Blending Office Hours into Scheduled Class Time in Gateway Math

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A blended course model uses both classroom learning and online learning to create flexibility in the weekly schedule for students. In this paper, we describe a blended course model and the rationale for implementing it in Calculus I. We report on student responses to the model and the behaviors it encouraged. The design of the blended course model created the opportunity for office-hours-like interactions in scheduled class time to help reveal the hidden curriculum of office hours. Two goals the model strived to achieve for students were (1) normalizing help-seeking behaviors and (2) normalizing working with peers. Data collected through questionnaires and focus group interviews suggest that the blended course model achieved these goals and more.

Keywords: office hours, blended classroom

The term *hidden curriculum* was first introduced by Jackson (1968) to describe implied social norms of classrooms and schools. Today we commonly refer to the *hidden curriculum* of modern academic institutions as the norms, strategies, and expectations that students need to navigate their learning and networking on college campuses. Office hours are a component of the hidden curriculum; many teaching and learning centers reinforce the need for instructors and teaching assistants to explain office hours (*Using Office Hours Effectively,* n.d.; CTEI, n.d.; Office Hours/Helprooms, n.d.; CRTL, 2023*)* and invite and encourage students to attend. Jack (2020) highlights that professors at elite institutions expect students to attend office hours to make connections needed to request letters of recommendation, and to enhance their learning. Jack states that some students are ready to tackle these interactions upon arrival at college, while other students are less comfortable initiating these connections.

This paper describes a course model that created the opportunity for office-hours-like interactions during scheduled class time and the rationale for implementing it in Calculus I. The model uses both classroom learning and online learning to create flexibility mid-week for students. There is some debate about whether such a course structure should be considered a "partial-flip" (Lax, et al., 2017; Urquiza-Fuentes, 2020) or a "blended model" (Webster, et al., 2020); and we settled on Johnson's (2012) description of a "blended model" where students use "class-time to discuss, apply and clarify" the content and interact with online course components. The blended course model (BCM) described here was designed to provide accessibility to office hours and (1) normalize help-seeking behavior and (2) normalize working with peers. Data collected through questionnaires and focus group interviews support that the model achieved these goals and more.

Rationale for the Blended Course Model

The blended course model used in gateway mathematics builds on a typical course meeting structure of 3 class meetings per week in a large (n=150) lecture meeting with an instructor, plus a small (n=24) recitation meeting with a team of graduate student and undergraduate student teaching assistants (TAs). In the blended course model, interactive lectures (using think-pair-share, polling and exit tickets) are delivered in person on Mondays and Fridays. Recitation time (on Tuesday or Thursday) is used for an alternating schedule of group work, quizzes, and review. The Wednesday class meeting is repurposed for an office-hours-like large group meeting where instructors and TAs work together to facilitate the class. During this

50-minute class, students are prompted to prioritize what they need to work on or study, and the time is dedicated for students to do that work with opportunities to ask and answer questions. This prioritization is intended to help the class, as a community, identify difficulties that are arising in real-time and validate students' need for support. In this blended course model (BCM), the lecture content for the Wednesday classes is replaced by asynchronous video lectures created by the instructional staff and published on the learning management system. The schedule is depicted in Figure 1. Students watch the videos on their own time. The BCM pushes one hour of lecture into unscheduled time and replaces one hour of scheduled contact time with high-impact in-person office-hours-like interactions.

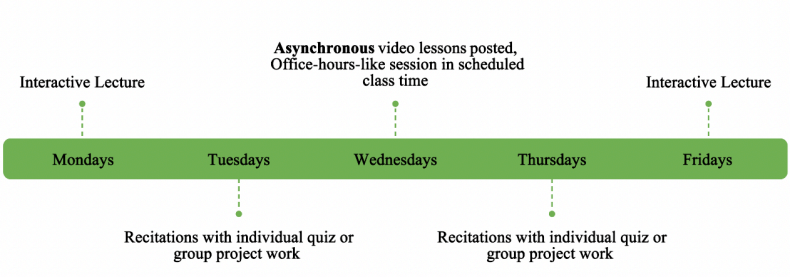

Figure 1. The weekly schedule in the blended course model.

The design goals of the BCM aimed to create access to office hours in scheduled class time to address two key goals:

(1) Normalize help-seeking behaviors
(2) Normalize working with peers and provide a scheduled meeting time for peer meetings

Data Collection

Methods

This study aimed to build a case study of a blended course model and used a convergent parallel mixed methods design in which a questionnaire and focus group interviews were used to collect data. In convergent parallel design, both qualitative and quantitative data were collected and analyzed to triangulate results (Creswell & Creswell, 2018).

This study was conducted at a private institution in the Mid-Atlantic region of the United States. The institution is a "very high research university," and we will refer to it as VHRU in this paper.

Data Sources. I. Questionnaire: The questionnaire collected enrollment information, demographic information (major, gender identity, racial/ethnic identities), and the option to self-identify as a first-generation student, limited-income student, person with a disability, international student, immigrant, etc. This paper will focus on student rankings and responses about the instructional components of the course that contributed most to their learning.

Respondents were asked to rank instructional components according to what worked best for them: blended course model, UPT (Undergraduate peer tutors) tutoring space, office hours in-person, office hours via Zoom, supplemental instruction sessions, recitations with TAs and UPTs, textbook, and in-class worksheets. Additionally, a five-point Likert scale portion asked the level of agreement on questions related to comfort interacting with instructors, TAs and peers, as well as feelings of support and workload.

II. Focus Groups. Dr. Yap interviewed 11 focus groups; 4 in person with 23 participants and 7 online via Zoom with 20 participants. The interviewer referenced trends in the instructional component ranking and responses from the questionnaire in interviews and encouraged participants to elaborate on their written responses.

Participants. In February 2023, first-year students from the 1,310-student incoming class in Fall 2022 who were enrolled in Calculus I were identified as the population of interest. From 161 randomly selected students from the top, middle, and bottom thirds of the final exam grade distributions, 43 students responded to the questionnaire; the response rate for recruitment was 26.71%. The 43 students participated in 11 focus groups. Participants came from a variety of majors, with the most represented as Computer Science (23.26%), Mechanical Engineering (16.28%), Pre-Major (16.28%), and Chemical and Biomolecular Engineering (13.95%). Just over half, 51.16% of participants identified as female, while 48.84% of participants identified as male.

Results and Discussion

Overall class experience. In general, participants had a positive experience in Calculus I. Think-pair-share, in-class activities and group projects contributed to participants studying with their classmates (76.75% of participants) and forming meaningful connections with Calculus I peers (88.37% of participants). One student reported that they "*ended up becoming good friends of [theirs].*" They continued, "*One of the TAs walked up to us and asked if Calculus I turned us all into friends, and we said, 'Yeah.' We had fun."* 86.04% of participants felt encouraged by their Calculus I professor, and 72.09% felt comfortable participating in class discussions.
Ranking Instructional Components. Students identified the two most helpful instructional components to be the in-class worksheets and the blended course model (BCM). Students described the worksheets as "very structured", "easy to follow", and "organized." The in-class worksheets average ranking was 2.72 out of 10 with a standard deviation of 1.76. The BCM's average ranking was 2.84 out of ten with a standard deviation of 1.90.

The BCM created access to Office Hours (OHs) with instructors and TAs in scheduled class time. This addressed student feedback that OHs were not always scheduled conveniently and students had inequitable access to the instructional staff. Comments, like the two below, state explicitly that this was helpful for students and addressed issues with time-conflicts:

> I really like the Wednesday sessions where you could come in and then ask questions and I liked that it was the time of a class time because sometimes I wouldn't be able to go to office hours because of schedule conflicts. So I really liked starting the homework early and then coming up with questions that I would ask on Wednesdays, and I felt like that was really helpful.

> *Well, because you have more than one class. All of those teachers have different office hours. All of those TAs have different office hours in different buildings. It sometimes you're just too tired to go… you can't go. Also, clubs, organizations, the fact that you have to eat. It's kind of just the volley of being a human being who has to take care of his or her body, which gets annoying.*

In the sections below we will discuss evidence that the BCM addressed the intended design goals and provided flexibility for students. We will also comment on how students used the asynchronous videos and opportunities for improvement.

Achieving the Blended Course Model Design Goals. The first goal of the OH-like session was to normalize help-seeking behaviors. We wanted to make visible needing help from instructional staff on homework, project work and quiz/exam preparation. This strategically addressed previous student comments that some students are accustomed to working on their own and not confident asking for help. These sessions helped reveal some of the *hidden curriculum* of OH:

> Having Wednesdays as an in-person office hours when I couldn't usually attend [instructor]'s office hours was really nice for me because I would just work on homework and then have her... At my disposal is kind of a bad way to say it, but I would have her there to help me if I needed help, and that was nice.

> So a few of my friends and I would just take the homework problem sets to the in-class office hours and just kind of work through them as we were sitting there and if we ever just ran into a problems doing the homework, we can just ask conceptual questions or even just ask the professor or the TAs to go over the sample problems that we went over in class again. And that really helped me shorten the amount of time I needed to put into studying.

The OH-like session normalized working together to do homework or study in the class, which was the second goal the design hoped to address. It guaranteed scheduled time that students could collaborate on homework or project work. This strategically addressed previous complaints that scheduling group meetings outside of class time was a challenge for students:

> … you could work on projects or do homework or something. So I ended up not having to meet outside of class with my group other than once or twice, because we got most of it done on Wednesdays.

> And so on Wednesdays, I got together with my teammates and we worked on the project sometimes… So it prevented me from procrastinating, I'll say, the work session on Wednesday was most helpful.

Providing Flexibility and Support. Students reported that the BCM provided flexibility that they appreciated. Students were comfortable navigating the digital learning tools embedded in the model and liked the mixed mode of content delivery. Students reported that the asynchronous videos in the BCM provided an opportunity to pace their learning:

> I think the [BCM] was super helpful for me, especially first semester of college, learning how to study, learning how to keep up in all your classes, just having a little bit of flexibility in the middle of the week was super helpful.

> ...it also allows me to go home, study on my own time, especially with those videos, which I can pause, play, replay, pause, take notes, do whatever, and then study on my own and be able to go to a class and ask about the things I have trouble with and have more time dedicated to that.
>
> I like the fact that I could [watch videos] on my own time and because the concepts on the Wednesday videos were obscure, I liked having the ability to rewind and look over them again.

Many students used the videos as a reference and review while studying for quizzes and exams:

> The Wednesday videos… I would stay and watch the videos and they would be more or less of add-ons to the lectures. So for some of the quizzes, I would go back and watch some of the videos to review.
>
> "Oh, there's these videos I can watch." …if I was struggling on a topic, I would go to that video… So I used them as a textbook in a way or a resource.

A few participants felt that the videos were not well enough aligned with what happened in the Monday and Friday lessons, but still reported watching and using the videos as part of the BCM:

> When I started watching the hybrid videos, I was like, "These are off-topic." It just didn't feel like it was super relatable to the other content. There's a gap between what we were learning in class and what the videos were showing.

This is consistent with feedback from students about flipped-classrooms (Tague & Czocher, 2016) in other contexts. Messaging the planned cohesion of the asynchronous videos and the interactive lectures on Mondays and Fridays is an area for reconsideration and improvement in future implementations of the model.

Conclusions and Questions

In this blended course model, students are provided an office-hours-like learning environment during scheduled class time. Students can work independently and collaboratively and at the same time access help from instructors, TAs, UPTs, and classmates. Participants ranked the blended model, with the in-class-office hour, as one of the most valuable course components that contributed to their learning. This study has implications for math departments acknowledging that the evolving student population expects easy access to instructional staff and flexibility in their courses. This model helps reveal the hidden curriculum of office hours and makes accessible the valuable resource of attending office hours weekly.

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