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The Use of Adaptive Textbook Technology as a Learning Tool in Legal Studies Courses

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Abstract. The paper furthers the literature on technology use in business law courses by providing evidence that business law students perceive that digital adaptive textbook technology (DATT) is more effective than traditional textbooks, identifying factors that influence this perception, and making recommendations for implementation of DATT in legal studies courses. In pursuing these goals, the study employs descriptive statistics, textual analysis and machine learning tools.

Keywords: educational technology, adaptive learning, legal studies, adaptive textbook and online learning.

1. Introduction

An increasing trend in higher education is the use of digital adaptive textbook technology (DATT),[1] learning technology that personalizes instruction by delivering content dynamically tailored to each individual student.[2] Adaptive textbooks,[3] which students generally perceive as positive,[4] may help improve the entire system of learning because they tailor learning to individual needs.[5] However, their effectiveness as learning tools warrants further investigation.[6] This article contributes to the literature by assessing student perceptions of DATT's effectiveness, identifying demographic and other variables that are correlated with these perceptions, and offering recommendations for the use of DATT in undergraduate classrooms based on the authors' successful implementation thereof.

2. Literature Review

Prior research by two of the co-authors investigated the history and effectiveness of technology tools in law and legal studies classrooms,[7] the extent to which technology has been used to meet legal studies' objectives,[8] and students' perceptions of DATT.[9] They found that most students view such technology favorably and prefer it to traditional books.[10] Research by others point to three favorable findings discussed below.

First, adaptive technology has been associated with higher exam scores.[11] Samulski et al. found that students in a course requiring the use of integrated learning systems (ILS) outperformed students in ILS-optional courses by 6% across exams and that the comparative benefits of ILS occurred across multiple levels of Bloom's taxonomy.[12] They also found that after using adaptive eLearning modules, learners' knowledge improved over traditional methods,[13] and that DATT allows students to experience a self-paced, individualized curriculum based on each student's prior knowledge and learning ability.[14] Overall, participants using DATT demonstrated notable improvement. [15]

Second, DATT has been positively correlated with student study time. One study found that students using an interactive e-text saw more improvement in their test scores compared to print book users but they spent more time studying than did the print book users.[16] Whether spending more time studying is good or bad is an open question.

Third, adaptive technology has been associated with reductions in achievement gaps between low and high performing students.[17] Adaptive

1. Ron Legon and Richard Garrett, The Changing Landscape of Online Education (CHLOE) 2: *A Deeper Dive*, 1, 6 (2018) https://www.qualitymatters.org/sites/default/files/research-docs-pdfs/2018-QM-Eduventures-CHLOE-2-Report.pdf (last visited December 3, 2018) (noting that "Adaptive learning…[is] poised to lead the next wave of [technology] adoption" in colleges and universities); Charles Dzubian, et al., Adaptive Learning: A Stabilizing Influence Across Disciplines and Universities, 22 *Online Learning* 7, 10 (2018)(suggesting that the enthusiasm for adaptive learning tools found so far in higher education is likely to continue); S. Adams Becker, et al., NMC horizon report: 2017 higher education edition, *The New Media Consortium*, 1,2 (2017) https://files.eric.ed.gov/fulltext/ED582134.pdf (last visited December 1, 2018)(suggesting that "Adaptive technologies… are driving institutional decision-making…"); Office of Educational Technology, U.S. Department of Education, Reimagining The Role of Technology in Higher Education, *A Supplement to the National Education Technology Plan*, 1 69-70 (2017) https://tech.ed.gov/files/2017/01/Higher-Ed-NETP.pdf (last visited December 3, 2018)(finding that adaptive learning platforms have become more pervasive and can be a help to higher education students); Ontario's Distance Education & Training Network, A 2016 Look at the Future of Online Learning, *Ontario's Distance Education & Training Network* (2016), https://teachonline.ca/sites/default/files/tools-trends/downloads/2016_look_at_online_learning.pdf (last visited December 1, 2018) (noting that adaptive technology use is one of seven key patterns of development of technology that supports learning).
2. Bella Ross, et al., Adaptive Quizzes to Increase Motivation, Engagement, and Learning Outcomes in a First Year Accounting Unit, 15 *International Journal of Educational Technology in Higher Education* 1, 1 (2018).

technology has also been associated with improvements in the performance of otherwise "slow learners."[18]

However, not all research suggests that DATT is effective. For example, in one study of undergraduate and undergraduate anatomy classes, results no DATT gains over traditional methods.[19] Another study, this one on the effectiveness of adaptive online quizzing in an introductory psychology course, found that students assigned to complete adaptive quizzing (n = 495) scored slightly lower than the control group (n = 402).[20] Results of a third study found that while use of DATT in a first-year accounting course was correlated with increased student motivation and engagement, no significant learning gains were observed.[21]

Thus, the literature on the effectiveness of DATT is mixed. While the literature is cross-disciplinary (i.e., spanning psychology, healthcare, and medical school), no study has yet tested the effectiveness of DATT in the legal studies context. This article addresses this gap in the literature and shares insights that can be used to transform and improve legal education from the undergraduate to law school level.

3. Questions, Methods and Data

A. Research Questions

We seek answers to two primary questions:

3. Sonia Toson & Cristen W. Dutcher, Students' Perceptions of Adaptive Textbook Technology as a Learning Tool in Legal Studies Courses, 12 *Journal of International Business Education* 213, 215-217 (2017) (suggesting that adaptive technology, including textbooks, "…uses artificial intelligence to methodically tailor the content to the student-user's individual needs…[and] can be considered an intelligent database in that it features an interactive digital content as well as automated learning tools that adapt to the individual student-user.")
4. Qin Sun, et al., Perceived Value of Interactive Digital Textbook and Adaptive Learning: Implications on Student Learning Effectiveness, 93 *Journal of Education for Business*, 323, 328 (2018), https://doi.org/10.1080/08832323.2018.1493422; Toson & Dutcher, *supra* note 3.
5. Belle Selene Xia, An In-Depth Analysis of Teaching Themes and the Quality of Teaching in Higher Education: Evidence from the Programming Education Environments, 29 International *Journal of Teaching and Learning in Higher Education* 245, 252 (2017).
6. Toson & Dutcher, *supra* note 3.
7. *Id.*
8. *Id*. at 217-220.
9. *Id*. at 224-229.
10. *Id*. at 217-231.
11. Jeffrey S. Nevid & Alexander J. Gordon, Integrated Learning Systems: Is There a Learning Benefit?, 45(4) *Teaching of Psychology*, 340-345 (2018); T. Danielle Samulski, et al., The Utility of Adaptive eLearning in Cervical Cytopathy Education, 126 *Cancer Cytopathy* 129, doi.org/10.1002/cncy.21942 (2018).
12. Samulski, et al. at 132.
13. *Id*. at 133.
14. *Id*.
15. *Id*. at 132-135.