

MIXING IT UP - MORE EXPERIMENTS IN HYBRID LEARNING*

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ABSTRACT

This paper is a follow-up to our initial study on offering a hybrid instructional format that combined students from the traditional face-to-face and online environments. During a second term, we were able to draw on our experiences from our previous pilot [1] and refine our mixed format approach. We report both on the setup and the logistics of our hybrid classroom environment, and our experiences and impressions with regard to teaching effectiveness of this approach within the e3-learning framework [7]. Our results this term continue to reinforce our belief that this approach holds much promise as an alternative to the two more traditional instructional modes, online and face-to-face, and that it offers the "best of both worlds."

1 INTRODUCTION

Many traditional students, as well as working adults seeking to improve their professional opportunities, recognize the need for additional education to accomplish their goals. However, a number of these potential students often find themselves squeezed for the time needed to pursue this endeavor and, therefore, opt for online classes as they offer greater flexibility in terms of both scheduling and location. Some of the students, however, enroll online with some reluctance as they miss the benefits that come from the more traditional face-to-face environment, such as closer contact and engagement with the instructor and fellow students, and the immediate feedback that can result from this setting.

Although we have nearly a decade of experience delivering online education at our institution, we have been exploring a new "hybrid" format that allows online students to

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retain many of the benefits of online instruction while simultaneously gaining some of the advantages of a face-to-face class, resulting in more effective, efficient, and engaged learning as measured by the e³-framework [7].

Having just concluded a second term using the hybrid format, this paper reports our experiences regarding the design and setup for this hybrid format and the logistics of running this environment successfully. Our experiences this term confirm the findings of our previous study [1] and our belief that this approach holds much promise as an alternative that offers the "best of both worlds" for students unable to attend traditional face-to-face classes but who are also reluctant to commit to a pure online classroom experience.

2 MODES OF INSTRUCTION

For the purposes of our paper we identify the following instructional formats as described briefly below:

2.1 Face-to-Face

This format is most commonly used in traditional educational environments: students and instructors physically meet regularly at a specified time and place. The success of this setup depends on both parties being in attendance and taking part in the exchange of information. This format offers great opportunities for immediate interactivity and feedback, which greatly improves the conditions for student engagement with the material, their peers, and instructors.

2.2 "Pure" Online

In the pure online format, the location of the student and instructor are irrelevant as all instruction is computer mediated. Generally, online instructional units are posted and available for students to consume according to their own schedules (within certain time limits as dictated by the course schedule). Synchronous activities are required in some online classes. Students communicate with their classmates or instructors via electronic means such as text/voice chats, e-mail, or bulletin boards. This format offers those unable to commit to a regularly scheduled meeting time, or unable to make it to a classroom, a very flexible alternative.

2.3 Hybrid

Hybrid, or blended, delivery has developed rapidly as an instructional mode at many universities [8]. Although those two terms are used interchangeably by some researchers, others distinguish them by the pedagogical use of technology. Hinterberger, Fässle, and Bauer-Messer [6] define hybrid learning as the method of educating at a distance that uses technology combined with traditional education, while blended learning is a mix of old and new best practices in pedagogy, such as using online tutorials or other technologies in a traditional classroom setting. According to Graham, the elements that are blended within a hybrid course are the instructional modalities (or delivery media),

methods, and venues [5]. As such, we use the term hybrid as opposed to blended as it is closer to our experiment.

In this paper, the hybrid learning format refers to the mixed mode of instruction that combines both face-to-face and online students *in the same class* by incorporating synchronous technologies to facilitate the learning process. For example, online students are required to be present in a virtual classroom for a relatively short prescribed time (from any location) to "meet" with their face-to-face peers and their instructor.

The advantages of offering hybrid classes include increasing student enrollments, reducing students' seat-time in class, serving more students, especially those who prefer more informal, active, and collaborative learning, and provide a "fun and new experience" that offered more flexibility, convenience, and effectiveness [8, 11, 12].

The University of Central Florida describes their hybrid classes as "media enhanced and reduced seat time" and "have higher success rates" [2]. The University of Wisconsin at Milwaukee reports that hybrid courses promote an independent learning style, more comprehensive in-class discussion, higher student self-achievement, better performance on exams, better quality of projects, and less class seat time [4].

It is worth noting that the hybrid classes in the above research referred to traditional classrooms with online components. There has been a shortage of studies that have investigated the use of the hybrid format defined as combining both face-to-face and online students in the same class. Park and Bonk [10] examine learning experiences of 22 distance students and 11 residential students in one graduate course at Indiana University. Students' participation increased most in the sessions where the distance students and residential students met for lecture and discussion with the help of Breeze (a synchronous conferencing tool). Students enjoyed the prompt support and feedback, sense of connectivity, and different perspectives from peers and instructors expressed in those synchronous sessions. This study is designed to bridge this gap and, hopefully, render valuable data for decision makers.

3 E³-LEARNING

Researchers advocate that the trends in e-learning will be to provide an effective, efficient, and engaging learning environment, which is also referred as e³-learning [9, 7, 3].

According to Doering and Veletsianos [3]

- "Effectiveness refers to the ability of a program to achieve its proposal goals ..."
- "Engagement refers to students investing themselves in the experience of learning, immersing themselves in the learning experience, enjoying the process, and being involved in learning."
- "Efficiency means doing so with the least resources possible ..."

For the purpose of this study, we specifically used the following definitions of e³-learning so that our students could understand the terms easily.

- Effective: helped me to learn
- Engaging: held my interest
- Efficient: used my time well

4 MOTIVATION

Our motivations for experimenting with the hybrid model were predominantly pedagogical as described above; however, there were student satisfaction and economic motivations as well. The hybrid approach attempts to engage both online and face-to-face students synchronously, auditorily, and visually just as is common in traditional classes. When enrollment for a course is split between an online and a face-to-face section in a small department, economics and students' satisfaction can come into conflict. Too often, economics wins out, and the face-to-face section is canceled and students are moved into the online section, overriding their learning preference. A hybrid approach that takes place in a classroom setting gives the face-to-face students the experience they desire while saving resources by combining low enrollment sections.

5 THE FRANKLIN HYBRID MODEL

This approach uses remote meeting software, audio and video mixing hardware, and a structured curriculum design to integrate face-to-face students and online students in the same class. The instructor meets with face-to-face students in a computerized classroom. Rather than use traditional "chalk-and-talk" methods of instruction, presentations are orchestrated via remote meeting software through which online students join the class. The hardware setup permits both online and face-to-face students to hear one another as well as see the instructor in a video window. Unlike 70's era CCTV setups of present-day PBS video courses, these sessions are live and afford many opportunities to interact with peers and the instructor. Synchronous sessions are recorded in the event that a student is unable to attend, and are limited to about 1.5 hours out of respect for the online students, who typically choose that delivery format for its flexible time considerations. However, the additional time is made up in other asynchronous activities.

In this approach, the following off-the-shelf technology tools are used:

- A computerized classroom with PCs for each face-to-face student;
- A projection system, preferably one that permits control of the computer from the screen, such as a SMART Board™;
- A wireless lavalier microphone and mixer tied into the instructor's computer;
- Wireless microphone/speaker combinations for each face-to-face student;
- Web meeting software; and
- A web-cam that is compatible with the web meeting software.

Face-to-face students can log in to the web meeting via the computers at their desks so that they are able to monitor the text chat that online students prefer for most questions and responses.

To best support a hybrid approach, out-of-class activities replace much of the time that would normally have been spent in class. To that end, we prepared both pre- and post-class exercises designed to reinforce the readings and synchronous delivery respectively. Table 1 compares the time spent in each activity for the three delivery modes.

	Face-to-Face	Online	Hybrid
Synchronous contact	4	0	2
Outside activities	1	5	3
Readings	2	2	2
Assessments	3	3	3
Total	10	10	10

Table 1: Time distribution (hours per week) of student learning activities

6 OUR EXPERIMENT

We taught the Summer 2009 section of COMP 311, "Object-oriented Data Structures and Algorithms 2," using our hybrid approach. The sessions were conducted in a computerized classroom for those attending live and were simultaneously run through web meeting software for online students. Synchronous time was used to discuss solutions to previous exercises (pre-class activities and homework and lab assignments), present new material, perform live coding demonstrations through desktop sharing, and preview new homework and lab assignments. Students had the opportunity to interact both with the instructor and with each other throughout the session, either by using a microphone or instant messaging. Most online students preferred instant messaging while most face-to-face students preferred using microphones.

Based on the findings from our previous hybrid pilot [1], we added a live classroom video feed and reconfigured the microphones to be voice-activated rather than push-to-talk. Both changes had mixed results. Although some online students appreciated the video feed, others would immediately turn it off. The video feed also had the misfortune of increasing the size of the recordings by an order of magnitude, thereby interfering with the fast-forward and rewind capabilities. Consequently, aside from first day introductions, we would not include a video feed in future hybrid efforts. The second change, switching the microphones from push-to-talk to voice activated, improved the classroom experience for face-to-face students but caused echo-cancellation difficulties with the online students. Again, we would not include this feature in a future hybrid offering.

7 ANALYSIS AND RESULTS

We conducted a survey of the 11 students (3 face-to-face, and 8 online) one week prior to the final exam. Seven students responded, a rate similar to our previously reported findings [1]. Prior to this hybrid class, respondents had taken, on average, more than four courses in the face-to-face format and more than 11 courses online. We asked questions about various structures in the course within the context of e³-learning.

7.1 E³-LEARNING

Effective: Students overwhelmingly resonated with the instructor-led synchronous sessions, the interactions with the instructor, and the recordings of the synchronous sessions with 85.7% of students rating them either "effective" or "highly effective." Live

coding demonstrations in Eclipse rated highly as well with 71.4% rating this component positively. Conversely, 57.1% of students indicated that the video feed of the classroom and the interactions with other students were either "futile" or "utterly futile" in helping them to learn.

Engaging: Instructor interactions, live demonstrations, and, surprisingly, recordings of presentations were the most highly rated with 85.7% of students marking these as either "engaging" or "highly engaging." The synchronous sessions and post-class learning activities were next at 71.4%. The least engaging activities were, again, the student interactions at 57.1% and the video feed at 42.9% marked as "boring" or "utterly boring."

Efficient: The synchronous sessions, post-class learning activities, instructor interactions, coding demonstrations, and recordings were rated the most efficient with 71.4% of students scoring them as either "efficient" or "highly efficient." As seen previously, student-to-student interactions and the video feed were rated as the least efficient, with 42.9% ranking them as either "wasteful" or "utterly wasteful" of their time.

7.2 Comparisons

Compared to a typical face-to-face class, 71.4% of students either agreed or strongly agreed that the hybrid format was more effective, engaging, and efficient. No students indicated that the hybrid was worse than any face-to-face class. Compared to the typical online class, 85.7% of students either agreed or strongly agreed that the hybrid format was more effective, engaging, and efficient. The sole dissenter, who strongly disagreed, was an online student who experienced technical difficulties throughout the term. Finally, 71.4% of students indicated a preference for taking the hybrid over face-to-face, and 85.7% of students indicated a preference for taking the hybrid over online.

8 CONCLUSION AND FUTURE WORK

The results of this second experiment confirmed our belief that hybrid classes can provide a more effective, engaging, and efficient learning environment for students than either pure face-to-face or pure online classes. Online students overwhelmingly appreciated the synchronous, instructor-led recitations, instructor interactions, and live demonstrations - features not usually present in pure (i.e., asynchronous) online classes. Face-to-face students, on the other hand, found value in the recordings of those same activities since they could be reviewed at a later time. Although the study did not include questions about reduced seat time, anecdotal evidence from face-to-face students indicates a strong advantage there as well. Finally, in low-enrollment situations, the hybrid classes offer a viable alternative to canceling classes by combining sections.

We intend to continue to offer hybrid classes and improve upon the design based on ongoing student feedback and our own experiences. While we realize that our sample size is limited, we still believe that these techniques hold great promise. As a smaller department it is unlikely that we will be able to produce sufficient enrollments for a large-scale study. We, therefore, hope that sharing our experience with the larger community will encourage others to further explore this promising approach.

In future iterations, we may consider adding mobile learning into this hybrid format through the use of various supplemental materials such as podcasting, social media, and multimedia pieces. Finally, we would like to systematically explore and identify the pedagogy and instructional design elements that best implement effective, engaging, and efficient hybrid courses.

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