

# ARS Clicker Technology: A Useful Tool for Language Teaching with Large Groups?

By Eoin Jordan; Samuel Crofts

*This article reports on the trial of ARS (Audience Response System) clicker technology in language lectures at an English-medium international university in China. Seven lecturers used an ARS with a group of 258 students over a semester-long series of English language lectures. At the end of the course, questionnaire feedback was collected from both lecturers and students to discover: (i) whether they felt that this technology had enhanced learning in the lectures, and (ii) what problems they had experienced when using the ARS. The results suggested that both lecturers and students felt the ARS did enhance learning, by both increasing interest in the lecture materials and improving understanding of content. Problems reported were limited to the performance of the equipment used during the trial. These findings suggest that ARS technology may be a useful tool for language teaching with large student groups.*

## Introduction

Facilitating a mixture of traditional lecturing techniques and the kind of technology more at home on TV game shows, *clicker*-based Audience Response Systems (ARS) are currently attracting considerable attention among educators across the world (Cardoso, 2010). In a classroom environment, ARS clickers enable students to instantly send information to a central computer, which can then display the responses on a screen. In several disciplines at university level, ARS technology has been shown to improve student performance in tackling in-class concept questions (Smith et al., 2009), as well as classroom engagement (Duncan, 2006). For language educators, however, a comparative lack of research makes it difficult to gauge the potential usefulness (as well as potential uses) of this kind of technology. With this in mind, we present here a short report of an empirical study on the effectiveness of an ARS in a series of language lectures at an English-medium university in China. The first section below provides a brief overview of ARS technology in education, as well as details about the context for this study and our research questions. This is followed by a description of our methodology, results and conclusions.

## ARS technology in language education

Clickers can be used for a range of classroom purposes, including in-class surveys, multiple-choice questions, the recording of attendance, as well as checking understanding. In the language classroom, research into the application of ARS technology has been limited so far, with Cardoso (2010) suggesting this lack of research may be due to the smaller class sizes typically involved in language education.

Among the few studies specifically connecting ARS technology to language learning, Cutrim Schmid (2008) suggests that the engaging nature of clickers can increase interactivity, especially in larger classrooms where interactions between students and teachers are logistically difficult. Further to this, a study conducted with advanced English learners in a Brazilian language school leads Cardoso (2010) to suggest that clickers can increase both motivation and in-class participation. The opinions of language teachers are almost absent from research in this area; however, one study does report positive responses from primary school ESL teachers in Nigeria, who particularly praised the ability of clickers to trigger effective communication and improve participation among students (Agbatogun, 2011).

Given the relative lack of previous research focused particularly on language education, it

is also useful to briefly explore the reported effects of clickers in other educational disciplines. Caldwell (2007) states that clickers, by their very nature, encourage participation as all students are asked to respond to all questions (as opposed to, for example, the comparatively small numbers that respond when teachers ask students to raise their hands). By simultaneously gaining feedback from large groups, clickers can also help to guard against the dominance of a vocal minority, who may give the impression of understanding a particular topic, when in fact the silent majority does not understand at all (Simpson & Oliver, 2007). Alongside these advantages, Caldwell (2007) suggests that the feedback provided by clickers can help to reveal student misunderstandings that lecturers may otherwise be oblivious to. Other benefits mentioned in the literature include their potential to promote self-assessment among learners (Hoekstra, 2008) and their ability to break up a lecture and increase student attention (Caldwell, 2007).

Although previous research into the educational uses of clicker technology is generally positive, both Caldwell (2007) and Cardoso (2010) highlight difficulties in evaluating the effects of clickers in educational contexts as a result of the “Hawthorne Effect”; this is when participants improve their performance simply because they are being observed. Other researchers caution against attributing the positive effects observed after the introduction of any classroom technology to that technology alone, suggesting that any effects may also be the result of the improved learning environment that is created to allow the technology to work, not necessarily because of the technology itself (Bruff, 2009; Clark, 1983).

### **ARS Usage in the English Language Centre (ELC) at Xi’an Jiaotong-Liverpool University (XJTLU)**

As a joint venture institution set up by Xi’an Jiaotong University (China) and the University of Liverpool (UK), XJTLU is part of an emerging English language sector within tertiary education in China. The university runs a four-year program almost exclusively in English, with students offered the chance to study during years three and four of their degree at the University of Liverpool. In order to move students

closer to the level of English ability required by UK higher education, the first year of an XJTLU degree consists of a foundation course run by the ELC. This course provides an intensive learning experience for students, and covers a number of aspects of UK higher education that differ significantly from those provided by Chinese institutions. Aside from English tuition, the XJTLU foundation year also introduces students to structural elements of the UK system, such as lectures, seminars and tutorials (<http://www.xjtlu.edu.cn>).

In the summer of 2011, an interdepartmental working group was formed at XJTLU to investigate the effectiveness of using an ARS in lectures at the university. Initially, the trial of this technology was carried out in two departments, Civil Engineering and the ELC; however, as the focus of this article is on language learning, only the trial conducted in the ELC will be described in this report. Given the large number of enrollees, Year 1 Semester 1 language lectures were selected as the most appropriate ELC course for the trial. These lectures are run to familiarise students with the lecture mode of delivery, and to provide them with practice in note-taking and listening. With over 250 enrollees on the course, interaction between students and tutors in lectures is limited as a result of student numbers.

A further challenge faced by tutors delivering ELC language lectures is their focus on topics that do not usually arouse a high level of interest among students, such as sentence structure or punctuation. Sustaining students’ attention when covering such topics can be challenging and, when considered in conjunction with the limited opportunities for interaction between students and tutors, it is easy to see the difficulty of trying to provide engaging language tuition in this format. Given this context, we hoped that the use of an ARS might help to stimulate student interest and interaction in the lectures.

### **Research questions**

Our study was driven by two basic research questions:

RQ1: To what extent did students and lecturers perceive ARS technology to enhance learning, through increased interest and improved understanding in ELC lectures?

RQ2: What problems did teachers and students encounter when using ARS technology in ELC lectures?

Data collection methods, a discussion of important results, and our conclusions about the potential of ARS technology in language learning are presented below.

### Methodology

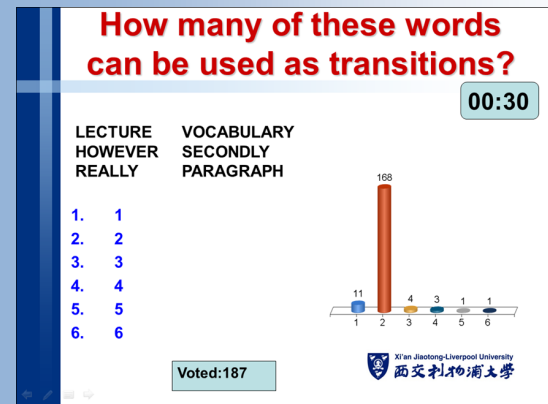
At the start of the 2011-12 Semester 1 ELC language lecture course, 258 Year 1 students were selected to pilot the clicker technology. These students, alongside the seven tutors responsible for delivering eight lectures using the ARS, made up the sample for the study. Each student was provided with one Sunvote (<http://www.sunvote.com.cn>) ARS clicker and was instructed to bring it to lectures for the duration of the research period. Lecturers used Sunvote software to embed clicker-compatible questions into existing PowerPoint lecture presentations. An example of a clicker-compatible question on a PowerPoint slide is shown in Figure 1. In the lectures, tutors informed students that they would be using their clickers for given sections of each session, during which they would be shown questions and asked to select answers by pushing buttons.

Following their ARS lectures, the seven ELC tutors involved in this research were sent a five-part open-ended feedback questionnaire<sup>1</sup>, designed by a member of the Civil Engineering Department (see Appendix A). After all eight ARS lectures were completed, student feedback was collected via an online survey, which was designed by the researchers to elicit opinions on the usefulness and performance of the clickers (see Appendix B).

### Results and discussion

This section is divided into two parts, looking first at the responses of students, and second at those of tutors, with regard to the two research questions.

**Figure 1.** A Clicker-Compatible Question on a PowerPoint Slide



### Student Responses

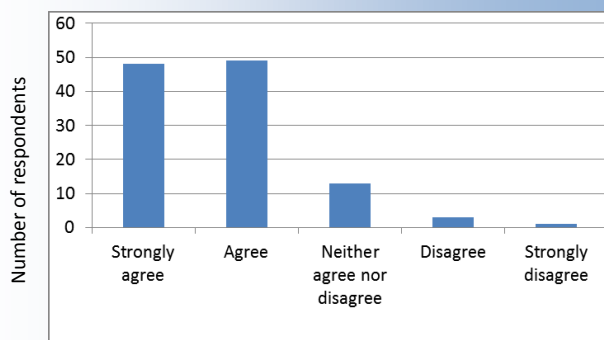
*Enhancement of learning.* From the 258 students asked to participate in the study, 118 responses were collected. Although this response rate appears low, it should be noted that attendance at the lectures during the trial (recorded via clicker usage) was usually between 150 and 200 students. Feedback was generally very positive, similar to results obtained by Cardoso (2010), with negative responses being confined mainly to the performance of the equipment used. The results from two important questionnaire items are presented here to highlight two key areas in which students felt that the ARS enhanced their learning experience.

As Figure 2 demonstrates, students' overall enjoyment of lectures appeared to be improved by the use of ARS clickers. Additionally, Figure 3 suggests that students generally felt the system was useful for learning. Both of these results display positive reactions from students to the use of the clicker system, and reflect a positive overall response across all items (see Appendix B for a more complete table of relevant results).

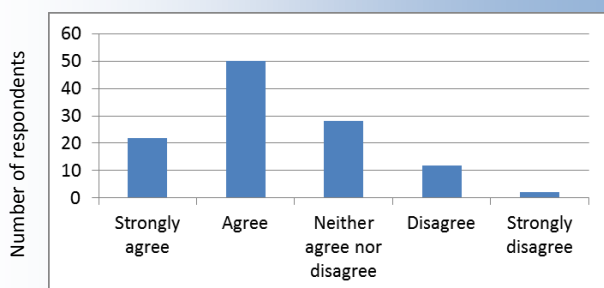
*Problems with ARS technology in lectures.* In terms of problems, we initially suspected that the clickers may prove distracting or overly time-consuming, but such concerns were not

<sup>1</sup>The tutor questionnaire used in this study was designed by Professor Steven Millard from the Civil Engineering Department at XJTLU.

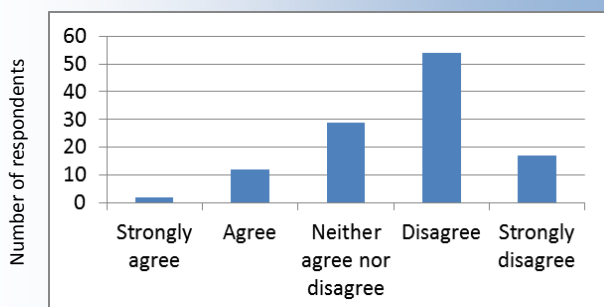
**Figure 2.** “Lectures with Clickers Were More Interesting Than the Ones Without Clickers.”



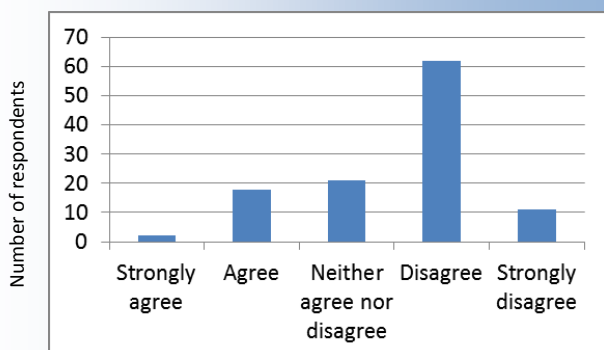
**Figure 3.** “The Clickers Gave Me Useful Feedback that Helped Me to Learn in Lectures.”



**Figure 4.** “The Clickers Distracted Me from Important Content in Lectures.”



**Figure 5.** “Using the Clickers Took Up Too Much Time in Lectures.”



reflected in the data collected from students, as shown in Figure 4 and Figure 5. However, student responses to an open-ended item in the questionnaire provided some interesting contrasts with the generally positive quantitative data. Most striking among these responses was dissatisfaction with the performance of the equipment itself. Of the 49 respondents that chose to answer the final open question, 34 mentioned difficulties with their devices working correctly.

### **Tutor responses**

*Enhancement of learning.* In general, tutors were positive about the clickers, feeling that they increased interactivity and made lectures more engaging and interesting for students. This was a similar result to that obtained by Agbatogun (2011) for primary school ESL teachers. Each of the seven tutors reported that students displayed above-average levels of engagement in lectures, with one tutor speculating that this could be the result of the instant and visual feedback that students receive. The same tutor also reported that this feedback encouraged students to ask questions.

The second significant finding, explicitly reported by over half of the tutors, was the potential of this technology to highlight areas requiring reinforcement for students, allowing a more reactive style of teaching.

As one tutor explained:

*I used real time data to direct my time to elaborating on things which appeared to be less understood by the class. In a situation where you rely on questions from students, such interaction is usually dominated by students with the confidence to ask a question.*

This comment, reflecting our earlier suggestion that hesitancy from naturally shy students may cause their opinions and questions to be lost, displays a particularly strong feature of clicker technology. The anonymous nature of clicker technology may, it seems, encourage the participation of quieter students (although it should be noted that this may not lead to an increase in *oral* participation in class).

*Problems with ARS technology in lectures.* Problems reported by teachers were limited to technical issues, often relating to the performance of the software used. One tutor in particular also had a number of difficulties with malfunctioning equipment; however, despite these difficulties, this tutor still appeared to regard the ARS as having considerable educational potential: "With fully-functioning (and easy-to-use) software/hardware, and perhaps a demonstration of the software's full range, this could be an effective, additional learning/teaching tool."

## Conclusion

We began this report by considering whether ARS technology had the potential to improve the language learning experience of university-level students. After undertaking an eight-week research project, we believe that there is considerable potential for this technology to enhance language teaching with large groups. Overall, students reported an enjoyable experience and enhanced learning. Tutors also reported their experience in complimentary terms, praising the ARS for increasing student interest and focus in lectures, as well as for its ability to provide feedback on students' level of understanding. On the other hand, responses from both tutors and students highlighted significant problems with the performance of the equipment used in the trial, and it is clear that such issues would need to be addressed before any larger scale employment of an ARS.

Although the results of this study suggest that ARS technology has great potential to enliven language teaching with large groups of students, caution must be exercised in generalizing these results. Firstly, it could be argued that the duration of the project was not sufficient to allow the novelty of using such technology to ebb (Clark, 1983). Secondly, with the research confined to students from a single subject major, there are limitations to the extent to which results can be generalised to students from other academic backgrounds. In addition, the seven tutors involved in this project responded to a call for volunteers, so they were likely to be generally enthusiastic about using new technology in education. This may not be representative of the stance of the wider teaching population, either at our institution or elsewhere. Finally, the low response rate for the student questionnaire may mean that results were not repre-

sentative of the opinions of all lecture participants. With these issues in mind, further research over a longer time period and with more students from a wider range of cultural backgrounds is recommended. Future studies should also consider using some form of incentive to encourage participants to respond to questionnaires, in order to provide a higher response rate.

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## Appendix A: Tutor Questionnaire

Name	
Department	
Module	
<b>Preparation of questions</b>	
Ease of preparation	
Flexibility of graphics	
Flexibility of question type	
Other comments	
<b>Set up in lecture room</b>	
Ease of setup	
Student login	
Other comments	
<b>Use in lecture room</b>	
Ease of delivery	
Student response	
Ease of feedback	
Other comments	
<b>Saving/retrieving data</b>	
Ease of use	
Data handling	
Other comments	
<b>Enhancement of student learning</b>	
Student engagement	
Lecturer-student interaction	
Lecturer modification of pace or content from clicker feedback	
Enhancement of student performance	
Other comments	
<b>Overall</b>	
Satisfaction	
Negative comments	
Other comments	
Should we procure?	

## Appendix B: Student Questionnaire Results (Multiple-Choice Items Relevant to Teaching Only)

118 responses (out of a total of 258 students)							
<i>*Numbers of responses for options on each item are indicated below. The most common response for each item is highlighted in bold.</i>							
How many lectures in total did you attend that used the clickers?	A: None	B: 1-5 lectures	C: 6-10 lectures	D: 11-15 lectures	E: 16+ lectures		
	1	5	<b>74</b>	30	8		
<b>Students were asked about the extent to which they agreed or disagreed with the following statements:</b>							
I enjoyed using the clickers in lectures.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	33	<b>58</b>	15	7	1		
Lectures with clickers were more interesting than the ones without clickers.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	48	<b>49</b>	13	3	1		
The clickers gave me useful feedback that helped me to learn in lectures.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	22	<b>50</b>	28	12	2		
I have changed my mind about an answer after seeing other students' clicker responses.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	6	27	<b>37</b>	34	10		
Using the clickers took up too much time in lectures.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	2	18	21	<b>62</b>	11		
The clickers distracted me from important content in lectures.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	2	12	29	<b>54</b>	17		
The clickers were easy to use.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	37	<b>39</b>	17	16	5		
My clicker worked well.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	17	<b>46</b>	19	29	3		
I would like to use clickers in lectures or classes again in future.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	<b>57</b>	41	10	6	0		
I would be happy for clickers to be used to check my attendance at lectures.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	31	<b>43</b>	22	12	6		
I would be happy for my clicker response scores to be used as part of assessment in a module.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree		
	17	<b>33</b>	30	24	10		
<b>Students were asked how useful the following activities were:</b>							
Signing in at the start of lectures.	Very useful	Useful	No opinion either way	Not useful	Not at all useful		
	20	<b>46</b>	23	21	2		
Multiple choice questions where you had to choose one answer.	Very useful	Useful	No opinion either way	Not useful	Not at all useful		
	23	<b>66</b>	15	6	0		
Multiple choice questions where you had to choose more than one answer.	Very useful	Useful	No opinion either way	Not useful	Not at all useful		
	27	<b>64</b>	17	3	0		
Roughly how many clicker questions do you think there should be in each lecture?	A: None	B: 1-2	C: 3-4	D: 5-6	E: 7-8	F: 9-10	G: More than 10
	0	1	7	27	<b>43</b>	20	14