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Using Educational Technology Applications to Enhance Collegiate Mathematics Education

Spring 2020 (/connections/spring-2020)

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Classrooms in the United States today look very different than they did 10 or 20 years ago. Mobile technology has a pervasive and too often disruptive presence in today's learning environments, but it does not necessarily have to be an obstacle for students' learning. In our own classrooms, we have embraced the idea that technology, such as cell phones and tablets, is here to stay as a powerful force. Thus, we strive to find ways to harness our students' obsessions with the technology they cannot seem to function without, by incorporating it into our weekly, if not daily, mathematics instruction at the collegiate level.

The following paragraphs detail the ways in which we utilize two smartphone compatible applications, namely *Edmodo* (Edmodo, Inc., 2017) and *Socrative* (Socrative, 2011), in class routines in a mathematics education course for preservice elementary and middle school teachers that concentrates on mathematics content and pedagogy for Grades 6-8. In order to be mindful of our students' differing social backgrounds and financial capabilities, we focus on the free versions of these applications so that extra costs are not a prohibitive issue that serve as an obstacle for their integration and use.

Edmodo

Edmodo (Edmodo, Inc., 2017) is an educational application and website that provides a free version for instructors to assign work that can be graded and to deliver quizzes. In order to have access, students must create a free account. They then can respond directly in the app or website, or they can create a Word document and upload it. Instructors can grade and provide written feedback on students' assignments in the app or via the website.

For example, instructors can create their own quizzes in five question formats (multiple choice, true/false, short answer, fill-in-the-blank, and matching), as well as share quizzes created in *Edmodo* with other instructors who have *Edmodo* accounts. Currently, there is not a feature for instructors to utilize a bank of free quizzes, which is available in other applications like *Kahoot!* or *Socrative*. We have utilized the quiz feature of *Edmodo* as part of warm-up assignments in our classes, with the aim of checking for understanding of the previous class content. *Edmodo* allows you to configure a quiz ahead of time for a specific class and to schedule specific start and end dates and times. Students must login to their *Edmodo* account and take the quiz at the scheduled time.

An additional way we implement *Edmodo* is for a weekly reflection class activity. Our students typically write about the week's lessons and difficulties encountered in class, or they are asked to respond to prompts about posted lessons, class projects, and/or videos. In this manner, the instructor collects useful feedback about student understanding and can hone in on topics and/or activities that might need to be revisited in future classes or modified in subsequent semesters. We also gather our

students' opinions about class projects and videos we provide and then use this feedback to modify class content. One other helpful feature of *Edmodo* is that it allows us to download all of the accumulated grades from quizzes and reflections into a spreadsheet for final grading purposes at the end of the semester.

From our perspective, there are several appealing features that make *Edmodo* stand out as a valuable resource for instructional purposes. The free version is very versatile for use both within and outside of the classroom, and it allows instructors to create a number of free "classrooms" unlike the application *Socrative*, which is described in detail below. As previously mentioned, instructors have the ability to create assignments and quizzes with due dates/times that prevent students from answering after the predetermined deadline. Instructors can also delay the release of the quizzes to students, yet at the same time give students the freedom to complete the assignments at their own leisure and on their own time.

Socrative

Socrative (Socrative, 2011) is an educational website and application where instructors can create a free account that allows them to create quizzes and discussion questions with in-time answering from students, providing for instant feedback and also great warm-ups and prompts for class discussion. Like *Edmodo*, instructors can create their own quizzes and additionally are able to modify quizzes from the Quiz Shop. The Quiz Shop is a strong feature of *Socrative* because instructors can search for already made quizzes on various topics, which can then be imported into their accounts and modified in order to fit their classes. When compared with *Edmodo*, the main purpose of *Socrative* is the quiz feature.

Like *Edmodo*, there are clear positives that set *Socrative* apart from other applications. *Socrative*'s quiz capabilities are user friendly with easy navigation for quiz making. There are three quiz type questions (short answer, multiple choice, true/false), as well as a feature to create an "exit ticket" (i.e., an end of class question) and even play a "space race," a game where each student is a space rocket that tries to cross the screen first to win. Instructors can create the quizzes in advance and save them for later use. Students are not required to create an account to complete quizzes, as they just need the "room code" provided by instructors. Students may begin the quiz once the instructor has "launched" or begun the quiz for the class. After quizzes are completed, an instructor can stop the quiz and request copies of the quiz report in various ways, such as downloadable excel spreadsheets/pdfs or via email.

Even though there are definite positives to *Socrative*, there are clear drawbacks to the free version. With the free version of the application, the instructor can create only one classroom with a maximum of 50 participants, which can potentially cause problems with managing quizzes and grades if an instructor teaches multiple courses. *Edmodo*'s free version does not have this limitation. There is only one "room code" for *Socrative* that is used throughout the course and in comparison, applications like *Kahoot!* give students a unique code for every launch of the quiz to avoid students potentially completing a quiz without being present in class.

Summary

As can be seen, there are clear pros and cons for both *Edmodo* and *Socrative* in the classroom. We summarize in the table below some of the most striking features we believe are important about these two applications.

 Table 1

Features of the Free Versions of Edmodo and Socrative

Application	Students must create an account	Writing prompt capabilities	Quiz making capabilities	Bank of free questions	Multiple classrooms allowed	Game mode feature
Edmodo	X	X	X		X	
Socrative			X	X		X

For quiz purposes, we prefer to utilize *Socrative*. We believe its easy navigation, game mode option, and Quiz Shop feature are useful for instructors, and additionally students are not required to create an account. For the purposes of student reflection, we prefer *Edmodo*. *Socrative* does not have this student reflection capability, which is a nice feature for instructors to implement in their classes. Overall, both applications are resources that instructors can utilize in their classrooms, and in turn provide their students with experiences with these applications they may use in their own classrooms someday.

References

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2. Identify and engage a broader constituency for AMTE.
3. Engage membership in strategic planning for the organization.

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