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Developing an Automated Essay Scorer with Feedback (AESF) for Malaysian University English Test (MUET): A Design-based Research Approach

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ABSTRACT

This paper presents the development of an automated essay scoring mechanism based on the Malaysian University English Test essay marking criteria using the Design-based research (DBR). It is a learning intervention to facilitate students in their essay writing process and at the same time, serves as a tool for teachers to mark essay. DBR is the most commonly used method for conducting research in technological enhanced learning context especially for solving real classroom problem. The development of the automated scoring system is presented step by step following the four phases in DBR model. In each phase, data collection procedure, research instrument and the lessons learnt that lead to further iterations are discussed in order to produce a workable and effective automated essay grader. The outcome resulted from the five iterations lead to the present intervention, Automated Essay Scorer with Feedback (AESF). This system allows teachers to collect samples of marked essays to be trained to grade newly entered essays. Then the teacher can set task and keep track of students' progress and provide additional feedback as well as rectify the scores generated. For students, they can practice writing essays and demand for feedback at any point of their essays writing process for the system to provide scores by paragraph as well as the whole essay. The system was tested by 24 teachers from 5 schools in real-classroom context with favorable comment.

Keywords

Automated essay scorer with feedback (AESF), Design-based research, Malaysian University English Test (MUET)

INTRODUCTION

Writing is an important productive skills that students of all disciplines need to master (Graham, Gillespie, & McKeown, 2013). This skill is often under-developed due to time constraints (Weigle, 2007). Writing an academic piece of writing involve time and similarly, more time is needed for the teachers to read, grade and provide feedback (Kellogg, Whiteford, & Quinlan, 2010). It is necessary to provide timely feedback to let students to have better understanding of the given task before they forget or lose interest of the topic written (Ahmad & ul Hussnain, 2012; Lipnevich & Smith, 2009). A technology-based system, in this case the Automated Essay Scorer with Feedback presented in this study can help teacher score and provide immediate language feedback to students. At the same time, this automated essay scorer with feedback provides students a platform to write essays, get feedback on demand as well as access to immediate scores based on paragraph and complete essay as a whole.

In order to design a technologically rich teaching and learning experience, design-based research (DBR) approach has gained popularity as this research model calls for improving an intervention based on the context of occurrence by seeking help from expert as well as practitioners in reality (Reeves & McKenney, 2015). This is a pragmatic approach that utilises both the quantitative and qualitative data to solve a real classroom problem (Reeves & McKenney, 2015).

DBR is the most commonly used methodology when conducting research in technological enhanced learning context (Kennedy-Clark, 2013). In line with the pragmatic worldview, DBR "seeks to increase the impact, transfer and translation of education research into improved practice" (Anderson & Shattuck, 2012), a term synonym with developmental research that focuses on solving complex real world problem critical to education while at the same time leads to theory construction and explanation (Reeves, 2006)

Since learning is a complex phenomenon that cannot be solved by only one discipline, DBR allows researchers to derive important characteristics about the messiness of natural condition (Bell, 2004) so that we can systematically understand and predict how learning occurs, then attempt to create and sustain educational innovation in actual everyday classroom setting that is not merely workable in the laboratory (Barab & Squire, 2004). In terms of sustenance, it requires the understanding of how and why an innovation may have work and vice versa so that on-going improvement can be made over time and across setting (Joseph, 2004). It usually attempts to connect the relationship between the theory, designed innovation and practice where the innovation may even lead to new teaching and learning theory ("Design-based research collective: An emerging paradigm for educational inquiry," 2003)

The process in DBR does not stop at merely testing the innovation in a particular experiment. Its iterative nature requires cyclic processes where improvement is made at every level of testing from its prototype to actual testing grounds with teachers and students from various settings. The reflection on why the innovation works will strengthen the theory proposed while failures will indicate more rooms for improvement and the generation of more validated data (Reeves, 2006). In short, the fundamental principles of DBR are listed below:

- Addressing complex problem in real contexts in collaboration with practitioners;
- Integrating known and hypothetical design principles with technological advances to render plausible solutions to these complex problems; and
- Conducting rigorous and reflective inquiry to test and refine innovative learning environment as well as to define new design principles.

(Reeves, 2006)

DBR serves as the main approach for the current study on designing and developing an Automated Essay Scorer with Feedback (AESF) environment to facilitates students essay writing and teachers essay marking because it is "a systematic but flexible methodology aimed to improve educational practice through iterative analysis, design, development and implementation based on collaboration among researchers and practitioners in a real-world setting and leading to contextual sensitive principles and theory"(Anderson & Shattuck, 2012).

The AESF is based on the behaviourist theory which espouses more practice leads to better performance (Mitchell, 2013) and the humanist theory that higher motivation leads to more the satisfaction in improving the