Using AI Based Software as an Assessment Aid for University Engineering Assignments

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Abstract : As the process of teaching has evolved with the advent of new technologies over the ages, so has the process of learning. Educators have perpetually found themselves on the lookout for new technology-enhanced methods of teaching in order to increase learning efficiency and decrease ever expanding workloads. Shortly after the invention of the internet, web-based learning started to pick up in the late 1990s and educators quickly found that the process of providing learning material and marking assignments could change thanks to the connectivity offered by the internet. With the creation of early web-based virtual learning environments (VLEs) such as SPIDER and Blackboard, it soon became apparent that VLEs resulted in higher reported computer self-efficacy among students, but at the cost of students being less satisfied with the learning process . It may be argued that the impersonal nature of VLEs, and their limited functionality may have been the leading factors contributing to this reported dissatisfaction. To this day, often faced with the prospects of assigning colossal engineering cohorts their homework and assessments, educators may frequently choose optimally curated assessment formats, such as multiple-choice quizzes and numerical answer input boxes, so that automated grading software embedded in the VLEs can save time and mark student submissions instantaneously. A crucial skill that is meant to be learnt during most science and engineering undergraduate degrees is gaining the confidence in using, solving and deriving mathematical equations. Equations underpin a significant portion of the topics taught in many STEM subjects, and it is in homework assignments and assessments that this understanding is tested. It is not hard to see that this can become challenging if the majority of assignment formats students are engaging with are multiple-choice questions, and educators end up with a reduced perspective of their students' ability to manipulate equations. Artificial intelligence (AI) has in recent times been shown to be an important consideration for many technologies. In our paper, we explore the use of new AI based software designed to work in conjunction with current VLEs. Using our experience with the software, we discuss its potential to solve a selection of problems ranging from impersonality to the reduction of educator workloads by speeding up the marking process. We examine the software's potential to increase learning efficiency through its features which claim to allow more customized and higher-quality feedback. We investigate the usability of features allowing students to input equation derivations in a range of different forms, and discuss relevant observations associated with these input methods. Furthermore, we make ethical considerations and discuss potential drawbacks to the software, including the extent to which optical character recognition (OCR) could play a part in the perpetuation of errors and create disagreements between student intent and their submitted assignment answers. It is the intention of the authors that this study will be useful as an example of the implementation of AI in a practical assessment scenario insofar as serving as a springboard for further considerations and studies that utilise AI in the setting and marking of science and engineering assignments.

Keywords : engineering education, assessment, artificial intelligence, optical character recognition (OCR)