

Advantages and Disadvantages of Clicker Use in Education

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ABSTRACT

Since the birth of clickers at Pennsylvania State University, there have been numerous arguments on its effectiveness. This study, aiming to review use of clickers in education, examined literature over around a decade on use of clickers, involving benefits and defects of use of clickers, peer discussion, use of clickers in learning, teaching and problem solving, the effectiveness of use of clickers among non-students. Besides, relationships between lecturing and learning aided with clickers, and current developments in use of clickers were also reviewed and discussed. It was concluded that clickers, as one form of modern technology, had gained growing popularity due to their advantages, such as peer discussion, anonymity and instant feedback although disputes still remained. More studies on clickers and other new technologies were still needed to further push forward levels of education. Cross-disciplinary cooperation between computers, education and psychology may be needed to design more advanced educational technologies.

KEYWORDS

Clickers, Learning and Teaching, Peer Discussion, Problem Solving

INTRODUCTION

Technologies could be integrated into learning and teaching to improve the effectiveness. Clickers are a kind of technology easily applied in education (Bruff, 2009). Clickers are also called a Classroom Communication System, Student Response System, or Audience Response Technology. Clickers-aided education refers to inquiry-based pedagogy coupled with a clicker technology system, a computer technology that enables instructors to raise questions and has students respond using hand-held devices (clickers), through which the questions and answers summarizing student responses can be displayed simultaneously on the multimedia projector.

Although use of clickers has been catching growing attention in the field of education, there are, admittedly, still some controversial issues regarding the clickers assisted learning and teaching. Examples are the effectiveness of clickers use in teaching and learning (Chen et al., 2010), in large-scale (King, 2011) and small-scale classes (Smith et al., 2011), and among non students (Millar and Curtis, 2007). With the controversial issues, learners and teachers tend to feel puzzled to determine whether to use clickers in education and which pedagogy should be adopted when clickers were in use. It is therefore important to review this literature in order to address the issues in question.

Why have some arguments gone against clickers? How can we explore and overcome the obstacles on the way to education assisted with clickers? How can we extend the support factors to facilitate the use of clickers? The purpose of this study was to identify obstacles and support factors (Jeffrey, et al., 2011) that influence the use of clickers in learning and teaching in the education sector.

Material and Methods

This study was conducted in order to extensively examine past literature on advantages and problems of clicker use. The criteria of selecting previous studies as the pillar of this study were:

1. The paper included had to be published in a peer reviewed journal in edited collections;
2. Master's or doctoral dissertations and short reports were excluded;
3. The paper had to focus explicitly or implicitly on blended learning;
4. The paper had to provide a sufficient description of data and data analysis from which the results were concluded.

Based on these criteria, 34 publications (available upon request) were found to be suitable for inclusion. The review study was mainly based on the findings of these studies.

Once the nature of the sample was established, the publications were then further categorized by obstacles and support factors which arose from reading the corpus of papers. The focus questions to identify the obstacles and support factors were as follows:

1. Is use of clickers effective in teaching and learning?
2. What is the relationship between lecturing and learning aided with clickers?
3. Can use of clickers promote peer discussion?
4. Can use of clickers benefit learning and teaching in large-scale and small-scale classes?
5. Can use of clickers promote peer discussion in problem solving?
6. Can clickers be used among non-students?
7. What is the role of clickers in knowledge retention?
8. What are current developments in clicker use?

The cited studies were explored to discuss the key themes in the following sections. The prototype of clicker device was created and developed by Carpenter (1950a, p. 33, 1950b, p. 20) at Pennsylvania State University. Forty-four years later, "Peer Instruction" (Mazur, 1997) gave rise to a rapid development of clickers at numerous educational institutes in Europe and North America (Steinberg, 2010: A14), followed by prospering studies on clickers.

RESULTS

Until now, there have been numerous arguments both for and against use of clickers. The following sections will elaborate on them.

Use of Clickers in Teaching and Learning

Findings of use of clickers in literature were not in agreement although overall they were supportive of clickers. Whether use of clickers has been explored maturely or systematically cannot outweigh the research into effectiveness of clickers use in teaching and learning.

It was considered as an effective means to engage students and stimulate their interest so that interactive communication among learners could be facilitated via clickers in the classroom (Chen et al., 2010). Through case studies, it was also proved that using "clickers cases" online was an effective strategy for engaging undergraduate students in physiology (Knabb, 2012). However, the study of Chen et al (2010) was limited to a single engineering course, and the small sample size was not convincing enough.

Some studies revealed that use of clickers showed large gains in learning outcomes (e.g., Beatty et al., 2006; Caldwell, 2007; Duncan, 2006; Meltzer and Manivannan, 2002; Van Dijk, Van Der Berg, and Van Keulen, 2001). The conclusion of the study conducted by Caldwell (2007) was somewhat

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