Figure 4, above.

Pattern for Engagement and Interaction

The patterns for engagement and interaction focus on creating a community of trust within the virtual class to enable students to collaborate, promote students' active participation in a class, and foster a conducive environment for the learning process.

Personal Introductions

To engage students and create a class community from the start of the semester, start the class by doing a personal introduction of the educator and each student. The 15 patterns, in this section, depict the teaching experience of the main researcher.

Teaching Experience

Each class, regardless of school or delivery mode, consistently receives a discussion forum creation within the LMS (learning management system). These forums include detailed descriptions and instructions for students. Online participation varies, with some students in asynchronous learning even failing to complete the discussion. Reviewing these discussions later proves helpful in understanding student motivations for taking the course, revealing both present and absent engagement.

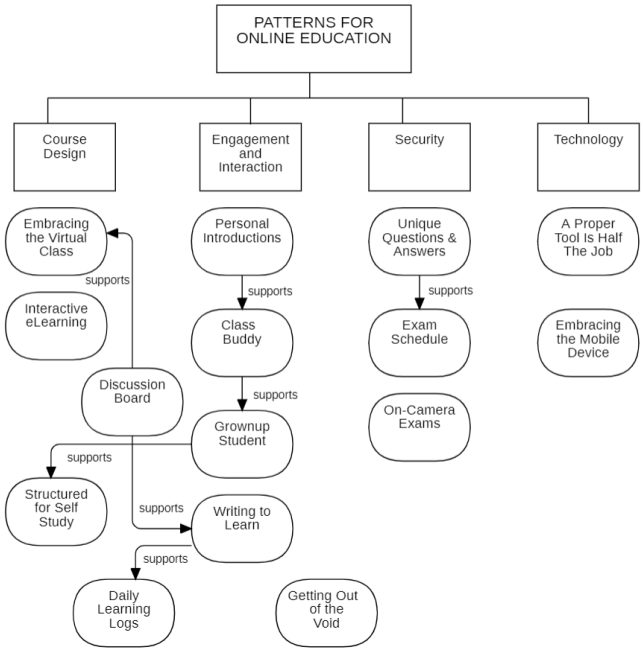

Figure 4: Overview of Patterns for Online Education

Recommendations

Create a natural critical learning environment with the discussion board, an online forum for asynchronous communication between instructors and students on course topics. Students encounter the skills, habits, attitudes, and information they are trying to learn embedded in questions and tasks they find fascinating - authentic tasks that arouse curiosity and become intrinsically interesting. To further enhance student engagement, schedule regular virtual coffee chats during which students can participate at their convenience. Designate a specific time each week or bi-weekly for these informal meetings, keeping them optional. Additionally, consider recording the sessions for students who couldn't attend, ensuring they can catch up on any discussions or interactions. Through these strategies, foster active participation, collaboration, and a sense of community within the virtual class environment.

Class Buddy

To enable every student to communicate with other students, create a peer buddy from the start of the semester to seed student-to-student interaction.

Teaching Experience

Instead of relying on a single student partner, the class was divided into small teams of 3-4 students. These teams were expected to remain together for the entire semester. In one class, teams were formed on the first day, while in another, team formation occurred in week four.

This approach, however, carried an assumption: that students would be able to work well together. Unfortunately, this is not always the case. A lack of commitment from a team member could lead to the teacher being blamed by the student for the difficulties encountered [20]. Despite this potential drawback, most classes functioned effectively with the small group structure.

Recommendations

The idea of teaching presence rather than teacher presence [2] shows this pattern. The pattern of class buddy is students teaching each other in the group. We waited until week 4 in the Information Security class so that students would first take a 13-hour computer-based learning course. Students needed to build the required skill level before being in a group.

Discussion Board

To engage students so that they can learn better about the course topics, encourage the use of a discussion board, and make sure the students know that using it counts towards class participation.

Teaching Experience

In our online certification training, to prepare to use discussion, we emphasize the importance of engaging in discussions by assigning two points: one for the initial post responding to a proposed question, and another for responding to a peer's post. This approach ensures that students actively participate, read each other's contributions, and foster meaningful interactions. Without these guidelines, students might refrain from participating or only make minimal contributions, leading to redundant efforts and limited engagement.

Recommendations

Leveraging discussion boards can foster critical thinking by prompting students to confront existing ideas with evidence and fresh perspectives. This aligns with the notion that effective learning involves grappling with authentic, intriguing questions and tasks. Students should be encouraged to make decisions, defend their choices, learn from setbacks, and refine their approaches [2]. In this vein, when tasked with brainstorming for a new climate change minor, students initially struggled to see the connection to their cybersecurity studies. However, through facilitated discussion boards, they actively participated in course design, demonstrating the power of this approach in sparking new ideas.

To further enhance the effectiveness of discussion boards, consider facilitating small group discussions within sub-groups on the platform. By creating smaller, more intimate settings, students may find it less intimidating to share their thoughts, leading to increased participation and engagement. This approach not only encourages collaboration but also provides an opportunity for students to delve deeper into topics and exchange diverse viewpoints, ultimately enriching the learning experience.

Writing to Learn

To engage students and help them process the scope of the daily classes, make the students create a written item during each class and share it with the class.

Teaching Experience

A review of writing activities across three classes revealed success in the undergraduate course with high participation in presentations and papers. However, the graduate discussion board lacked engagement, while the math class saw low asynchronous writing. Encouragingly, the collaborative case-study paper in another graduate class led to a well-researched document, valuable professor feedback, and even new insights for the instructors themselves. This highlights the importance of tailored approaches to writing activities and the potential for deeper learning through collaboration.

Recommendations

Give students open-ended questions to address ideas and arguments in the readings. The questions should be designed to encourage reflection on what the teacher and students find important, interesting, and stimulating. Encourage students to articulate their questions, concerns, or disagreements with the claims or ideas presented in the assigned material.

Ask students to address connections among the material, lectures, and experiences the class has explored for this course [9].

Daily Learning Logs

To help the students interact with the class contents, ask the students to keep a daily log to create a low-profile ongoing engagement.

Teaching Experience

In the Information Security class of 24 students, they are required to write the last 10-15 of each session and submit a daily learning log. It is informal but required. The majority complete the task. When we met face-to-face, and they had an actual physical booklet, participation was more frequent and regular. In the online weeks, students slipped in turning in anything. Some students did not complete and were handed back booklets. If noticed in class, they had to sit down and complete it before leaving. Students left to their own devices would forget to complete or disregard the instructions, which led to nothing being submitted.

Recommendations Regular scheduled structured writing assignments can successfully be part of a learning environment designed to enhance student ability to engage in self-directed learning, a skill necessary for lifelong learning. Self-directed learning requires a set of skills that corresponds to the skills associated with the high-order learning skills as described in Bloom's Taxonomy [1].

Getting out of the Void

To engage with the students through the virtual tooling, design the sessions to have parts with verbal interaction, and share the benefits of the teacher having visual contact with the students.

Teaching Experience

In Zoom classes, students rarely turned-on cameras unless required. In HyFlex with in-person elements, cameras were active during presentations. However, online-only sessions saw the teacher as the sole camera user. While students in face-to-face settings presented nervously, all participated. Mixed online/in-person classes and faculty/staff meetings had higher camera usage, suggesting a norm of camera-on for better connection in virtual environments. To address this in future HyFlex classes, the instructor plans to encourage camera use during sessions.

Recommendations

Putting your camera on, even for a short time, shows you are interested, engaged, and listening to others on the call. However, research shows that teachers can still measure engagement and strengthen social bonds using chat windows and reaction icons.

Polls and breakout rooms are also used to see how closely students are engaged with lessons [32].

Grown-up Student

Several of the above patterns are related to the behavior of the student, or more fundamentally to the expectations that the educational institution has of the student. In the US, colleges are in many ways continuing the management of students and classes not too different from high school. Class attendance is mandatory, there are roll calls, and grades depend on class participation and many tests throughout the year. This may ease the transition from high school life to college, but it can also contribute to the students not realizing they now need to take control of their educational progress.

To avoid students who were falling behind and not engaging with the teacher or the class, it was made clear at the beginning of the semester that students would be treated as grownups responsible for their own lives. The instructor emphasized that their role was that of an educator and not a parent.

Teaching Experience

Today's teachers wear many hats. Gone are the days of simply conveying knowledge. They manage diverse needs, create positive learning environments, and navigate disruptions, all while keeping students engaged and supported. This requires skill and flexibility to ensure all students feel included. In the last two semesters, several frustrating situations have been experienced with students who are far from mature enough to attend college and/or have impossible expectations of the instructor and the school:

- A student stopped attending, leaving a group with fewer members than needed
- Student moved to Pennsylvania and stopped attending face-to-face but attended some online sessions.
- Student was confused and asked in the middle of the semester when the lecture was going to start.
- Student missed over one hundred assignments and asked for an extension of the final exam, also still expected to pass the course with just a low midterm grade.
- Student decided that after the deadline for the final exam, they would request an extension, claiming they had COVID-19.

Without the instructor being able to verify this, they complied reluctantly. A recent class situation caught them off guard. Instead of a final exam, students were tasked with group projects, with instructions to self-organize into teams. These guidelines were in place prior to the instructor's arrival, and they adhered to them. Throughout the semester, students affirmed the group project format, and the instructor consistently reiterated that only group projects were permitted, not individual ones. Despite this, three students presented individual projects and demanded no penalty for going against the established format. To add to the issue, students left after their presentations, disregarding the work of their classmates. Their behavior was frustrating.

Occasionally, an enjoyable experience occurs. One student left the US to study abroad and then returned. They never missed any sessions throughout their time away! Some students will occasionally evaluate courses exceptionally low in response to a low course grade. Some students with low grades in course assignments may have responded to the self-report measure about perceived learning in the present course in a dishonestly low manner as they might do in an end-of-course evaluation.

Recommendations

Finding the right balance between empathy and adhering to the rules is crucial in this role. Students encounter various teachers, experience stress, and might react unexpectedly. Being overly harsh can pose risks [21]. However, students need clear boundaries and expectations. The focus should be on building relationships while addressing manageable issues, while also being prepared to de-escalate behavioral episodes through calmness, problem-solving, and acknowledging feelings. Establishing rules at the semester's beginning serves as a guideline, allowing for flexibility within reason.

- To minimize the impact of missed days on student grades and reduce the need for make-up work, the course grading structure has been revised. This new approach utilizes scaffolding and distributes points throughout different phases of assignments and projects. This ensures students can still earn partial credit even if they miss a specific deadline.
- The course structure was revamped to provide a clear framework and specific requirements for each class. To enhance the learning experience, a group project was introduced. This project involved a four-week independent online study with a completion certificate issued by an accredited federal website, adding a valuable credential to the student's portfolio. Following this, teams were formed based on student interest in six pre-defined topics. A reference was provided as a starting point, and students embarked on a ten-week journey, individually writing papers, and collaborating on a group presentation.
- Skipping extra homework to catch up on missed work and avoiding on-the-spot punishments, a system with a high volume of smaller assignments can be more effective. This approach focuses on consistent learning through manageable tasks rather than relying on penalties that might create negativity.

Patterns for Course Design

The patterns for course design deal with creating classes that are tailored to online teaching and interactions.

Embracing the Virtual Class

When designing a new class to be taught online, take advantage of the online medium when creating a class rather than trying to mimic the face-to-face classes from the past.

Teaching Experience

Online OS courses can be more engaging. Students can use discussion boards to chat about labs and connect new topics to what they already know. The teacher can start by reminding them of old ideas (reassignment) before introducing something new. This way, learning builds on itself, and discussions focus on understanding, not just getting the right answer.

Recommendations

Writing clear and coherent instructions for assignments is important. Faculty need to expect how their students will understand the assignment and actions they are asked to take. Faculty also

need to be able to reproduce the steps and logical sequence and grouping of tasks associated with the assignment. You must be able to supply the details the students need to know before they can embark on an assignment [3].

To enhance student understanding and engagement, faculty can incorporate real-world applications into assignments. Connecting theoretical concepts to real-world scenarios, case studies, or examples demonstrates the relevance and practical applicability of course content. This approach helps students grasp the real-world implications of what they are learning, fostering deeper comprehension and interest in the subject matter.

Establishing a clear communication plan is vital for maintaining transparency and keeping students informed in the virtual class environment. Faculty should communicate expectations, guidelines, and any changes consistently using various channels such as announcements, emails, or discussion forums. By implementing a clear communication plan, faculty can ensure that students understand what is expected of them and feel supported throughout the assignment process.

Structured for Self-Study When building up the content of an online class, the key to success is to have a very clear structure with informative headings to support the content overview and navigation.

Teaching Experiences

The course content is designed by the educator and organized within the LMS using weekly folders for each topic. These folders contain a variety of materials to engage students and enhance their understanding of the textbook content. Links, videos, and additional resources are included to draw students' attention to key details. Additionally, PowerPoint presentations and vocabulary lists relevant to each chapter are provided within the folders.

While some evidence indicates student use of the LMS materials, ongoing monitoring and review are necessary to assess student engagement effectively. Blackboard offers tools to track student activity details, such as video viewing data, which has been enabled by the instructor. Canvas, another LMS platform, boasts even more robust functionalities for tracking student activity [4].

Recommendations

How the students perceive the online course makes a difference. Active interactive measurements, such as posting to the discussion board, were significant in affirming the importance of providing opportunities for online students to learn by active interaction with each other and the instructor. Show the students the syllabus and course calendar along with each weekly lesson to remind them of the course learning goals [27].

Interactive Learning

When teaching an online class and looking for more resources and support, evaluate the use of interactive learning systems that fit your classes and allow you to add content as needed or desired.

Teaching Experience

Using ZyBooks for some of the classes has been useful and helpful to the instructors and the students. Usage in math class has been beneficial, especially in an asynchronous class with no synchronous lecture.

Recommendations

E-learning quality is a complex and multidimensional topic, as it is difficult to gauge all the aspects to assure learning excellence. E-learning Content has a significant effect on both student satisfaction and e-learning quality. The learning content and website content provided in the online study environment are important factors of e-learning quality, having a positive effect on e-learning quality and student satisfaction. The instructors should pay attention to the content development and designing of the course structure to develop a sense of engagement among the learners to understand the course structure and, to ensure the quality of the e-learning system and student satisfaction [18].

Patterns for Secure Exams

Creating exams that can be administered online requires serious considerations to avoid or at least reduce the possibility of cheating. When combined, the patterns in this chapter make it difficult to cheat on exams.

Unique Questions and Answers

When designing an exam that will be held online, ensure that each exam given to a class of students has a unique set of questions and answers so that none of the exams given are identical.

Teaching Experience

We gave an online security midterm to the students in class and students were using tools like Google to look for answers even though they had scrambled questions and answers.

Recommendations

Exams are part of the assessment process. Ensuring academic integrity within an online exam has become an important concern for educators. One way to safeguard academic integrity is by adopting methods to mitigate rampant breaches of the online examination procedures that were developed primarily due to the COVID-19 pandemic confinement. Questions can be developed from "scratch" or paraphrased a question that could prevent searching for related questions and answers online. Educators suggest using a test of randomly selected questions from a vast test bank (pool) as an effective solution to address question-sharing [12]. Every student gets a different choice of questions.

On-Camera Exams

When managing an exam held online, use a camera during the test to see the actual person taking the test to supply visual "control" of the students and make sure they are not getting the answers to exams from each other or the internet [29][9].

Teaching Experience

Although opting out of camera or lockdown browser software, a colleague introduced "Classroom Spy" which allows real-time monitoring of student activity directly from the teacher's desk. With this tool now available, exploring its use for the final exam seems like a valuable option.

Recommendations

Remote teaching and assessment are essential for current education. Online proctoring is often used as a surveillance tool. Students worry about unjustified invalidation of their exams due to unstable internet connection, background noise or webcam issues, and privacy issues. Multiple studies have shown that in non-proctored online exams, students seek help from friends or books, which underlines the need for supervision during online summative tests.

The fear of unjustified invalidation of the exam and privacy issues may be partially improved by communication. Most students will accept online proctoring if it prevents any study delays [23].

Exam Schedule

When planning the execution of an online exam, schedule a test with reasonable time (enough but not more) to complete and stick to the one-time event to reduce the opportunity to get external help.

Teaching Experience

For the asynchronous math class, this is an important pattern, as there is no practical alternative. Some of the courses and schools need face-to-face exams only and paper tests. The schools want traditional testing to return.

Recommendations

Exam scheduling might affect the cognitive circumstances during assessment; hence exam performance may vary depending on the time of day. Taking several tests in a short period of time might cause cognitive tiredness, which will impair performance. On the other hand, practice with cognitive tasks such as exams can improve meta-cognitive correctness and performance over time. This implies that knowledge may become automatic with repeated exposure, lowering cognitive load—scaffolding. Exam scheduling affects not only traditional face-to-face settings but also online courses and exams, even though it may largely affect test performance immediately rather than long-term learning over the course of the academic year [15].

Patterns for Technology

Teaching in a virtual setting requires some level of digital technology to enable communication and access to the learning material. The patterns in this section are helpful when choosing and using these tools.

Embracing the Mobile Device

When teaching an online class for a diverse group of students, design your course to enable students to take the class using only their mobile devices.

Teaching Experience

This scenario highlights the importance of supporting multiple devices in classrooms with blended learning environments. A classroom without a microphone required the use of Zoom for a remote student, even during the in-person portion of the class. The teacher had to use an iPhone to log in to Zoom and provide audio and video through the phone for the remote student. This situation underscores the need for educational institutions to equip teachers with the ability to utilize Chromebooks, iPads, and cell phones alongside laptops to ensure all students have an equal learning experience.

Recommendations

We feel pressured to be constantly available, from work to friends. Phone plans with limited data or minutes are becoming outdated due to this need. People react differently, some find it positive, others a burden. The study sheds light on 3 factors: who expects it (work, family etc.), how clear the expectation is, and why we use phones. Reliable internet is crucial, making mobile learning even more important. [22]

A Proper Tool is Half the Job Done

As a college level educator doing most of or all your teaching online, select digital tooling that supports the basic needs of both the teacher and the students in a way that supplies a positive user experience for both.

Teaching Experience

The instructor's control over LMS selection is limited by institutional choices. While reliable internet connectivity is vital for both students and faculty to participate in synchronous lectures, recordings are rarely made, with exceptions for guest speakers.

Just as a coping saw tackles specific tasks, online classrooms require essential tools for success. These include consistent internet access, adequate bandwidth, reliable Wi-Fi, up-to-date Zoom software, and appropriate devices like laptops, tablets, or smartphones. The lack of cameras and microphones in classrooms and offices disrupts instruction and meetings, hindering performance. In one instance, the individual was assigned office hours in a room lacking these crucial components, creating an unexpected obstacle. Improvisation can sometimes bridge these gaps. For example, if a camera or microphone is missing from a classroom or office computer, a smartphone can be used via Zoom to facilitate communication. However, unexpected equipment failures are disruptive and unprofessional. Imagine attending class in an internet cafe due to Wi-Fi issues or delivering a lecture from a store with background music – situations the instructor has personally encountered. These experiences highlight student preferences for muting microphones and cameras, which can stem from inadequate technology or unreliable environments.

Is the technology as good as being in the classroom face-to-face? We tried class meetings sometimes in person and sometimes online. We tried just meeting every other week in person only and not online. Does a Zoom meeting suffice as an alternative to a face-to-face classroom experience? The learning process using Zoom cloud meetings is highly effective because it is more relaxed than face-to-face learning.

What about the HyFlex model? This is doing both face-to-face and online students at the same time. HyFlex is beneficial as students have a choice of coming to class or being remote. There are disadvantages if the rooms are not set up for a hybrid environment. One class had an OWL camera and microphone in the front of the room. Students needed to physically move to the device. Later, a microphone and camera were installed in the back of the classroom wall. This helped improve sound quality. Other issues: student engagement, collaboration, and staying connected with teachers.

In a classroom of 16 students set up for Hybrid, the study investigates the potential for educators to implement strategies that mitigate the challenges associated with student engagement and off-task communication within a HyFlex learning environment. The goal is to foster a more interactive and productive learning experience for all participants.

Recommendations

The COVID-19 pandemic forced a rapid shift in education, breaking down cultural and technological barriers that previously limited remote work. At Baruch College, for instance, a student's need to isolate due to their spouse's COVID-19 infection necessitated remote participation, demonstrating the technology's potential

within a hybrid course structure. This pandemic has established new working norms, accelerating the move away from traditional classrooms. However, this transition requires reliable internet access, suitable work spaces for students, and appropriate devices like laptops or tablets. The pandemic highlighted the critical role of robust IT infrastructure, especially considering its closure for safety reasons during the initial outbreak. Hurricane Katrina serves as a stark reminder: Louisiana State University School of Medicine's IT staff successfully used data backups to maintain remote administrative operations [8] [25]. Unfortunately, CUNY's unpreparedness in March 2020 became evident, prompting an early Spring break to distribute Chromebooks to students in need. This episode underscores the importance of resilience and disaster planning in the face of unforeseen disruptions.