

Classrooms for the Millennials: An Approach for the Next Generation

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Abstract

The purpose of this paper is to introduce educators to three types of applets that are compatible with smartphones, tablets, and desktop computers: screencasting applets, graphing calculator applets, and student response applets. The applets discussed can be seamlessly and effectively integrated into classrooms to help facilitate lectures, collect assessment data, and provide students with additional instructional support. While three specific applets will be discussed, there are many applets available, each with diverse features, varying capabilities, and different price points. In addition to discussing various applications of each type of applet, the authors will share their experiences with using these technologies in the classroom and disclose some tricks-of-the-trade.

Technology is an ever-changing tool that can be utilized to revolutionize the classroom and engage students of the new generation, the Millennials (Strauss & Howe, 1991). Advancements in technology continue to provide educators and students with smaller, more powerful devices that can be integrated into the classroom with ease. Even better, devices such as cell phones and tablets are popular with millennial students and have become more affordable over the past few years. According to the Pew Research Center (2015a & 2015b), 78 percent of "online teens" between the ages of 12–17 own a cell phone and 37 percent are smart phones. The time to tap into the possibilities of new classroom technologies is upon us. Our task, then, is to determine how we can utilize new technologies to enhance the best practices we already subscribe to, such as active student learning, timely and frequent feedback, and effective questioning strategies.

While new types of applets are being developed every day, three types will be discussed here: screencasting applets, graphing calculator applets, and student response applets. Graphing calculator applets and student response applets are similar to traditional graphing calculators and student response systems (or clickers) commonly used in classrooms. Screencasting applets, however, are providing students and teachers a new mode of communication inside and outside of the classroom. The three specific applets discussed in this article were chosen based on affordability, ease of use, and their potential to engage students; however, there are other excellent screencasting, graphing calculator, and student response applets available. Since needs vary from classroom to classroom, educators should look for applets that best meet their needs and the needs of their students.

Screencasting Applets

Screencasting is a relatively new technology in which video-recordings are made from a computer's on-screen activities and then broadcast through the internet (Séror, 2012). While the use of instructional videos is not new to educators, the cost and time commitment involved in formal video production can make teacher-created videos unrealistic. In addition, the use of scripted instructional videos makes student-specific tutorials nearly impossible. Screencasting applets provide educators a cost- and time-effective alternative to formal video production. Furthermore, as Séror (2012) points out, screencasting tools are "likely to appeal to a generation of students used to exploring texts multimodally, often through customized video clips or images that can be accessed on a digital device" (p. 114).

The Educreation interactive whiteboard and screencasting applet (Educreation, 2015) is a free applet that is compatible with desktop computers, smartphones, and tablets. This applet can be used to quickly create audio-video recordings that can

be emailed or uploaded to the internet to provide an alternative communication route between educators and students. In addition, students can use the recording feature to record the class lectures as they take notes and instructors can create private digital classrooms to provide students with a safe environment where they can share videos, ask questions, and receive feedback. Along with these features, here are a few other ideas about how screencasting applets can be utilized as well as some things to remember when using this type of technology in the classroom.

Applications

- “Appetizer” videos—Instructional videos need not be focused solely on current class materials. Consider posting videos that include interesting problems or applications related to what’s being covered in class to help students engage with the material in more meaningful ways.
- Prep videos—Instead of taking up time in class to review prerequisite material, you could create preparatory videos to help students get ready for upcoming material. For example, in mathematics, a video reviewing the different factoring techniques could save valuable class time when covering quadratic and rational functions.
- Virtual office hours—Many students never visit an instructor during office hours. This could be because they feel intimidated or because they have job and family obligations. Screencasting capabilities make it possible for instructors to send videos that address a particular question in a format that involves both text and audio feedback and students have the opportunity to receive the type of one-on-one assistance typically available only during office hours.
- Record class lectures—Both students and instructors can record class lectures. Instructors can send their recording to a student who missed class and students can re-view their recordings in order to expand upon class notes, go back over a class example, or solidify their understanding.

Tricks-of-the-Trade

- Video images will include only what appears on your device’s screen, as it appears on the screen. Writing needs to be legible and figures should be sharp and clear. If writing with the finger appears sloppy, you may want to consider purchasing a stylus.
- When creating videos with audio, remember to speak slowly and clearly. Also keep in mind that microphones often pick up surrounding noise, so try to create recordings in a quiet environment.

Graphing Calculator Applets

Graphing calculators are great classroom tools that facilitate discovery-based learning, help students understand and make connections between various mathematical representations (e.g., algebraic, graphical, and tabular), and give students the power and confidence to explore challenging mathematical topics (Martin, 2008). While the potential for graphing calculators to positively impact student learning has been well documented, the fact remains that graphing calculators can be an expensive investment and cumbersome to learn to use. One of the more cumbersome aspects of traditional hand-held graphing calculators involves the toggling between the various representations. However, many graphing calculator applets have the ability to display all three representations on one screen for simultaneous observation.

An inexpensive, user-friendly applet that allows the simultaneous viewing of the multiple representations is the graphing calculator applet by Desmos (Desmos, 2014). While the Desmos graphing calculator is a free applet that can be downloaded on any smartphone or tablet, it is also compatible with desktop

computers. This applet goes beyond traditional graphing calculator capabilities; it has pre-programmed explorations that can be used to engage students in dynamic investigations of various mathematical functions. For instance, the applet includes a pre-programmed exploration in which students can adjust the slope and y-intercept of a linear function in order to make conjectures regarding how the slope and y-intercept affect the graph. Included below are additional application ideas and some tricks-of-the-trade.

Applications

- Traditional graphing calculator activities—The vast majority of the graphing calculator activities that were written to be used with traditional hand-held graphing calculators can still be implemented with graphing calculator applets. Instead of throwing out all the activities you already have, revise them to work with the applet of your choice.
- Dynamic explorations—Make class activities more engaging by utilizing built-in or self-constructed dynamic explorations. Employing cooperative learning during these explorations can make the activities more powerful and more enjoyable for students.
- Connecting the multiple representations—Graphing calculator applets make connecting the various representations easier. Capitalize on this feature by facilitating comparisons between the representations in class.

Tricks-of-the-Trade

- While graphing calculator applets can be significantly more user-friendly than traditional hand-held graphing calculators, students may still struggle with entering equations and using various features. Therefore, instructors should consider using the graphing calculator applet in class on a regular basis. Also, include students in demonstrations as they will often find new features or innovative uses of the technology.
- If you decide to allow students to use graphing calculator applets on exams, be sure to think about how you will ensure students do not have access to the temptations of the internet while using their devices. (Most graphing calculator applets do not require internet access once the applet has been downloaded.)

Student Response Applets

Student response systems (clickers) are wireless electronic devices that allow students to individually respond to questions or prompts from the instructor, usually with the click of a single button (Barrett, Bornsen, Erickson, Markey, & Spiering, 2005). Once students have responded, data are summarized and displayed for instructor and class analysis. Student response systems allow instructors to provide immediate feedback to students, increasing performance and retention (Oswald & Rhoten, 2014; Bryfczynski, et al., 2014). Along with providing the opportunities for students to receive immediate feedback and for the instructor to receive valuable formative assessment data, student response systems also “provide a convenient means of disrupting the monotony of lecture” (Bryfczynski, et al., 2014, p. 362) and increase student participation by eliminating shyness through the use of anonymous participation (Denning, Griswold, Simon, & Wilkerson, 2006).

Again, student response systems present an additional expense for students. This additional expense, however, is no longer necessary due to the availability of free student response applets like Socrative Student (Socrative, 2011a) and Socrative Teacher (Socrative, 2011b). The Socrative applets are compatible with smartphones, tablets, and desktop computers. Again, new student response applets go beyond traditional classroom clickers. The Socrative applets allow the

use of open-ended questions along with the more traditional true/false or multiple choice questions allowed by “clickers.” Moreover, the Socrative applets allow anonymous data collection as well as identifiable data collection. Below is a brief list of how you can use student response applets in your classroom and some things to keep in mind if you decide to implement this technology.

Applications

- Formative assessment—Using the student response applets, instructors can see students’ responses in real time allowing the instructor to identify student misconceptions and spot students who are struggling. However, rather than revealing the correct answer to students, use results to initiate class discussion and have students share ideas or paths taken to arrive at an answer.
- Exit ticket—Some student response applets have an “Exit ticket” feature in which students are asked to identify material from class that they are still unsure about. While this feature alone can give an instructor incredible insight into where students need additional help, consider using such features along with anonymous response. Research has indicated that students are more willing to be honest if participation is anonymous (Denning et al., 2006).

Tricks-of-the-Trade

- When using these types of applets in a mathematics classroom, keep in mind that many applets allow graphs and illustrations to be uploaded into the question stem. However, uploading these images as answer choices can be more difficult. Also, equation editors are not common in these applets. So, complex expressions, equations, and functions may have to be uploaded as images.
- Using student response applets in conjunction with slide presentations can alleviate restrictions imposed by formatting issues and can also provide an alternative means of participation for students who do not have access to smart devices by allowing them to participate in written format.

Technology is constantly evolving and educators should embrace new classroom tools. To increase student motivation, interest, and engagement, educators need to change their view of technology in the classroom and learn different ways to incorporate emerging technology in the classroom. Screencasting applets, graphing calculator applets, and student response applets are just a few resources available to educators. While three specific applets have been discussed, there are many more applets out there with diverse features, varying capabilities, and different price points. Before integrating a new technology in your classroom, take time to research the different applets available to determine which ones work best for you and your students.

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