Improving Traditional Lectures with Personal Response Systems

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Introduction

This position paper argues in favor of integrating personal response systems (PRSs) also known as audience response systems or clickers into traditional lectures to increase student engagement, participation, and achievement. Traditional lectures have been disregarded as an effective method of teaching and learning (Freisen, 2011). They are inferior in facilitating learning primarily because they use a transmissive form of pedagogy (McWilliam, 2008). In a traditional lecture, it is difficult to gauge the progress of students, whether they understand the material, and whether they are ready to move on to a new topic (Voelkel & Bennett, 2013). Furthermore, traditional lectures do not give students the skills needed for success such as collaborating and communicating with others and thinking critically (Terenzini et al., 2001).

Tlhoaele, Hofman, Naidoo, and Winnips (2013) also found lack of student engagement in the learning process and loss of motivation to be major issues of traditional lectures. In traditional lectures, students are not given an opportunity to participate, process and integrate new and previous knowledge (Tlhoaele et al.). One study found that as many as half of the 659 students in the study did not participate when the lesson was a traditional lecture format (Kay & Knaack, 2009). When students are motivated and actively engaged in the learning process, there is increased student learning, student achievement and better acceptance of challenges (Raines & Clark, 2011). Efforts are, therefore, needed to enhance the student experience through "better engagement and by providing more effective feedback to enhance learning" (Voelkel & Bennett, 2013, p. 2).

Personal response systems

Whereas, in lecture classes, feedback is often very difficult to implement without technology (Voelkel & Bennett, 2013), PRSs increase opportunities for feedback as compared to a traditional lecture (Dawson, Meadows & Haffie, 2010; Pagano & Paucar-Caceres, 2013). They give students instant feedback and provide teachers with a clear indication of whether learning is or is not taking place (Dawson et al., 2010; Masikunis, 2009). The frequent and rapid feedback provided by the PRSs gives the teacher more opportunity to adjust to the needs of students, which is not always possible in a traditional lecture (Chen, Whittinghill, & Kadlowec, 2010; Woodfoode & Lopez-Zang, 2012).

Using PRSs in union with interactive activities has "a significant impact on students' performance as compared to more traditional lectures" (Tlhoaele et al.,

2013, p. 11). One study found that the improvement of 22.8% in test scores of the interactive lecture group (experimental) was significantly higher than the traditional lecture group (control) which showed an improvement of only 0.69% on pre- and post-tests (Tlhoaele et al., 2013). Buhay and McGuire (2010) also found a 10% increase in scores from a pre-test to the post-test as compared with only a 0.94% increase when PRSs were not used.

PRSs improve students' attention and achievement (Masikunis, Panayiotidis, & Burke, 2009; Tlhoaele et al., 2013). When students interact through engaging activities with PRSs, they experience an increase in motivation that is higher than the increase in more traditional types of lectures (Tlhoaele et al., 2013). Students who participate less and are not motivated in traditional classes are also more likely to participate with use of PRSs (Kay & Knack, 2009; Tlhoaele et al., 2013). Kay and Knaack (2012) found that fewer than 50% of the students in their study rarely or did not participate in traditional lectures. Students also reported that they were more likely to respond to in-class questions when PRSs were used as opposed to in a traditional lecture (Pagano & Paucar-Caceres, 2013). Pagano and Paucar-Caceres (2013) found that more than 90% of students participated when PRSs were used in a lecture. Masikunis (2009) found that the introduction of PRSs facilitated and encouraged in-class interaction among students.

A study by Chen, Whittinghill, and Kadlowec (2010) found that 65% of students said their performance would decrease in a traditional lecture course versus one using PRSs. Farkas (2003) found that schools offering interactive learning instruction gave students a greater chance to succeed versus traditional instructional methods. Masikunis and Panayiotidis (2009) found when surveying students, the overall rating scores for every category that related to teaching and learning effectiveness increased by at least 5%. Voelkel and Bennett (2013) found that students valued the interactivity of the lessons and felt that it gave them a greater opportunity to think through questions and feel engaged in the lessons. These positive reactions may be due to the fact that, as Lane (2012) observed, use of PRSs creates a sense of community by allowing students to engage and participate in their classes

Obstacles to use of personal response systems

The effectiveness of technology depends on pedagogy (Russell et al., 2003). Therefore, PRSs need carefully constructed content and teaching methods to achieve their potential (Tlhoaele et al., 2013). Alone, PRS technology will not improve students' performance, but in co-operation with engaging instructional approaches, it can be effective (Tlhoaele et al., 2013). Professional development should focus on effective teaching strategies for the integration of technology into constructivist classrooms rather than traditional classrooms (Chen, 2008).

The training and set-up of a PRS can be time-consuming and difficult (Volekel & Bennett, 2013). The use of a PRS takes more preparation time and requires more class time than traditional lecture formats (Tlhoaele et al., 2013). However, one study found that the majority of teachers showed an accepting attitude towards PRSs (Agbatogun, 2012). The initial set-up cost of a PRS can also be high and often prevents the prevalent use of these systems (Miller, Ashar & Getz, 2013; Volekel & Bennett, 2013). Alternative approaches, such as the use of SMS-messaging via mobile devices, can be a cost-saving measure for implementing PRSs into lectures or into any class with Internet access (Volekel & Bennett, 2013).

Although PRS technology is easily mastered by a diverse group of students (Pagano & Paucar-Caceres, 2013), not all students respond positively to PRSs (Kay & Knaack, 2009). In one study, males remained more self-confident when using technology than females (Colley and Comber, 2010). However, Kay and Knaack (2009) found that there was no statistically significant difference between males and females using the PRSs and that the majority of students enjoyed and learned better with PRSs.

References

Agbatogun, A. (2012). Investigating Nigerian primary school teachers' preparedness to adopt personal response system in ESL classroom. *International Electronic Journal of Elementary Education*, 4(2), 377-394.

Buhay, D., Best, L., & McGuire, K. (2010). The effectiveness of library instruction: Do student response systems (clickers) enhance learning?. *The Canadian Journal for the Scholarship of Teaching and Learning*, 1(1), 1-9. DOI: http://dx.doi.org/10.5206/cjsotl-rcacea.2010.1.5

Chen, C. (2008). Why do teachers not practice what they believe regarding technology integration?, *The Journal of Educational Research*, 102(1), 65-75. DOI: 10.3200/JOER.102.1.65-75

Chen, J.C., Whittinghill D., & Kadlowec, J. (2010). Classes that click: Fast, rich feedback to enhance student learning and satisfaction. *Journal of Engineering Education*, 99(2), 159-168.

Colley, A., & Comber, C. (2003). Age and gender differences in computer use and attitudes among secondary school students: What has changed?. *Educational Research*, 45(2), 155-165.

Dawson, D., Meadows, K., & Haffie, T. (2010). The effect of performance feedback on student help-seeking and learning strategy use: Do clickers make a difference?. *The Canadian Journal for the Scholarship of Teaching and Learning*, 1(1), 1-23. DOI: http://dx.doi.org/10.5206/cjsotlrcacea. 2010.1.6

Farkas, R. (2003). Effects of traditional versus learning-styles instructional methods on middle school students. *The Journal of Educational Research*, 97(1), 42-51.

Friesen, N. (2011). The lecture as a transmedial pedagogical form: A historical analysis. *Educational Researcher,* 40(3), 95-102.

Kay, R., & Knaack, L. (2009). Exploring individual differences in attitudes toward audience response systems. *Canadian Journal of Learning and Technology*, 35(1).

Lane, J. (2012). Developing the vision: Preparing teachers to deliver a digital world class education system. *Australian Journal of Teacher Education*, 37(4), 59-74.

Masikunis, G., Panayiotidis, A., & Burke, L. (2009). Changing the nature of lectures using a personal response system. *Innovations in Education and Teaching International*, 46(2), 199-212.

McWilliam, E. (2008). Unlearning how to teach. *Innovations in Education and Teaching International*, 45(3), 263-269. DOI: 10.1080/14703290802176147

Miller, R., Ashar, B., & Getz, K. (2003). Evaluation of an audience response system for continuing education of health professionals. *Journal of Continuing Education in the Health Professions*, 23 (2), 109-115.

Pagano, R. & Paucar-Caceres, A. (2013). Using systems thinking to evaluate formative feedback in UK higher education: The case of classroom response technology. *Innovations in Education and Teaching International*, 50(1), 94-103.

Raines, J., & Clark, L. (2011). A brief overview on using technology to engage students in mathematics. *Current Issues in Education*, 14(2), 1-8.

Russell, M., Bebell, D., O'Dwyer, L., & O'Connor, K. (2003). Examining teacher technology use: Implications for preservice and inservice teacher preparation. *Journal of Teacher Education*, 54(4), 297-310.

Terenzini, P., Cabrera, A., Colbeck, C., Parente, J. & Bjorklund, S. (2001). Collaborative learning vs. lecture/discussion: Students' reported learning gains. *Journal of Engineering Education*, 90(1), 123-130.

Tlhoaele, M., Hofman, A., Naidoo, A., & Winnips, K. (2013). Using clickers to facilitate interactive engagement activities in a lecture room for improved performance by students. *Innovations in Education and Teaching International*, 1-13. DOI:10.1080/14703297.2013.796725

Voelkel, S., & Bennett, D. (2013). New uses for a familiar technology: introducing mobile phone polling in large classes. *Innovations in Education and Teaching International*, 1-13. DOI:10.1080/14703297.2013.770267

Woodforde, L., & Lopez-Zang, D. (2012). Transforming engagement in learning through innovative technologies: Using an audience response system in nursing orientation. *The Journal of Continuing Education in Nursing*, 43(2), 102-103.