

Predicting Performance in Technical Pre-Doctoral Dental Courses Using Advanced Simulation

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Advanced Simulation exam elements demonstrate the value of computerized assessment with immediate feedback and the ability to detect trends such as exam scores rising as number of evaluations increase. It is essential for students to develop self-assessment skills to avoid repeating errors such as additional tooth damage and lower their scores with increased session time. Recording students' performance at initial stages of training in Advanced Simulation assists OD and FP course directors in designing suitable procedures for students and better allocating resources to support struggling students as well as challenge advanced students. The authors suggest laboratory instruction include exercises to reinforce self-assessment and thereby improve future performance.

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The purpose of this study was to determine if elements of Advanced Simulation examinations, such as exam score, session time spent completing the exam, number of evaluations student used to assess his or her performance during exam, and total evaluation time spent assessing the exam served as predictors for performance in two preclinical courses. Methods: The study was reviewed and approved by the Institutional Review Board (IRB #HM15508). Data of dental students' performance in three sequential classes in two preclinical laboratory courses, Operative Dentistry (OD) and Fixed Prosthodontics (FP), were compiled for analysis. The OD laboratory course was a two-semester course in the D1 year, consisting of both virtual reality-based training (Advanced Simulation using DentSim [DS] by Image Navigation Ltd.) and conventional manikin simulation sessions.

Course competencies included Class I and II amalgam 288 Journal of Dental Education ■ Volume 78, Number 2 2014 ADEA Annual Session: Poster Abstracts (cont.) preparations (Advanced Simulation, DS1 and DS2, respectively), Class II amalgam preparation and restoration, Class II composite restoration, Class IV composite restoration, and five-surface complex restoration (conventional simulations). The exams were given throughout the D1 year, beginning with the Advanced Simulation procedures. The FP laboratory course was a two-semester course in the D2 year, consisting of conventional manikin based exercises given throughout the year: CVC, PFM and ceramic preparations (single), interim crown, CVC and PFM FPD preparations, and interim FPD. Study subjects were students who completed the OD and FP preclinical courses (n=282). Students who repeated a course were not included in the analysis (n=6). Student distribution: Year 1 n=99, Year 2 n=93, Year 3 n=90; 129 (46%) females and a total of 16 (6%) left-handed students. Analysis was designed to first investigate which variables were significant for performance on each individual Advanced Simulation exam and then test these significant variables as predictors for performance in the two preclinical course examinations.

Correlations between significant predictors and the preclinical grades were calculated. Advanced Simulation exams were also compared to analogous individual OD and FP competency exams that involved only the completion of a single tooth preparation. Analyses were completed using JMP 10.0.0 SAS Institute Inc., USA. Results: Regression analysis revealed both Advanced Simulation (DS1, DS2) exam scores were significant predictors of the preclinical courses. Year was significant for only FP. The elements of session time, evaluation time, number of evaluations, gender, and handedness were not significant. There were no significant interactions detected between year and the other predictor variables. Notably, for DS1, exam scores fell as session time increased; and for both DS1 and DS2 exam scores rose as number of evaluations increased. Of the Advanced Simulation exams (DS1, DS2), correlations exceeding 0.20 were found for both OD and FP courses, including the highest OD correlation of 0.35 with DS1 exam and the highest FP correlation 0.40 with DS1 exam in Year 2. The authors conclude that Advanced Simulation exam scores serve as predictors of performance in OD and FP preclinical courses. These results highlight the predictive value of dental students' performance on the Advanced Simulator at an early stage of their psychomotor skill development.

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