Development of a Browser-Based Mobile Audience Response System for Large Classrooms

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ABSTRACT

Didactical advantages of audience response systems (ARS) have been discussed extensively ever since they have been used in classes. However, conventional ARS bear some drawbacks, such as requiring specific hardware, generating costs (text messaging based and web service fees) and creating a dependency on external hosts. In this paper we present a browser-based ARS, which provides a platform-independent channel for the interaction between students and teachers. The authors provide a solution of an ARS for potentially large and spatially distributed classes, where the audience can provide feedback via PCs and mobile devices such as smart phones and tablets. The proposed system has been integrated into the e-learning system of the Vienna University of Economics and Business (WU), one of the largest business universities worldwide. The server side implementation of an ARS brings some challenges, such as the integration into an e-learning environment, the technical feasibility due to a broad variety of possible end user devices, and user acceptance issues. This paper documents the experiences and findings of the stepwise development and deployment in large classrooms. This resulted in an enhancement of the information policy with students and an optimization of the WLAN network settings. Finally, a new, unanticipated usage scenario emerged for mobile, browser-based response systems.

Keywords: Audience Response System, Mixed Methods, Mobile Audience Response, Mobile Learning, Wireless Local Area Network Test (WLAN Test), Workflow

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INTRODUCTION

Massification of Education is a trend in Higher Education, meaning that large student cohorts participate in tertiary education (Altbach, Reisberg, & Rumbley, 2009; Teichler, 1998). Despite this trend, stagnant budgets for universities can be observed in many countries, including Austria (OECD, 2011). These factors are complemented by local factors such as free university access in Austria. This means that in most cases no tuition has to be paid by students and every student with a high-school degree can start to study without having to pass any selection criteria in most faculties, leading to an additional increase of the student population.

These circumstances force Higher Educational Institutions to offer economically cost efficient studies, for instance by introducing larger classes, because of their course efficiency. Especially in the first year of study, a large set of lectures is often held for large audiences. Furthermore, e-learning facilities deliver cost efficient solutions for large cohorts, but also gain increasing importance in order to support the learners in the learning process (Cross, 2004).

To increase economies of scale, universities introduced live broadcasting, for instance to multiple lecture halls (Lorenz, 2011).

Focusing on the students and a high quality learning progress in the educational setting of a mass lecture, special solutions to support this didactical environment are highly in demand. However, receiving feedback from students in large auditoriums, or in a remote setting, where students are at different locations, is nearly impossible without technical support. A technical solution for this problem is audience response systems (ARS, also known as classroom performance systems, classroom response systems, personal response systems and clicker systems), which also have a quality increasing function in the didactical dimension.

REVIEW OF DIDACTICAL ASPECTS OF AUDIENCE RESPONSE SYSTEMS (ARS)

ARS are famous for their applications in quiz shows. In this setting they are used to receive real-time audience feedback. Didactical applications of ARS in an educational environment were introduced by Harden, Wayne & Donald (1968) and Dunn (1969) in 1968. Technically, they used machine readable paper based cards (see also Elliot, 2003).

Draper, Cargill, & Cutts (2002) define the following didactical reasons for using ARS:

1. Formative feedback on learning within a class (i.e. within a contact period)
2. Formative feedback to the teacher on the teaching (i.e. “course feedback”)
3. Peer assessment which can be done on the spot
4. Community mutual awareness building
5. Experiments using human responses
6. Initiation of discussions using the equipment

Edens (2006) finds that the use of ARS in the classroom enhances student (intrinsic) motivation. It is generally well known that motivation plays an important role in the learning process and has been intensively investigated (Caldwell, 2007; Deci, Ryan, & Williams, 1996; Perry, Vandekamp, Mercer, & Nordby, 2002; Pintrich, 2003).

Kay & LeSage (2009) conducted a comprehensive review of the literature about teaching strategies with ARS. In the 52 investigated articles, they identified four major strategies: general, motivational, assessment and learning based strategies (Table 1).

However, as shall be discussed in the next section, conventional ARS have some drawbacks, particularly when they are used in large classes and spatially distributed classes.
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