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Utilizing decision tree machine model to map dental students' preferred learning styles with suitable instructional strategies

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Abstract
Background: Growing demand for student-centered learning (SCL) has been observed in higher education settings including dentistry. However, application of SCL in dental education is limited. Hence, this study aimed to facilitate SCL application in dentistry utilising a decision tree machine learning (ML) technique to map dental students' preferred learning styles (LS) with suitable instructional strategies (IS) as a promising approach to develop an IS recommender tool for dental students. Methods: A total of 255 dental students in Universiti Malaya completed the modified Index of Learning Styles (m-ILS) questionnaire containing 44 items which classified them into their respective LS. The collected data, referred to as dataset, was used in a decision tree supervised learning to automate the mapping of students' learning styles with the most suitable IS. The accuracy of the ML-empowered IS recommender tool was then evaluated. Results: The application of a decision tree model in the automation process of the mapping between LS (input) and IS (target output) was able to instantly generate the list of suitable instructional strategies for each dental student. The IS recommender tool demonstrated perfect precision and recall for overall model accuracy, suggesting a good sensitivity and specificity in mapping LS with IS. Conclusion: The decision tree ML empowered IS recommender tool was proven to be accurate at matching dental students' learning styles with the relevant instructional strategies. This tool provides a workable path to planning student-centered lessons or modules that potentially will enhance the learning experience of the students.

Author Keywords
Decision tree model instructional strategies; Dental undergraduates; Learning styles; Student-centered learning

Index Keywords
adult, article, automation, decision tree, dental education, dental student, dentistry, female, human, learning, learning style, machine learning, Malaysia, male, questionnaire, sensitivity and specificity

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