ABSTRACT

E-Learning provides a rapid and meaningful access to information and knowledge and hence is far ahead of the concepts of traditional learning. E-learning has the ability to provide both online and offline instructional materials anytime, anywhere and to anybody through many electronic learning methodologies like online discussion forums, online chat windows, virtual classrooms, web-based learning objects and audio-video conferencing systems. However, e-learning might not be effective if it is not handled with proper web usability and communication techniques. The facilitating factors are teacher, course contents, provision of support for the technology and the society as a whole.

In this research work, an integrated e-learning management is proposed focusing on the three aspects for the purpose of e-learning described namely personalized learning, intelligent tutoring system, and continual assessment of learner’s progress. The developed system provides enhanced intelligent teaching-learning methodology using peer-learning software agents by improving the self-efficacy of the learners through learning styles identification and evaluates the learner’s performance accurately through a combination of answering questionnaires and descriptive answer patterns.

This research work proposes, a new learning style identification technique based on Fuzzy logic. The proposed model is based on Felder
Silverman learning style model that relies on psychological theory. The model has been tested for the learners who are learning ‘C’ programming language through e-learning environments. The proposed system uses the learners’ web interface information and Felder Silverman learning style preferences as inputs.

In addition to learning style identification, the self-efficacy which is the belief in one’s own capabilities is increased in this work by providing prior-learning experiences. Three different learning methodologies: namely self-learning followed by peer learning agents using pair programming, learning through peer-learning agents and pedagogical learning assuming the instructor role followed by peer learning agents using pair programming are analyzed with the help of the post-test questionnaires mean score values in this work. Among them, the self-learning group is assumed to have a prior learning experience that increases the self-efficacy of the learners. The other two groups have either a direct interaction with peer-learning agents through pair programming strategy or pedagogical agent assuming the instructor role in learning.

Another contribution of this thesis is the proposal of an ontology based semantic analysis method for evaluating the learners effectively. For ontology construction, anaphora resolution is carried out where, an enhanced pronominal anaphora resolution algorithm is proposed by providing an addition feature to resolve inter-sentential anaphors. The key motivation of this algorithm is that the existence of related anaphors found anywhere in the web input text corpus or standard corpus are identified and replaced.
A new ontology alignment technique which aims to find semantic correspondences between similar elements of different ontologies, and a new framework that derives deontic relations from the input text documents for identifying non-dominant words to perform better evaluation in an e-learning environment has been proposed. In addition, a measure for similarity/conflict resolution between two ontologies is also proposed. The application of deontic logic allows the use of universal and existential quantifiers in rules. Moreover to enhance the efficiency of semantic matching technique, additional predicates have been proposed in this research work. Therefore, this proposed system considers not only the predicate logic features namely equals and partialequals but also provides the newly added consistency checking deontic predicate ‘conflicts’.

The major advantages of the proposed system are the proposal of effective technique for learning style identification, new learning methodologies through pair programming and provision of accurate e-learning evaluation.