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Implication of Retrieval Based Learning on Students' Engagement

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Description

Recent studies were interested in the outcomes of how students are engaged after several arrangements of reading and testing on the subject. The recommendations showed that reading that is associated with a quick test in which students can write down several notes could help the students to learn associated with a greater remembrance in the final evaluation. That outcome has been compared with giving the students another opportunity to study and shows that the reading associated with quick test has a more significant impact in terms of recalling the information in the final exams even though without providing feedback to them. The direct testing after reading approach is essential as it leads to that testifying and questioning the material given to students could improve recalling information in long-term memory. To effectively recover, review and practice theories and knowledge introduced in the lecture, retrieval-based learning needs to be adopted, involved and improved. Retrieval-based learning such as delivering the lecture using the whiteboard together with pre-prepared gapped handouts has the potential to recover difficulties linked with actively engaging learners in electronics and electrical engineering course in higher education. Creating new learning opportunities is one the most important aims that academics seek to achieve in order to provide new margins for the students to go beyond just memorising the information and methods but improving the sophisticated and imaginative design and ways for more robust solutions to link the newly learned theories with the practical problems.

Motivation and Aims

During the early stages of my teaching I adopted a traditional style of teaching in order to deliver my lectures to students, and the students were playing a passive role by just listening to the lecture delivered. It was clear that using the traditional methods was not pleasant by the students, and I received advice from my peer reviewers to utilise more effective ways of learning in order to engage more with the students. Appropriately, the traditional way of teaching did not last for a long time as I took the advice and started developing my teaching style. Consequently, I put more effort to investigate new teaching approaches, and one of the approaches was the retrieval-based learning by utilising the pre-prepared gapped handouts with the whiteboard and working in small groups for discussion and solving problems. During the teaching of the new module that I introduced in power electronics and motor drives, and the control systems module, my teaching approach requires improving and developing methods that link the theory with the practical information to engage and attract students' attention throughout the whole year. This was attainable by providing continuous feedback from the students. The feedback helped to improve methods for assessing the teaching outcomes and the implications of quality assurance and quality enhancement for academic practice with a particular focus on teaching.

Methodology

The observations and the learning experience from the students of this whiteboard/gapped handouts approach were obtained by using two methods. The first one is a teaching evaluation questionnaire and the two-minutes paper. The second one is the feedback from the peer reviewers and the academic mentor. The teaching evaluation questionnaire included three main points which are: module structure and learning resources, assessment and feedback, and lecturer organising and overall satisfaction. A lot of open-ended questions were likewise provided, permitting students to give qualitative comments of their judgments of the teaching method. The questionnaire did not collect any data related to students' identities and participating in this data collection was an optional choice for all students. The percentage of responses was 51.5% for the teaching evaluation questionnaire and 48.5% for the module evaluation questionnaire. There was no information related to gender or age. However, these two questionnaires were provided by students from the second year of their undergrad study. The other method of collecting data, which was the two-minutes paper, was provided by students from the third year of their undergrad study. The percentage of responses was 70.9%, and the response rate was 64.5% male and 6.45% female responses. There was no information related to age in the two-minutes paper as well. Mainly, the quantitative information summary assumed the figure of descriptive statistics; qualitative answers were analysed to distinguish developing issues.

Literature Review

In recent years, many research findings that used educationally related materials have been introduced and testified for actual teaching conditions such as classroom in the school science (McDaniel, 2011). The research outcomes highlighted the effectiveness of retrieval based training and the use of teaching and training for meaningful educational results. Due to the complexity of the mathematical modelling and representations, some of electrical and electronics engineering courses are regularly practised solely using the strategy of lecture constructions and presentation, in which learners have limited opportunity to actively engage with the lecturer and the material offered by the lecturer. Apart from the value of retrieval approaches and active learning, research on the classroom activities that involve such methods in higher education classrooms still in its infancy (Martyn, 2007; Tinto, 1997). Research in this field is crucial since the engineering academics have other methods to equip their lecture with such as computer simulation and experimental laboratories, and that could increase the possibilities of applying more effective learning skills to establish a more in-depth knowledge of curriculum subjects. Although whiteboards are commonly used in the classrooms, effectively utilising them in university education is rare and difficult nowadays with the technological advancements (Glover, 2005; Warden, 2013). Besides, there is a lack of research that has practically investigated the leverage of utilising them in university education environment (Warden, 2013). Additionally, theories that are promoting active learning move away from utilising interactive employment of whiteboard as it is considered a conventional way of teaching (Estes, 2004; Thorpe, 2004). However, through the years, step by step learning using white/blackboard has been receiving pleasant feedback from learners since it provides exercises that may encourage more in-depth understanding. Scholars worked on research that exploring teaching policies in higher education (Cohen, 2009; Darling-Hammond, 2006). The outcomes accentuate the leading role of effectively reaching the information that is saved through retrieval practising. This

method has been called the testing effect or, as commonly used, retrieval-based learning. The method contradicts with the popular views that say retrieval learning is an unbiased method that happens just following the topic that has been studied (Joachims, 2002; Lyapustin, 2004). From another perspective, other studies reveal that effective retrieval training and repeated knowledge improves long-term memory (Anderson, 1994; Karpicke, 2011). Another piece of research has demonstrated the impact of the retrieval method in lab environments. The outcome consistently presents that students in the active retrieval situation prove great remembrance of the topics compared to learners in different educational situations, such as reading or just looking at the presentation slides (Nelson, 1999; Vinciarelli, 2006). The research proposed that using the retrieval approach needs extra cognitive training, and this additional thinking effort establishes optimal methods for education and enhance information remembrance.

Successes | Challenges | Lessons Learned

The reviewers and students mentioned the method of teaching in the class by highlighting the use of worked models and effective student training. These feedback results from the student view have designated that the value of effective training procedures such as using the whiteboard and emerge the simulation together with the hardware experiments are seen enthusiastically by students within electrical engineering disciplines and draw enhanced achievement. The approach increases engagement with the students. The observers were pleased from the use of a mix of direct and rhetorical questions, which keeps the mind stimulated and engaged. The outcomes also highlighted that this way was naturally indicating when I would like the class to answer and encouraging responses from different parts of the class. Pauses are taken at natural breakpoints in the lecture to allow students to ask their questions to improve understanding. Another encouraging and supportive perspective of the feedback was from students who enjoyed having an example for each concept. Some students found that the lab of the control system was not useful and not related to the lecture given in the class. Providing evidence of considering the essential benefits of peer feedback and student feedback methodologies for enhancing teaching and making appropriate links between theory and practice, I have taken this feedback into account and modified in the delivery plan of the control system module. In the academic year 2018/2019, I have swapped the lab experiments by starting with the simulation first then after a few weeks deliver the experiment on the position control. This change in the plan made the students understand the subject very well, and they were able to link what they have learned in the lab to what they learn in the class.

Scalability and Transferability

This research has shown that it is feasible to include retrieval-based learning procedures and techniques to increase students' engagement in the class, particularly in engineering modules. Results explained that when gapped handouts with whiteboard were incorporated in the module together with the lab exercises and computer simulation training, student engagement was significantly higher compared to engagement assessed through lecture only. Findings point to retrieval-based learning as a useful method that can be integrated into traditional lectures to increase students' understanding of power electronics and motor drives subjects. In contrast to common teaching methods, retrieval-based learning methods performed to increase the students' engagement prominently. Most of the students' feedbacks were positive, and they show a favourite for this style of teaching. However, feedback from

students has also shown that more effort is required to provide a method which preserves the strength to increase critical thinking and understanding, while adequately addressing negative feedbacks that are focused on the difficulty of the topics and the workload and time spent on explaining them. The learning technologies used provided synergy between the theory and practice and qualified the students to engage and work effectively in the industry. This study has confirmed successful incorporation of the subject within the activities as part of an integrated approach to academic practice as well as engagement in continuing professional advancement concerning teaching, learning, and assessment.

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