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Using Google Forms to Inform Teaching Practices

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Kay and LeSage (2009) conducted a literature review of research on use of student response systems in university courses (typically Science, Technology, Engineering, and Mathematics courses) and categorized benefits into classroom environment, learning, and assessment. The objectives of the proposed session are to discuss how using Google Forms will benefit those three above categories. Examples of Google Forms used to gather data, receive in-the-moment feedback to students and instructors, engage students' learning, and assess their learning will be shared throughout the paper. Limitations of Google Forms will also be discussed. This session can be beneficial to all K-College educators.

Keywords

Google Forms, Student Response System, Technology

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Kay and LeSage (2009) conducted a literature review of research on use of student response systems in university courses (typically Science, Technology, Engineering, and Mathematics courses) and categorized benefits into classroom environment, learning, and assessment. The objectives of the proposed session are to discuss how using Google Forms will benefit those three above categories. Examples of Google Forms used to gather data, receive in-the-moment feedback to students and instructors, engage students' learning, and assess their learning will be shared throughout the paper. Limitations of Google Forms will also be discussed. This session can be beneficial to all K-College educators.

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Introduction

To improve student learning, engagement, and feedback, various student response technologies have been developed and used since their introduction in the 1960s (Kay & LeSage, 2009; Cubric & Jefferies, 2015). Although response systems have had many names (e.g., clickers; classroom, student, personal, audience, or audio response systems; electronic voting systems), they have consistently made promises to deepen student learning and engagement and provide in-the-moment feedback to students and instructors (Kay & LeSage). A typical student response device allows students to send responses to software that an instructor can access; the device can be a dedicated keypad (often referred to as a 'clicker') or an app on a student's internet-capable device.

Over the past 20 years, lowered costs, increased availability, and increased ease of set up have contributed to widespread use of student response systems (SRS) (Burgess, Bingley, & Banks, 2016; Kay & LeSage, 2009). Instructors may choose to use SRS in different ways. For example, in mathematics courses, SRS could be used as a tool for engaging in mathematical work and thinking, or as a tool for feedback in the form of in-class content assessments, student self-reflection, course feedback, or peer review. Depending on how the devices are used, benefits and challenges have been identified (Kay & LeSage, 2009; Cubric & Jefferies, 2015).

Kay and LeSage (2009) conducted a literature review of research on use of SRS in university courses (typically Science, Technology, Engineering, and Mathematics courses). They discussed benefits categorized into: classroom environment, learning, and assessment. We briefly describe each of the three categories here, as they provided a theoretical structure for our discussion in this paper.

Kay and LeSage (2009) identified classroom environment benefits as including improvements in students' attendance, attention, participation (especially avoiding judgment through anonymity of SRS responses), and engagement. Learning benefits described by Kay and LeSage, based on their review of the literature, were: interaction, discussion, contingent teaching, learning performance, and quality of learning. Finally, Kay and LeSage described assessment benefits as allowing feedback, formative assessment, and student comparison of responses (in the moment reflection). Since Google Forms, an online application from Google, is free and easy to use, we propose using Google Forms as a tool to benefit classroom environment, learning, and assessment in any classroom.

Using Google Forms to Benefit Classroom Environment

Google Forms can be used in several ways to increase classroom environment benefits such as surveying students outside of class to learn about them as individuals, engaging them in class by collecting responses in the moment, and collecting their self-reflections after a lesson. The authors of this paper have engaged their students in each activity and they describe them in more detail here.

At the beginning of the semester, the authors create a Google Forms survey to learn about their students' interests, learning styles, and previous experiences, which can be emailed to students prior to the first day of class. By assigning the survey outside of class, it saves class time, decreases the amount of paper needed to be printed, and gives students more time to type their responses. Assigning such a survey also allows instructors to skim the responses before the first class and, potentially, create first day

experiences tailored to students' interests and backgrounds. Figure 1 displays part of a "Getting to Know You" Survey in Google Forms that were created for the content mathematics courses for pre-service teachers at the authors' university.

Figure 1. Part of a "Getting to Know You" Survey in Google Forms

When instructors ask students a question during class, not all students may attempt to answer the question. Not only does the lack of engagement mean students are missing opportunities to learn but the instructor is less likely to be able to respond to students' needs. It is easy for an instructor to incorrectly assume that students do or do not understand the material based on the outspoken students who quickly respond to questions. Instructors may move on from a topic when the majority of the class needs more help, or spend too much time on a topic when the majority of the class actually does understand but is not communicating. The need for accurate in-the-moment feedback from all students can be addressed by using Google Forms as free clickers to involve all students in the learning and feedback process. Additionally, at the end of each lesson, students can use Google Forms to fill out a one-minute reflection to summarize the main point of the class and name one new thing they learned or the "muddiest point" of the lecture, which supports their engagement and the instructor's ability to adapt the lessons to their needs. Google Forms can also be used as an exit ticket or to check student attendance, especially in large lecture hall style classrooms where more than 100 students are present.

Using Google Form to Benefit Learning

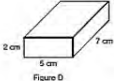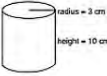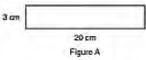To promote learning, Google Forms can be used to gauge students' pre-existing knowledge, identify misconceptions, and engage students in discussion. Because quizzes in Google Forms can be graded automatically and a summary of all answers can be viewed instantly under the "responses" tab in Google Forms, instructors can easily spot which questions were missed the most and decide on which concepts to

review for students. For example, students enrolled in a content mathematics class called Foundations of Data and Geometry for pre-service teachers at a southeast university were given a set of problems to select the appropriate measurement units for a given figure, prior to the measurement lesson. They worked individually in class and submitted their answers using their own devices. Figure 2 shows one of the problems.

Figure 2. A measurement problem

> **Question from Carnegie Learning (2011)**
> Which is the best measurement to describe the area of Figure A? *   1 point
>
> Figure A — 3 cm, 20 cm
> Figure B — 14 in., 9 in.
> Figure C — radius = 3 cm, height = 10 cm
> Figure D — 2 cm, 5 cm, 7 cm
>
> ○ 60 cubic centimeters
> ○ 60 square centimeters
> ○ 60 centimeters

Their responses to this problem revealed that only about half of the students could correctly identify the appropriate units for Figure A (**Fig. 2**). This led to a discussion of dimensions and why units of an area are square but not linear nor cubic.

Moreover, questions in Google Forms are not restricted to multiple-choice but can be created to stimulate deeper student thinking where they need to do more than just a click to answer. For instance, the following problem illustrated in Figure 3 required students to exercise higher-order thinking and make comparisons among area measurements.

Figure 3. A measurement problem

> **Adapted from Beckmann (2017)**
> Which of the following describe the same area? (Type complete sentences; for example, "g and h describe the same area.") *   0 points
>
> a) $3\ in^2$
> b) A 9-inch-by-9-inch square
> c) 9 square inches
> d) A 3-inch-by-3$\frac{1}{3}$-inch square
> e) 9 in. × 9 in.
> f) $9\ in^2$
>
> Your answer

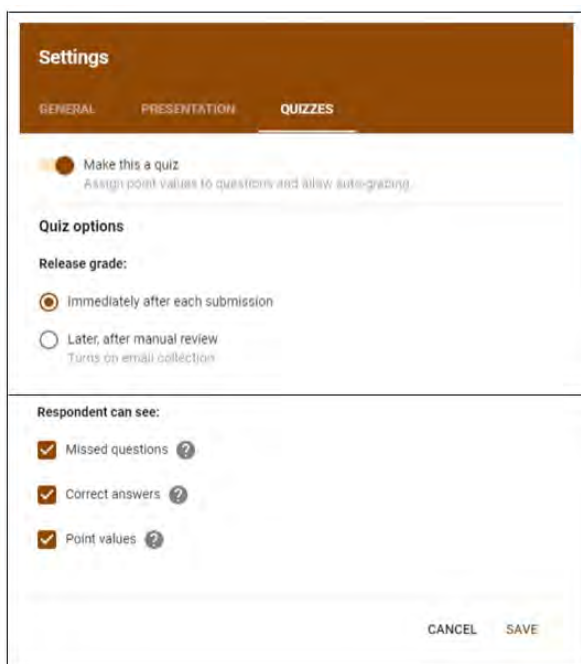The correct answer would be "b) and e) describe the same area and c), d), f) describe the same area." Of 23 responses, only three students gave a correct answer while the other students listed either the first part or the second part but not both, or completely missed it. From an instructor's perspective, receiving this feedback was important so she could respond quickly to the students' confusion. The feedback

was also important for the students because they were able to discuss the responses, confronting their own conceptions and thinking as well as their classmates'.

Using Google Forms to Benefit Assessment

Google Forms can provide in-the-moment feedback to both students and instructors. As shown in Figure 4, quiz settings in Google Forms have options to release grades immediately after each submission and allow students to see their total score and which questions they answered correctly or incorrectly. This immediate feedback allows them to immediately begin questioning their understanding and asking for help. In turn, faculty can assess how well students understand the material. Particularly, a formative assessment can be given to students during class immediately after a concept has been introduced, at the beginning of the next class as a follow-up activity, or at the end of a unit. Student responses give instructors ideas about which concepts need to be revisited or how to adapt follow-up lessons to the students' needs.

Figure 4. Quiz Settings in Google Forms

Limitation of Google Forms

While Google Forms have many benefits, there are also limitations. Currently, Google Forms do not allow mathematical symbols or a way to enter anything but the most basic of equations. Also, there are no formatting options such as italicizing, underlining, text, or bold facing. Another possible concern with using Google Forms is that students may get distracted easily when they have their smartphones or laptops in front of them. It may be difficult to bring distracted students back to class discussions and engaging in classwork. Nonetheless, these issues can be addressed; for example, inserting pictures when an equation cannot be typed, capitalizing words to be emphasized, or walking around the classroom to ensure every student stays on task.

Closing Thoughts

As technologies have developed, many changes have taken place in the classroom to support education and help teachers inform their teaching practices. Google Forms is a free online tool that can be used in the classroom to improve students' participation, engage them in their learning, and evaluate their learning. Moreover, it is user-friendly, easy to administer, and helps instructors save paper and time grading assignments.

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