Chapter 1.9
A Brief History of Networked Classrooms:
Effects, Cases, Pedagogy, and Implications

Louis Abrahamson
The Better Education Foundation, USA

ABSTRACT

The objective of this chapter is to explain the huge, burgeoning sense of excitement surrounding response systems, and more generally, networked classrooms today. Also why, for an idea apparently more than 40 years old, it took this long to happen! Beginning with a brief history of early response systems, it takes up the story from the author's own experience, leading through hardware barriers, misconceptions about pedagogy, and classroom successes, to summarize the variety of uses, and how they lead to improved teaching and learning. It then discusses why this is such a potentially important area of study for improving education, and finally goes on to describe the emerging characteristics of, and rationale for, more powerful types of modern systems.

INTRODUCTION

Today, at almost every university in the USA, somewhere a faculty member in at least one discipline is using a response system in their teaching. This is a phenomenon that has mushroomed to its present stage, mainly within the past three years, from a mere handful of pioneering educators a decade ago. Also, the revolution appears not to be limited to higher education. A cursory Web search, conducted in early 2005, found names of over 3,000 school buildings at the primary and secondary levels in the USA also using response systems. On the technology front, a brief survey showed 12 manufacturers of networked classroom systems,[1] compared with one or two a little more than a decade ago.

Amazingly, these generally somewhat primitive tools are used in just about every discipline taught. An example from the author's own experi-

ence: in the process of inquiring about response system usage at the University of Texas at Austin[2] for a letter of recommendation, I was told that response systems were being used that semester in over 10 disciplines, including physics, chemistry, psychology, biology, mathematics, criminal justice, computer science, library science, pharmacy, and physical education.

In education, few things happen this fast or with such endemic impact. Arguably, not since the overhead projector, has a piece of technology received such widespread acceptance as an aid to classroom teaching. The purpose of this chapter is to give some of the history behind this apparently sudden success story, and also to introduce the work described in this volume by giving some of the practical and theoretical background upon which the success has been based.

PERSONAL BACKGROUND

It is a salutary exercise for me, because I have spent a good deal of the past 20 years working with some of the predecessors of today's response systems, as well as some more advanced networked classrooms, and have firsthand experience of the history and difficulties behind the current successes. I also believe there is an excellent case to be made that current response systems represent only the first, humble step in an exciting, but as yet little explored territory of pedagogical tools that have the power to transform teaching and learning in formal education.

My interest in networked classrooms began almost by accident. From an education in physics and applied mathematics, I was 18 years into a career in aerospace[3] and managing my own research company when, in 1985, we had a small amount of unbudgeted overhead money that needed to be spent during that year. Within certain limits, as specified on government CPFF[4] contracts, the choice on how to spend it was mine, so I decided to use it to pursue an old dream of improving

teaching. With two colleagues (Fred Hartline & Milton Fabert) we built the first prototype of a series of systems known as Classtalk. Classtalk I was a response system constructed of surplus (i.e., junk) Atari keypads, each modified to include an additional communication circuit board, an LED display, and connected to the teacher's computer by a special-purpose digital multiplexer. Our main test system was installed in a large lecture hall (seating 200 students) at Christopher Newport University,[5] where it was used for teaching physics. After a couple of years of use, at the end of every semester, we took surveys of the students. Almost 90% of the students said they understood the subject better, came to class better prepared, paid more attention in classes, and enjoyed it more (Abrahamson, 1999, 2000). The professor (Dr. George Webb) said that the entire atmosphere in his class had changed; that it had become a much more lively, active, and friendly place. He found that weaker students, who would previously have dropped his course, would stay in to risk taking a "D" because they were enjoying it. He also found that the feedback he obtained from the system improved his teaching, and he could engage their interest and thinking in ways that were not possible before (Abrahamson, 1995).

An Early History of Response Systems and Learning Results

The idea of using an electronic system in a classroom for gathering and aggregating student answers to questions has been around for almost 40 years. But it is not a story of steady growth and success. Rather, it is one of pioneering efforts, followed by failure, with subsequent reinvention by others who (at least initially) had no knowledge of the prior work. The first systems actually built and used appear to be those installed in a lecture hall at Stanford University in 1966, and another at Cornell University about 1968 (Littauer, 1972). There are also descriptions of German and Japanese patents about this same period, but it is not

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