CHAPTER 9

CONCLUSION AND FUTURE ENHANCEMENTS

This chapter concludes the thesis by summing up the outcomes of research work carried out. This work was aimed at introducing Concept Map Based Formative Knowledge Assessment methods namely Collapsed Concept Map Game (CCMG) and Concept Tree Game (CTG). The CCMG and CTG were developed and tested as Online Formative Knowledge Assessment (OFKA) methods. This chapter is organized as follows; section 9.1 presents the conclusions and section 9.2 suggests future enhancements for this work.

9.1 CONCLUSION

The popularity of ICT and CM based OFKA has received a tremendous attention these days. Therefore, many researchers attempted to use online CM based assessments tools in higher education environments. To shift this paradigm to a new dimension, this work mainly focused on examining the effect of CM based assessment games in higher education environments specifically engineering education and on investigating whether the Concept Map Based Formative Knowledge Assessment methods (CCMG and CTG) serve as an OFKA methodology for the students and educators. The experiments were conducted and the results were analyzed. The following are the research outcomes of this work:
• Survey on the evolution of concept maps, their roles in knowledge assessment, game based learning and role of game theory in knowledge assessment.

• Design and implementation of Online Assessment Management System (OAMS)

• Design and implementation of proposed OFKA methods, Collapsed Concept Map Game (CCMG) method and Concept Tree Game (CTG) method.

• Analysis on the impact of experimental results obtained with different groups of students for all the two proposed methods.

• Performance comparison of the two proposed assessment methods with Class Test based assessment method.

The results of this research work revealed that OFKA through OAMS has positive impacts on students with respect to the OFKA. The quantitative results indicated the mean scores of the CCMG as well as CTG of all the groups were better than the Class Test scores. Statistics showed that the students performed better in OFKA methods thus the proposed method outperformed Class Test with significance.

The results of the surveys indicated that the students stated that using the CCMG and CTG was interesting than the boring Class Test. The students also felt that CCMG and CTG helped in improving their learning in the course with the help of prompt feedback at the end of the formative knowledge assessment process. It also encouraged them to study by themselves by providing the correct answers at the end of assessment. OAMS enabled them to take the assessment at any time. OAMS motivated them to
take actively participate in the assessments and made them think critically during the assessment.

The OFKA methods actually yielded positive impacts in terms of students’ performance and their interest to use both CCMG and CTG for OFKA. This assures the educators to accept such testing system. The system itself is not a tool for teaching as this is used for OFKA alone with remedial suggestions for a better learning. As these methods are developed using the concept mapping as a core process tailored with fun and excitement which motivated the students towards active participation. Concept maps are cognitive tools that force students to rekindle the memories for the concepts and relations.

Finally, the proposed OFKA methods introduced as games served better to the educators. The OFKA methods were found useful in assessing the students with respect the level of knowledge acquired. The educators were able to get an insight into the learning reflected by the students and act accordingly. The proposed OFKA with its feedback mechanism found useful to the educators.

To conclude, the newly suggested OFKA methods using concept maps and game theory significantly assisted to enhance the enthusiasm of the students to learn and help educators to assess the students’ knowledge.

9.2 FUTURE ENHANCEMENTS

The advents of new technologies in the field of ICT enables the researchers to propose, design, develop and experiment innovative ideas in their research fields are concerned. Indeed, ICT plays an important role in providing support for online formative knowledge assessment which helps to have a better learning. This research has brought out the effectiveness of CM
based OFKA methods for learning in higher education environments. Further research in this area could be as follows:

- To improve the user interface for a better gaming environment to engage the students effectively.

- Comparing the OFKA results with summative results in order to measure the learning improvements.

- Experimentation of proposed methods with different courses.

- Automatic map construction for OFKA directly from course materials.

- Research on Adaptive OFKA Games based on CMs can be explored.

- Attempt to create benchmark dataset for comparing CM based assessment results.

- Attempt to explore new CM based assessment methodologies.