ABSTRACT

The emergence of Information and Communication Technology has brought the revolution in teaching and learning as educators started using online applications in support to the traditional activities. Formative Knowledge Assessment (FKA) is the act of measuring the students’ level of understanding on a topic or course, in stages. Most of the higher education institutions across the country have acknowledged the needs of FKA. Currently the FKAs are carried out in the form traditional paper based tests and also using Online FKA (OFKA) tools like quizzes, multiple choice test and online assignments. These frequently conducted assessments make students uninterested and also the educators found it difficult to accommodate more number of FKA in their schedule. In addition to this, existing online FKA methods fail to motivate the students as they provide seldom or no feedback on the performance in the assessment. Development of automated OFKA tools that can measure the students’ level of understanding and provide instant feedback is considered for further research. Hence, there is an untapped research avenue for the development of online techniques that would solve these problems pertaining to OFKA in the higher education environments. As a solution, a game based online assessment management system (OAMS) is proposed.
The proposed OAMS is developed to address the above issues by integrating the following two different technologies such as Concept Map and Game Theory. This research work attempted to investigate whether the proposed CM based formative knowledge assessment games serve as a FKA tool in higher education environment. A Concept Map (CM) is a node-arc kind of a visual knowledge representation tool which is widely used for teaching and assessment processes. The challenges of CM based assessments like time consuming, difficulties in evaluation and interpretation are also addressed carefully in this work. As part of this research work OAMS is tailored with two novel and innovative OFKA methods namely Collapsed Concept Map Game (CCMG) and Concept Tree Game (CTG) are proposed as OFKA methods. The OAMS is developed using Java Server Pages, JavaScript and MySQL technologies and deployed in a tomcat web server.

Major data collection techniques used in this research are; the proposed OFKA methods with survey questionnaire and class tests. 230 students from various disciplines have participated in the research work. The performance of the students in both OFKA methods and corresponding Class Tests were statistically analyzed using the Wilcoxon Signed-Rank test and Paired t-test. The results are promising and positive in terms of usefulness of the methods and user willingness to use the OFKA in the future.
Results revealed that the students performed significantly better in proposed CCMG and CTG than the CT. There was a statistical difference between their overall means. All the groups have performed better in CCMG and CTG than in the CT invariably on different course selected for this work. The results confirmed that the newly suggested OFKA methods using concept maps and game theory enhanced the enthusiasm of the students to learn and helped educators to assess the students’ mastery of knowledge.