A mobile learning technology Used in teaching and learning in English Primary Schools

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Abstract - *This paper presents an investigation of an Internet based mobile learning technology used to learn English and Mathematics in two English schools. The purpose of this study is to evaluate a mobile learning technology – Wireless Response System. Learning activities were conducted in two schools in UK. Method employed in the investigation is the case studies. The data collected from the studies evidence the success of the technology and its application. The school children were interested in using it, and we conclude that the WRS can assist classroom teachers with students of different levels and age, especially in observing students' feedback, concentration and confidence*.

Keywords: Mobile Learning, Wireless Response System, Internet, ubiquitous engagement, confidence, feedback

1 Introduction

An effective learning technology for children in the school is a key to be success pedagogically [1, 2]. For a group of young learners in primary education, using mobile learning technology has been rarely reported [3, 4, 14]. The children engage in learning through fun activities, e.g. playing educational games. Likewise, as a young generation, the children may accept the new technology as easily as adult learners because mobile learning could enhance fun activities for pupils [4]. The activity may make the children feel excited once they find out they are learning well, as commented by the children from Lithwaith J&N primary school [4]. Thus, the teachers play a critical role to guide pupils to use the technology to fit their learning patterns and styles [5]. However, Arndt has mentioned that early training on using technology to learn is necessary [6].

It follows that mobile learning technology can help teachers to very quickly measure learning performance during the delivery of teaching, even though the children may not be using smartphones, but use different portable devices instead. Both able students and "at-risk" students, i.e. students who may have difficulty passing the assessment, can benefit. Most schools do have online software that children can use after classroom learning, as discussed by [7]. How much the pupils have learned in the classroom is not measured until the final assessment takes place. For the at-risk pupils, it seems too late to catch up, especially, if the learning involves multiple topics. Use mobile learning technology in the classroom may help teachers to provide support in time for the at-risk students [4].

A Student Response System is part of a mobile learning scenario [8, 9]. The challenges of using response technology to enhance teaching and learning have been reported in the literature for decades [1, 2], mostly in higher education, especially in European and American colleges and universities [1, 2, 9, 10, 11]. This study fills the gap of using mobile learning not just for adults but also for the children, and aims to use the collected data to analyze and discuss how this technology influences teaching and learning in English primary schools.

2 Methods Employed

The approach is based on the concepts of activity based learning together with problem based and opinion based learning. In the former, a typical example is that the children are doing an arithmetic calculation. There is only one correct answer. In the latter, an example is that the children are reading a piece of article. There may be more than one answer to measure their comprehension.

The case study was the main method used in the investigation and carried out in two UK primary schools, Linthwaite Clough Junior Infant and Early Years School and St. Joseph's Catholic Primary School in Yorkshire, Huddersfield, UK. The children are working in the groups who are able academically in the class, and entitled to have Free School Meal (FSM) that means the children come from disadvantaged families with lower incomes, etc. The topics covered were mathematics and English, e.g. spelling, punctuation and grammar, i.e. SPaG. The teachers attempted more than 40 sessions.

The technology used here is called Wireless Response System, and was developed by the research group in University of Huddersfield with four EU sponsored grants since 2009. The system was designed to be used for PC, Mac or laptop by teachers, and multiple portable devices, such as tablets or smartphones, for learners (see Fig. 1). Meanwhile, the system is facilitated ubiquitously to be accessed anytime and

anywhere as long as there is an Internet connection (see Fig. 1) [13, 8, 9, 5, 12].

The system is design on the basis of being fast and simple for users, the control actions are presented in one page, as follows.

1. The selection of question types, these could be multiple choice, text or predefined questions from the file storage.
2. User input could be text linked to the multiple choices, e.g. if the spelling for "Challenge" is correct, then select the question type: "Yes, No, Do not know" for the students to reply. Also, an image could be used as input content.
3. Process control, i.e. the control of a timer or audio that could be on or off, or a start button that could be paused then restarted, in order for teacher to give an explanation to the students who may need some clarifications, and stop button that is then used to end the session.

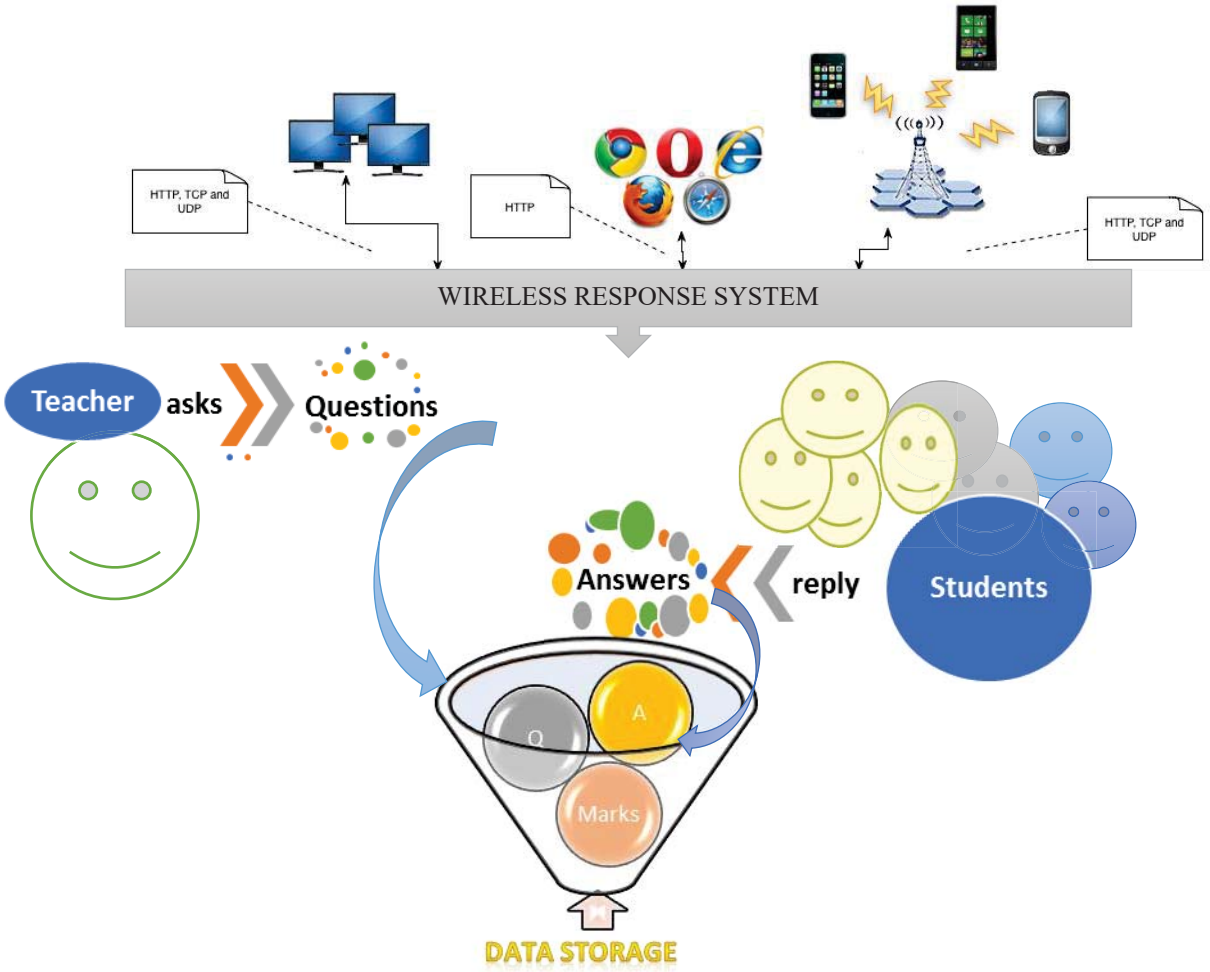

Figure 1 WRS is designed ubiquitously

3 Case studies and Discussions

The results are acquired from different case studies in English and Mathematics. In order to work with schools, the research group in the University of Huddersfield provided a set of tablets to the two English Schools. Also, the schools used their own devices like Netbooks, and Chrome-books. The four question types were designed with 33 groups. Each question type has a different number of pupils who are engaged in the activities. The detailed information is shown in table 1.

Table 1. Question types, pupil groups and number of pupils engaged in the study

No.	Question types	Groups	Pupils engaged with groups
1.	Yes, No, Do not know	2	11
2.	True, False, Do not know	1	4
3.	Multiple choices	10	46
4.	Text input	20	87

For multiple choices, they are dependent on the subjects. For learning mathematics, the pupils may choose one answer because most questions are targeted to solve the specific problems, i.e. problem based learning, see Fig. 3. For learning English, they can choose multiple answers, e.g. one spelling may have two meanings shown in Fig. 4.

For the text input, both teacher and pupils can pass messages to each other, and learning is more or less like a conversation. Furthermore, on the opinion-based learning, the children may express their views for their comprehension.

3.1.1. SPaG learning

English learning in spelling, punctuation and grammar, known as SPaG, is the focus of one of the activities conducted in this pilot study. For learning punctuation, the children can type the punctuation notations as text input, evidenced in Fig. 2. For learning spelling, one question may have two correct answers in vocabularies, i.e. one spelling has two meanings, evidenced in Fig. 3 in which both 'B' and 'C' are correct.

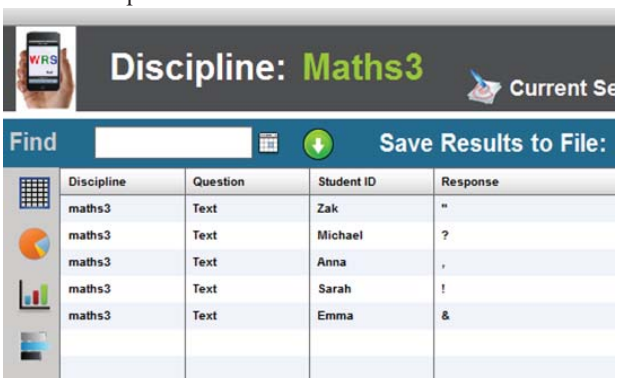

Fig. 2 Case for learning SPaG

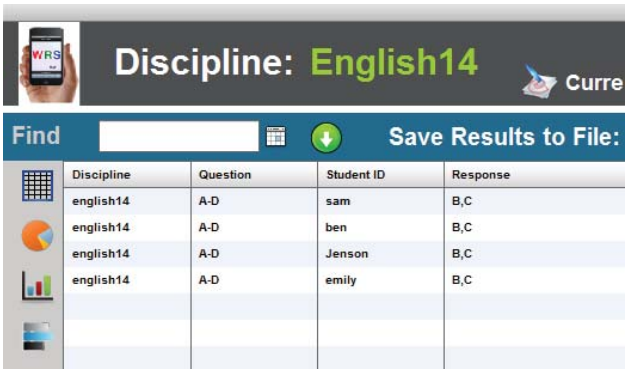

Fig. 3 Case for learning vocabularies

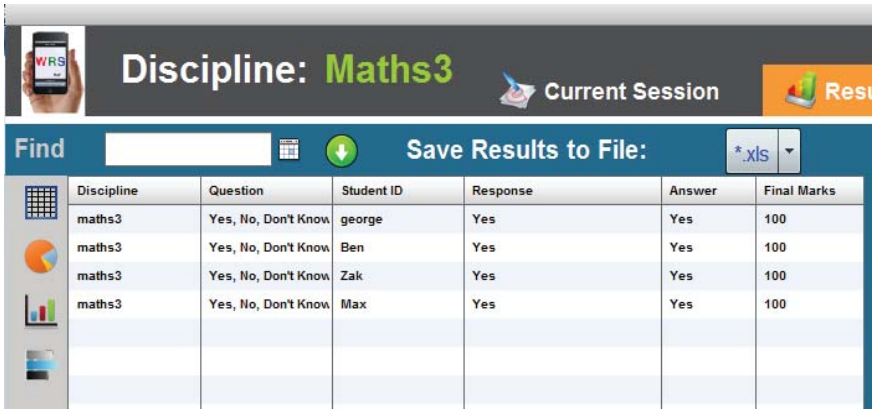

Fig. 4. Case one for observation of children's capability

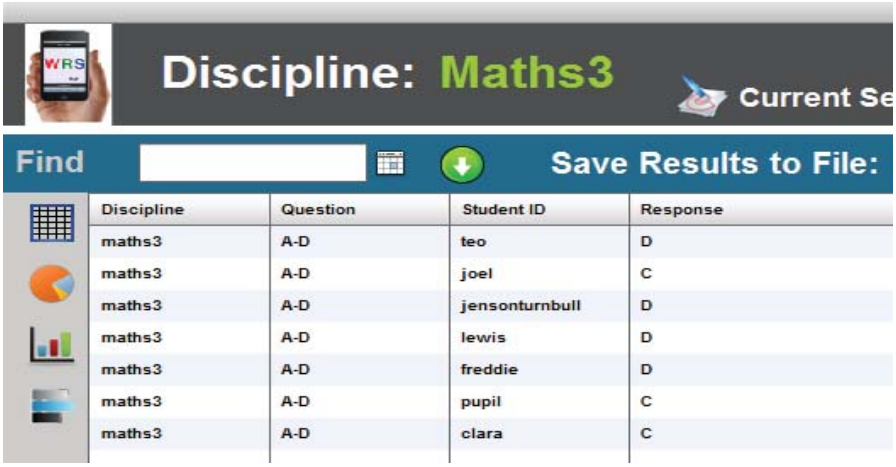

Fig. 5 Case two for observation of children's capability

Table 2 Report from the pilot study in St Joseph Catholic School [14]

Group	**Prior assessment average % correct score**	**Post 10 week testing % correct score**	**% difference**
Non-FSM (30 pupils)	**59.6%**	**60.3%**	**+0.7%**
FSM Control (3 pupils)	**40.7%**	**50.7%**	**+10%**
FSM WRS Intervention (4 pupils)	**50%**	**80%**	**+30%**

Generally speaking, teachers reported that the system was used successfully in the schools concerned [4]. The children's learning outcomes can be observed immediately in the class teaching as shown in the Fig.s 2 to 5. A summary of outcomes was reported from St. Joseph's Catholic School in table 1 [14]. Based on the results demonstrated, the use of WRS has improved the FSM (Free School Meal) children's success in spelling by around about 30%, as summarized in table 2.

4 Summary for WRS Used in The Schools

Finally, there are a few points that will be addressed in terms of feedback, concentration, and confidence.

a. Feedback

The immediate feedback from the system to the teachers and children is unique in comparison with current online game or other self-learning systems that may not give teachers a justiin-time opportunity to know how much the children have understood in the class [14]. As the system provides immediate feedback during the class, WRS provides assistance to the teacher to decide what necessary measures are required to help the children who have not understood in the class, through the analysis of children's answers, e.g. why 4 children answered 'D' and 3 children answered 'C' in Fig. 5. Meanwhile, the at-risk learners, who have been identified in time through the results obtained from WRS, could directly benefit from the immediate feedback.

b. Concentration

As the technology is relatively new in the classroom, the children can play with it interactively as fun learning. After teaching for a while in the class, the teacher initiated the questions for children to respond to. The curiosity of expecting such questions increased the children's concentration in classroom learning. The evidence in Fig. 4 shows that the whole group then answered the question correctly.

c. Confidence

Confidence is an important aspect for children's effective learning. As WRS is designed to accept multiple answers, the children can confidently express their multiple views during the learning as shown in Fig. 3, i.e. both answers in 'B' and 'C' are acceptable.

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