

2Know! Classroom Response System

A Tool for the Effective Teacher

Introduction

What defines an effective teacher? One might suggest that an effective teacher meets the challenge of instilling students with the knowledge required to succeed at the class or grade level in which they are enrolled, whether it be the second grade or college physics. Of course, while the end goal of academic success is important, so is the way in which that goal is achieved. In their 1993 article, Newmann and Wehlage purported the need for standards for instruction, and outlined criteria that they felt were strongly linked to authentic instruction.

Authentic instruction, they stated, is instruction that engages students' minds and leads to meaningful achievement. The task of attaining meaningful achievement through authentic instruction is often easier said than done, and today's teacher may choose to employ a variety of tools designed to make the job easier and more effective.

One type of technology that is finding its way into more teachers' toolboxes is the classroom response system. These systems, also referred to as student response systems, audience response systems, classroom communications systems, group response systems, or more generally, interactive classroom technology, consist of a set of wireless handheld responders (also known as clickers or response pads) and a receiver which is connected to a computer running software that records and tabulates responses. Questions and results can be projected for students to see.

Although the recent prevalence of literature relating to classroom response systems may lead some to believe this is a new tool, different forms of response systems have been around for some time (Bessler & Nisbet, 1971; Horowitz, 1988; Linder, 1977; Phillips, 1968; Uno, 1984; Whitehead & Bassett, 1975). Early models relied on complex wiring systems, did not have computers or software to compile data into a useful form, and had limited function and mobility—factors that severely limited their usefulness. The advent of computers and wireless technology has alleviated these early hurdles.

About the 2Know! Classroom Response System

The 2Know! classroom response system features the best components of interactive classroom technology. The system includes the AccelTest Plus Gradebook software, which provides the instructor with a wide range of classroom management capabilities. The software also includes a test generator and content item banks from popular textbooks, which customers can search and download from the Renaissance Learning website. A receiver connected to the instructor's computer receives the signals emitted by the handheld response units via radio-frequency (RF) wireless technology, a distinct advantage over wireless systems that rely on infrared (IR) transmissions. The advantages of RF wireless systems include the following:

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- RF systems receive and process responses more quickly than IR systems that cannot process transmissions simultaneously (Johnson & McLeod, 2004) and require students to respond multiple times, a process that can take several minutes for a large lecture class (Wit, 2003).
- RF systems have the ability to handle more response units than IR systems.
- RF systems allow a longer range from responder to receiver than IR systems (Duncan, 2005).
- RF responders do not need to be pointed directly at the receiver—a necessity with IR systems.
- RF systems are capable of two-way transmitting, enabling instructors to send notes, questions, and assignments directly to the student units.¹

The 2Know! classroom response system receiver itself is small and connects to a computer via a universal serial bus (USB). The handheld student responders are durable, easy to handle, and the response functions are intuitive. Responses can be multiple choice, Yes/No, True/False, or numeric. The responder's LCD screen contains multiple lines of scrollable text, and a 30-unit carrying case is available, making the system easily portable.

Why Response Systems Work

For a classroom tool to be implemented, it should facilitate instructional approaches that are proven by research to be positively related to authentic student achievement. The 2Know! classroom response system was developed to help teachers increase student engagement, assess student knowledge, and provide students with immediate feedback—three factors that have been proven to increase student achievement (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991; Berliner, 1990; Fisher et al., 1980; Shin, Deno, Robinson, & Marston, 2000), and are practices attributed to effective teachers (Stronge, 2002). The response system also helps the teacher to create and manage a more efficient classroom (Horowitz, 1988), thus allowing more time to devote to actual teaching, a fourth attribute of an effective teacher (Stronge).

Creating an efficient classroom

For teachers, time is the scarcest of commodities. Teachers who create efficient classrooms are able to spend more time on authentic instruction, thus maximizing their potential to be effective (Stronge, 2002). Classroom response systems can help teachers achieve this goal by automating tasks that would otherwise be done manually, and in turn, enable teachers to use their classroom time more productively (Horowitz, 1988). For example, teachers are able to get class started more quickly by using the 2Know! classroom response system to take attendance, and they also save time by not needing to grade quizzes by hand since the task is done automatically by the response system. Additionally, having instant access to student performance data enables the educator to make informed decisions regarding the content covered in class, without worrying about leaving students confused, or unnecessarily covering material they already know.

Another time-saving function of the 2Know! classroom response system, enabled by its large display and two-way RF technology, is the ability for assignments to be sent instantly from the teacher's software to the students' responders. This allows teachers to avoid making photocopies and distributing homework assignments. By reducing the amount of time spent on non-instructional tasks (the cost of information) while gathering the same amount of information, teachers increase the amount of time available to engage their students in authentic instruction, while increasing the information/cost ratio.

Student engagement

Unfortunately, the problem of disengaged students is not new and has been documented for many years (Sedlak, Wheeler, Pullin, & Cusick, 1986; Steinberg, Brown, & Dornbusch, 1996). Studies show that students who are more engaged in the learning process tend to reach higher levels of academic achievement (Berliner, 1990; Fisher et al., 1980; Shin et al., 2000), and that students who participate more in class tend to have histories of higher academic

¹ Some IR systems accommodate two-way infrared transmissions, which allow confirmation of a response via a light on the keypad. The responder must still be pointed at the receiver as with one-way infrared, and teachers are unable to transmit text to students' responders (Johnson & McLeod, 2004).

achievement (Finn & Cox, 1992). Therefore, teachers should strive toward an instructional environment that fosters student engagement and allows authentic instruction, as described by Newmann and Wehlage (1993).

The 2Know! classroom response system supports authentic instruction by cultivating a learning environment that is supportive of student engagement. According to Newmann and Wehlage (1993), two of the five standards of authentic instruction are (1) *substantive conversation*, or classroom discussions involving interaction and the sharing of ideas, and which work toward student understanding, and (2) *social support for student achievement*, which demands that teachers and students respect one another, set high expectations, and include everyone in the learning process. By promoting discussion and participation from *all* class members, classroom response systems foster these instructional standards.

Classroom response systems are effective at encouraging student engagement by increasing participation (Burnstein & Lederman, 2001; Dufresne, Gerace, Leonard, Mestre, & Wenk, 1996; Foegen, 2001; Horowitz, 1988; Shin et al., 2000; Uno, 1984) and group discussion (Burnstein & Lederman; Dufresne et al.; El-Rady, 2005; Foegen; Horowitz; Pollock & Perkins, 2004; Uno; Wit, 2003), even from students who would otherwise be reluctant to speak up in class (Uno). Students quickly become accustomed to using the response system, so participating in a discussion or answering a question becomes expected and respected, even in large classes. These components of student engagement can lead to higher student achievement (Pollock & Perkins; Shin et al.).

A key aspect of the 2Know! classroom response system is that it allows the teacher to interact with all students simultaneously. Students are more likely to be engaged with what is going on in class when they anticipate having to respond. Without a response system, teachers must either single out individual students to answer questions, or risk being met with silence and blank stares as response to a general inquiry. Instead, when equipped with the 2Know! classroom response system, the teacher can deliver a lesson and pose any number of preprogrammed or spontaneous questions to the class. As students respond, the system's software records, grades, and tallies their answers, which can then be projected as a variety of graphs and tables. Students can instantly see how the class answered as a whole, allowing them to be active participants in their education, and teachers can immediately see how individual students answered, enabling them to individualize instruction. Discrepant answers can serve as a natural opening for a classroom discussion or review. The teacher is also able to make sure all students enter a response, and can address nonparticipation issues, should they arise.

Students who skip class or school are unlikely to be engaged in the learning process. Incorporating a classroom response system into instruction is useful in that it can be used to take attendance; a practice that increases the likelihood that students will attend class, especially when linked to their grades (Burnstein & Lederman, 2001; Duncan, 2005; El-Rady, 2005; Pollock & Perkins, 2004). The 2Know! classroom response system provides a quick and efficient way for instructors to take attendance, a time-consuming task they might otherwise forgo if not required.

Finally, the incorporation of a response system into classroom instruction has the effect of increasing teacher engagement. To be used well, systems like the 2Know! classroom response system require the instructor to carefully consider the construction of questions that will inspire meaningful student discussions (Dufresne et al., 1996). While this upfront planning may require a bit more time than is usually spent on creating a lesson, it is far outweighed by the time-saving aspects of the system. Response systems also bring about a higher self-awareness of how well the educator is teaching (Foegen, 2001), and they enable instructors to become generally more in tune with how well students are learning (Foegen & Hargrave, 1999).

Assessing student knowledge

Research has confirmed that formative assessment—the use of frequent low-stakes testing or questioning to assess student knowledge, monitor progress, and inform instruction—is an effective way to increase student achievement (Bangert-Drowns, Kulik, & Kulik, 1991; Black & Wiliam, 1998; Mazur, 1997; Wiliam, Lee, Harrison, & Black, 2004). Incorporating strategies associated with formative assessment into daily classroom practice is not an easy task, given that it often requires the teacher to alter established teaching practices. The 2Know! classroom response system eases this transition. For example, when a teacher asks students a question to assess their understanding of a topic, only a few students may be willing to answer. But with the 2Know! classroom response system, *every* student gives

an answer which is recorded for immediate or later review. The system offers an exciting and easy way for teachers to include formative assessment in their teaching by administering questions or assessments and immediately utilizing the information collected to respond to student needs.

The importance of feedback

Research has demonstrated that the availability of feedback to students has a positive effect on their academic performance (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991; Coe, 2002; Fisher et al., 1980), including feedback that is supplied via response system (Whitehead & Bassett, 1975). In most cases, this feedback has the greatest impact when it is delivered immediately after the test event (Dihoff, Brosvic, Epstein, & Cook, 2004). Effective teachers provide their students with feedback that is constructive and which does not simply consist of acknowledgment of a right or wrong answer (Stronge, 2002), and some research supports providing feedback in the form of comments in lieu of grades (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Black & Wiliam, 1998). In the hands of an effective educator, the 2Know! classroom response system can be used to provide students with constructive, instantaneous feedback on homework assignments, pop-quizzes, or opinion polls, which is supportive of authentic instruction.

Student and Teacher Perceptions of Response Systems

In studies involving response systems, students enjoyed using the response system in class, thought the response system was a valuable addition to the class, and preferred classes with response systems to classes without response systems (Dufresne et al., 1996; Duncan, 2005; Horowitz, 1988; Pollock & Perkins, 2004; Swan, Kratcoski, van 't Hooft, Campbell, & Miller, 2007; Uno, 1984). Additionally, students believe that using a classroom response system helped them to pay closer attention in class, aided their learning, and made them more comfortable participating in class and likely to discuss topics with fellow students (Dufresne et al.; Duncan; Pollock & Perkins; Uno).

Teachers also have spoken favorably regarding their experiences with classroom response systems. They report that they value the feedback provided by the system (Dufresne et al., 1996; Foegen, 2001; Uno, 1984; Wit, 2003), and that this feedback influences their teaching style and in-class decision-making (El-Rady, 2005; Foegen & Hargrave, 1999; Uno). They also report that the response system is effective in increasing participation and student engagement (Burnstein & Lederman, 2001; El-Rady; Foegen; Swan et al., 2007), and that even the students who do not actively participate in discussions respond via the response system and remain attentive and focused on the happenings in class (Burnstein & Lederman; Dufresne et al.). Finally, teachers feel that the response system helps to focus their instruction and saves them time on non-instructional tasks such as grading quizzes and making photocopies, giving them more time to devote to teaching (El-Rady, Foegen).

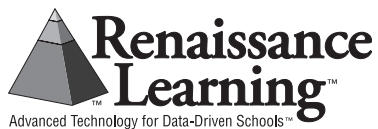
Conclusion

The 2Know! classroom response system is designed to streamline classroom management tasks, as well as make it easier for teachers to increase student engagement, provide students with constructive feedback, and assess student knowledge. Given the fact that these practices are backed by research demonstrating that they can increase student achievement, the 2Know! classroom response system is a piece of classroom technology that teachers of all grades and subjects can use to make their instruction more effective.

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