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### A Reverse MultipleChoice Based mLearning System

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Mobile learning can help in accelerating the students' learning strengths and comprehension skills. Due to the immediacy and effectiveness of mobile learning, many mobile educational systems with diverse assessments techniques have been proposed. However, we observe a common limitation in existing assessments techniques, such as, the learner cannot correlate question and answer choices or freely adapt answers in a given multiple-choice question, often resulting in incorrect assessment grade. In the current work, we present a reverse multiple-choice mobile learning system that is based on knowledge acquisition. Using a knowledge base, a set of answer choices will be created for a multiple-choice question. For each of one or more of the incorrect answers, a follow-up query is generated for which the incorrect answer is correct. The goal is to find, via a query, an optimal association between the incorrect answers and the correct answer. The user studies of the proposed system demonstrated its efficiency and effectiveness. Keywords—Mobile Learning, Knowledge Acquisition, Multiple Choice, Expert Systems. I. Introduction Nowadays, mobile devices opened a new horizon for learning. As most people own handheld private portable smart phones, this has become main medium of connectivity and reexamination. Using smart-devices for learning is beneficial and attractive as the learner can access educational materials and access assessment exercises at any time. However, existing assessment technique such as multiple-choice technique [1] does not enable a learner to modify answers in the given multiple-choice question resulting inaccurate assessment grade. For this reason, the attested research work was to extend the former multiple-answers question technique with the ability of selecting wrong answers in mobile learning scope. Thus, extra-assessments will be carried out to assess the knowledge of the learner using the selected wrong answer. II. Review of the Literature Several mobile learning applications have been

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proposed due to their ability in providing more engaging and successful learning environments [2]. Chen et al. [3] proposed a mobile learning system that provides multistage guiding mechanisms when the student selects wrong answer in a multiple-choice question. The proposed system enhanced the learning achievements of students and their learning motivation. Huang et al. [4] developed a mobile learning tool to improve learning the English language for foreign language (EFL) students. The tool uses 5-step vocabulary learning (FSVL) strategy. Thus, it employs the former multiple-choice questions in order to assess the learning of students. Koorsse et al. [5] proposed a mobile based system that uses two multiple-choice assessment methods. The assessment methods use self-regulated principles to support the learning of students in the secondary school of science and mathematics. As many mobile based educational systems have been proposed, adapting multiple-choice questions according to a selected wrong answer was not considered in previous mobile based educational systems. Hence, our system can be used to enhance the learning assessments of learners.

III. The Proposed System

Our proposed system provides educational content and uses a novel assessment technique based on reverse-multiple choice [6]. The system can be used in classroom to assess the learning of students. The proposed system covers: 1) presentation of educational content, 2) generation of multiple-choice based questions including their follow-up queries, and 3) performance analysis of the student. For the presentation of the content, we have created an educational depository that contains collection of educational stories. These stories are collected from diverse online ebook libraries such as MagicBlox library [7], BookRix [8], and others. For the multiple-choice questions, we start with the familiar multiple-choice format [1], which we call "Reverse Multiple-Choice Method" (RMCM). The question uses the power of wrong answer choices not just as "distractors," but to extract information about students' depth of learning from brief, machine gradable answers. RMCM question asks a student to weigh why a particular answer choice is incorrect, identify segment(s) of the query on which the answer turns, then change those segment(s) to make it correct. Indeed, the examiner must carefully select the answer choices for a multiple-choice query, but RMCM question databanks have lasting value and high re-usability; even having seen a question earlier, an examinee must answer it thoughtfully. The RMCM approach suits m-learning environments especially, since thinking comprises most effort and actual answers are brief. Eventually, for the performance analysis of students, we use the total number of correct answers done by the student to assess his/her performance. When a reverse multiple-choice option is employed, the grade will be computed according to the number of correct attempts achieved by the student. Thus, for every wrong attempt the performance is decreased by certain percentage.

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