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A Comparative Study of Online Art History Information Literacy Instruction: A Tale of Two Platforms

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Abstract:

In a collaborative effort between three departments at Portland State University, investigators designed and created Information Literacy (IL) modules tailored to the needs of Art History students utilizing two delivery platforms. One platform employed adaptive software (in this study, the product is called Realizeit), and the other was a static environment called Pressbooks. Students were randomly divided into cohorts based on these delivery methods. The author compared results of pre and post information literacy assessments and completed an analysis of students' preliminary bibliographies to measure the success of the IL instruction. But the core investigation was to determine whether the same content delivered in different online learning environments were appreciably different in terms of students' performance outcomes. This study reaffirms the value of information literacy instruction in Art History classes as evidenced by significant student improvements. Regarding the efficacy of adaptive learning software, however, the outcomes of this study are inconclusive.

Keywords: Academic libraries; adaptive learning; art history; asynchronous learning; information literacy

Introduction: Background and Context

At Portland State University, the Art History Librarian Elsa Loftis collaborated with Professor Anne McClanan of Art History, and Misty Hamideh, instructional designer from the University's Office of Academic Innovation (OAI) to initiate the creation of an information literacy module for online students in two courses. The aim was to give undergraduate art history students a grounding in the fundamentals of bibliographic instruction and research methods germane to their coursework, in an asynchronous online classroom environment. Because OAI was in the midst of trialling an adaptive learning platform called Realizeit, the course designers seized the opportunity to use this program and conduct research about its success in comparison to other content delivery methods. The desire to design online learning modules for Art History, coupled with the access to an adaptive learning platform presented the central research question: Does the delivery environment of asynchronous online IL modules impact learning for the Art History student?

Long before COVID-19 upended face-to-face teaching, there was already a clear trend toward more distance learning in colleges and universities nationwide.¹ Institutions of higher learning will continue to investigate whether technology such as adaptive course software will be beneficial to students as they try to improve their research skills. Adaptive technology is of interest because of its potential to harness students' prior knowledge and skill sets to a more tailored learning experience. This study sought to reveal how comparatively well this works in Art History courses.

Having designed a similar series of online tutorials for undergraduate art students in collaboration with librarians at other art colleges for Lynda.com (now LinkedIn Learning)², and having researched the use of those modules,³ this author was interested in the particular efficacy of the active and adaptive platforms as opposed to more traditional online asynchronous delivery methods.

Professor McClanan identified two fully online courses as appropriate venues to offer the IL modules and conduct optional assessments. Both courses, Medieval Monsters (ArH 355) and Medieval Magic and Science in Art (ArH 358), were offered in the Winter 2020 quarter, had an assigned research paper. Students in these courses were given the option to consent to the study, allowing their anonymized pre and post assessments and preliminary bibliographies to be used to assess their learning after participating in the IL modules and completing the course.

Literature Review

Adaptive Learning

In this study, the content of the IL instruction was not the primary investigation, rather it was to what extent the delivery method (passive versus adaptive) positively influenced student learning. Candace Walkington equips readers with a serviceable understanding of what adaptive learning is and why it is impactful in education, stating that these technologies are “emerging in educational settings as a means to customize instruction to learners’ background, experiences, and prior knowledge.”⁴ Stephanie Vanbecelaere, et. al build on this explanation to illustrate how a static approach is something a learner encounters that was created prior to their participation. The adaptation is “based on pre-task measurements of learner characteristics and takes place before the instruction starts.”⁵

There have been many contributions to scholarly literature regarding adaptive learning as it relates to a range of disciplines. Walkington presents evidence that adaptive learning technology has the potential to make an impact on learning outcomes in algebra, most especially when the adaptation allows for the presentation of material to align with the learner’s dispositions and interests.⁶ A study by Min Liu, Emily McKelroy, Stephanie Corliss, and Jamison Carrigan revealed that the adaptive learning intervention did positively impact students in a chemistry course, but the results did not mirror those in the other disciplines they investigated (biology, math, and information literacy).⁷

¹ U.S. Department of Education, National Center for Education Statistics, “Integrated Postsecondary Education Data System (IPEDS). Spring 2019 and Spring 2020, Fall Enrollment component.” See Digest of Education Statistics 2020, table 311.15. <https://nces.ed.gov/datatools/>.

² Loftis, Elsa and Wormser Martinez, (2015)

³ Loftis, Elsa and Wormser Martinez, (2016)

⁴ Candace A. Walkington, "Using Adaptive Learning Technologies to Personalize Instruction to Student Interests: The Impact of Relevant Contexts on Performance and Learning Outcomes," *Journal of Educational Psychology* 105, no. 4 (2013): 932.

⁵ Stefanie Vanbecelaere et al., “The effectiveness of adaptive versus non-adaptive learning with digital educational games,” *Journal of Computer Assisted Learning* 36, no. 4 (2020): 503. <https://doi.org/10.1111/jcal.12416>

⁶ Walkington, “Using,” 942.

⁷ Min Liu et al., "Investigating the Effect of an Adaptive Learning Intervention on Students' Learning," *Educational Technology Research and Development* 65, no. 6 (2017): 605-625.

Additionally, Edwin Griff and Stephen Matter present no appreciable difference in adaptive content delivery in the field of physiology.⁸

Directly comparing studies such as these is problematic because they are not only varied in their disciplines of focus, but also in degrees of interventions and design of adaptive learning platforms. George Magoulas, Yparisia Papanikolaou, and Maria Grigoriadou discuss the importance of how closely an adaptive web-based learning environment can be tailored to a student's learning style and disposition, and in turn, how much student input informs the adaptive platform itself.⁹

Indeed, there has been significant investigation in terms of adaptive learning as outlined by Haoran Xie, Hui-Chun Chu, Gwo-Jen Hwang, and Chun-Chieh Wang in their review of 70 journal publications between 2007-2017 which discusses "adaptive/personalized learning," and that a high percentage (86%) reported positive effects on learning achievements.¹⁰ Elizabeth Fitzgerald, Ann Jones, Natalia Kucirkova, and Eileen Scanlon also conducted a literature review of personalized technology enhanced learning. They examined 50 publications, highlighting the characteristics of personalized learning, and potential benefits of such interventions.¹¹ On the other end of that spectrum, those authors also discuss criticisms of personalized learning in that the models they use can be flawed and might not encompass enough adaptation to accommodate evolving learner preferences. They observe the positive impact personalization has on student motivation and satisfaction, but note, referring to Bart Rienties and Lisette Toetanel, that these do not always connect to positive student performance.¹² While many studies in this area were specific to a range of disciplines, the author did not uncover a single study related to adaptive learning and Art History.

Information Literacy Module Creation and Evaluation

In order to demonstrate the impacts of the IL learning modules and investigate adaptive learning, the author drew from the many previous studies and articles written on the subject of information literacy learning assessment. One such paper was Debra Gilchrist and Megan Oakleaf's paper which highlights assessment strategies, underscores the value of faculty-librarian collaboration, and the unique value librarians can bring to teaching and learning.¹³ Erin Rinto's 2013 article regarding the use rubrics with student bibliographies to assess student learning also proved useful in framing an assessment strategy for this project.¹⁴ The value of using rubrics in assessment was underscored by

⁸ Edwin R. Griff, and Stephen F. Matter, "Evaluation of an Adaptive Online Learning System," *British Journal of Educational Technology* 44, no. 1 (2013): 170-76. <https://doi.org/10.1111/j.1467-8535.2012.01300.x>.

⁹ George D Magoulas et al., "Adaptive Web-based Learning: Accommodating Individual Differences through Systems Adaptation," *British Journal of Educational Technology* 34, no. 4 (2003): 511-27.

¹⁰ Haoran Xie et al., "Trends and Development in Technology-enhanced Adaptive/personalized Learning: A Systematic Review of Journal Publications from 2007 to 2017," *Computers and Education* 140 (2019): 103599.

¹¹ FitzGerald, Elizabeth et al., "A Literature Synthesis of Personalised Technology-enhanced Learning: What Works and Why," *Research in Learning Technology* 26 (2018): 1-16.

¹² Bart Rienties, and Lisette Toetanel, "The Impact of Learning Design on Student Behaviour, Satisfaction and Performance: A Cross-institutional Comparison across 151 Modules," *Computers in Human Behavior* 60 (2016): 333-41.

¹³ Megan Oakleaf, and Debra Gilchrist, "An Essential Partner: The Librarian's Role in Student Learning Assessment," *National Institute for Learning Outcomes Assessment* (2012), http://niloa.limereddev.com/documents/LibraryLO_000.pdf

¹⁴ Erin E. Rinto, "Developing and Applying an Information Literacy Rubric to Student Annotated Bibliographies," *Evidence Based Library and Information Practice* 8, no. 3 (2013): 5.

Lori Knight, who explained that “the analysis of student work product is a useful and authentic assessment, especially in the context of information literacy.”¹⁵

The design of the study also incorporated pre and post assessments for the students to complete, so it is important to highlight the research being done in this area of information literacy study. Kevin Walker and Sara Whitver, in 2020, for instance, discuss identical pre-test/post-tests from before and after IL sessions as a way to “gauge student familiarity with a variety of IL concepts.”¹⁶ As Andrew Walsh, in 2009 points out, an indicator of understanding or mastery, multiple choice assessments appear to be a ubiquitous method of assessment used by librarians.¹⁷ Derek Stradler and M. Anne O’Reilly discuss an additional marker of student success and engagement which is the measurement of retention and completion of courses, as well as amount of time students interact with course content.¹⁸

In summary, there have been many contributions to the scholarly discourse regarding adaptive learning in a variety of subject areas, and also regarding information literacy assessment. The goal here is to weave these two concepts together and address the Art History discipline, for which there is a paucity of literature.

Methodology: IL Course Design and Assessment Measurers

Going beyond an assessment of whether Information Literacy instruction is important (as is widely accepted in academia), the course designers wanted to structure a study where the same material would be given to students in different environments. One group would be given the material in an environment called Pressbooks, which was arranged with all the material chapter by chapter. This experience is akin to reading an eBook, with video content mingled with the text. Students had access to all course material to complete at their own pace. This was to be the control group. The second group would encounter the material using the Realizeit software, and therefore be steered toward more review or advanced material dependent upon the student’s performance within the modules. Students could bypass or spend extra time on specific sections voluntarily.

Two groups in two different courses were selected to run this study: ARH 355 Medieval Monsters (4 credit, 60 student cap) and ARH 358 Medieval Magic and Science in Art (4 credit hours, 60 student cap). Students were able to opt-in for this research project. Of the 92 students in both the classes studied, 67 students consented to participate. Institutional Review Board (IRB) approval was granted to collect data in the Winter and Spring terms of 2020. Students were given an optional consent form to participate in this comparative analysis between the two platforms, and results of their pre and post assessments, as well as the bibliographies for their final papers, were anonymized by our colleague Misty Hamideh at the Office of Academic Innovation, so that the librarian did not have knowledge of students’ identities at any time during the study.

¹⁵ Lorrie A. Knight, "Using Rubrics to Assess Information Literacy," *Reference Services Review* 34, no. 1 (2006): 45.

¹⁶ Kevin W. Walker, and Sara Maurice Whitver, "Assessing Information Literacy in First Year Writing," *The Journal of Academic Librarianship* 46, no. 3 (2020): 102-136.

¹⁷ Andrew Walsh, "Information Literacy Assessment," *Journal of Librarianship and Information Science* 41, no. 1 (2009): 19-28.

¹⁸ Derek Stadler, and M. Anne O'Reilly, "Student Engagement with Online Course Content at A Two-Year College," *Journal of Library & Information Services in Distance Learning* 15, no. 3 (2021): 170-186.

The modules in both learning environments utilized multimedia presentations, with textual and video content to support students' diverse learning styles. Comprehension questions, or learning checks, were embedded at the end of each section of the module. The brief comprehension questions were meant to reinforce concepts and encourage students onward with some assurance of skill attainment.

The course was divided into eight sections. Each element of the ACRL's *Framework for Information Literacy in Higher Education* was considered and reflected upon throughout the design process, with a few sections taking their name directly from those frames. Other sections were direct responses to curricular priorities of Professor McClanan. These specifically derived from core concepts in Art History research, as outlined in *Information Competencies in Design Disciplines*.¹⁹ In the table below, the sections of the IL module for this study are mapped to their specific learning objective.

Sections of the IL module and their mapped Learning Objectives.

Section title	Learning Outcomes
The Information Cycle	<ul style="list-style-type: none"> ● Identify phases of the Information Cycle as applied to research within the arts and humanities ● Describe variety of information sources in terms of scope and purpose
Primary versus Secondary Resources	<ul style="list-style-type: none"> ● Describe the difference between secondary versus primary sources
Scholarly Sources and Peer Review	<ul style="list-style-type: none"> ● Demonstrate ability to find and differentiate between peer-reviewed books and journal articles on an assigned topic in the arts
Research as a Process	<ul style="list-style-type: none"> ● Recognize research as an investigative process
How Databases Can Help Your Research	<ul style="list-style-type: none"> ● Demonstrate ability to understand and navigate various databases
Strategic Searching	<ul style="list-style-type: none"> ● Demonstrate ability to build effective searches ● Keyword and controlled vocabulary ● Use Boolean logic in search process
Tools for Effective Searching	<ul style="list-style-type: none"> ● Acquire a general knowledge of how a library organizes information: components of bibliographic record
Confirmation Bias	<ul style="list-style-type: none"> ● Understand how art criticism deploys bias ● Describe role of bias in "objective" resources ● Recognize various methods of using/ misusing information (quoting out of context, bias, statistics)

It was an intentional decision to blend concrete library skills with more theoretical ideas because of their importance, but also because it offered students the chance to switch gears, as it were, between factual identification of some research jargon, critical thinking, and about how they, as students and researchers, relate to information.

¹⁹ Jeanne Brown et al., "Information Competencies for Students in Design Disciplines," *Art Libraries Society of North America Research & Reports*. (July 2007): https://assets.noviams.com/novi-file-uploads/arlisna/pdfs-and-documents/research_and_reports/Information_Compencies_for_Students_in_Design_Disciplines__2007_.pdf.

Assessment Methodology

The goals of this assessment were to determine whether the students using Pressbooks (Group One) and Realizeit (Group 2) demonstrated any measurable differences in their skill attainment after participating in the IL module. This was examined using the following:

- Pre-assessments administered to all participants prior to exposure to the IL material, to establish a baseline of knowledge
- Post assessment scores to assess the average rate of improvement between Group One (Pressbooks) and Group Two (Realizeit), and in what areas
- Assessment of preliminary bibliographies using a simple scoring rubric

Student participation in this study and assessment was completely voluntary, and of the students who opted in, 67 completed their pre-assessment, and 58 of those individuals completed their post-assessment, for a study retention rate of 87%. Of those students, 44 submitted their bibliography assignment, making the full completion rate 66% of the original participants.

Applying the rubric

The rubric served as an audit to check the successful execution of the bibliography assignment. There were a possible 3 points because there were only 3 specified parameters for the assignment: that it included a primary source, a scholarly journal article, and a scholarly book.

Further follow up with students was planned in the form of post course evaluation questionnaires and possibly a focus group. However, classes ended on March 15, 2020, which unfortunately coincided with a campus wide closure due to COVID 19. The swift transition to remote learning and working resulted in barriers to meaningful follow-up to this study. Future studies of this kind would be well served by direct student input into the design and efficacy of the learning modules.

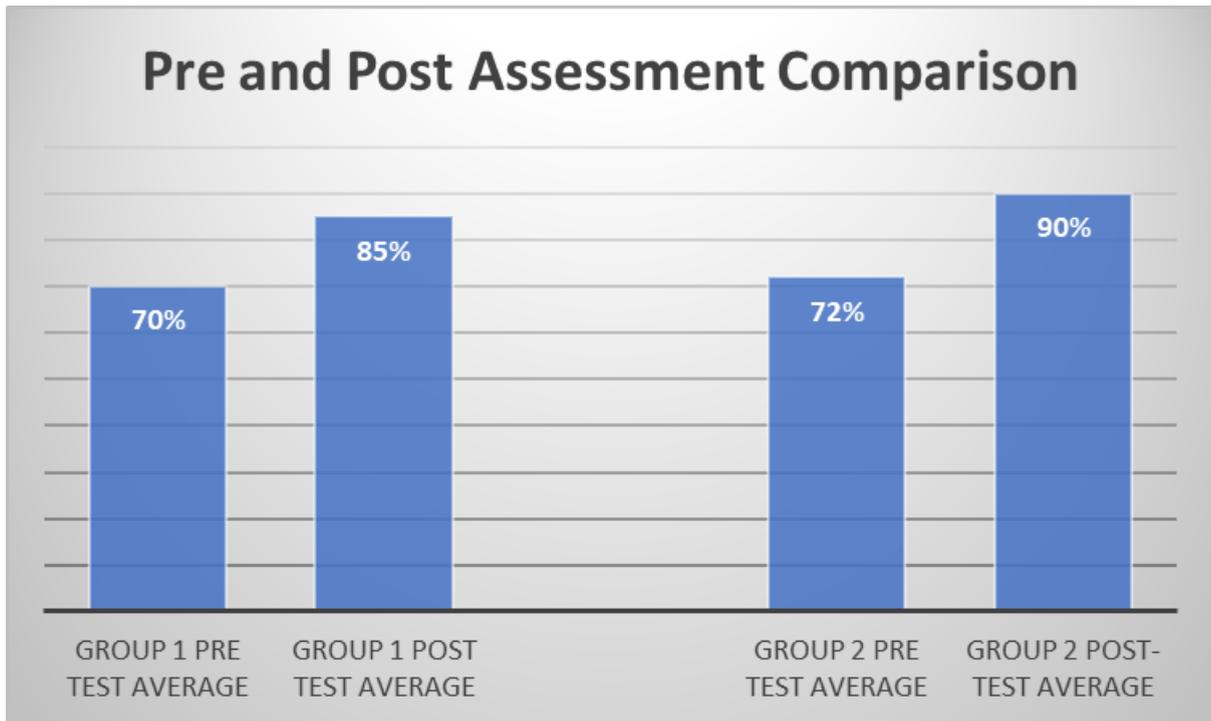
Discussion

The cohort utilizing the adaptive platform, Realizeit, were steered to additional review of the same content if their knowledge checks at the end of each section did not indicate proficiency. The platform allowed Professor McClanan to review the amount of time each student spent interacting with the material, and have automated responses sent to students who were not meeting certain thresholds.

The cohort of students that participated using the Pressbooks platform were given the same content, and were informed if their comprehension questions were answered correctly, but did not receive prompts that personalized certain types of review.

The table below demonstrates how the cohorts were divided between Group One (Pressbooks) and Group Two (Realizeit) between the two classes (ArH 355 and ArH 358), and indicates the pre and post assessment scores, with discussion below.

Pre and Post Assessment Comparison between groups. These are combined over the two courses.



Pre-Assessment

Students who consented to participate in the study completed a pre-assessment questionnaire that consisted of fifteen questions on a variety of topics related to information literacy and library research skills. Some of the questions were concept-checks that regularly appear on similar assessments, such as some database terminology, identifying a primary or secondary source, citation, and catalogue search strategies. Other questions were an attempt to generate some critical thinking, such as the value of scholarly sources, and identifying how searching might expand or narrow by scoping concepts.

Students who completed the pre-assessment in ARH 355, Medieval Monsters, averaged a score of 70%. Students in ARH 358, Medieval Magic and Science in Art, which was a smaller pool of students, averaged a 75% score. ARH 358 pre-assessments revealed that the students were by far the least certain about peer review and confirmation bias. The same areas were troublesome to the ARH 355 class, but this group also demonstrated uncertainty about the difference between keywords and subject headings. In summation, the baseline assessment for both classes demonstrated some familiarity with most concepts, but indicated room for improvement.

Post-assessment

It was pedagogically important to observe a measurable improvement in concept building after successful completion of the course material. A comparative analysis between the groups would also shed some insight upon whether the difference in students' user experience was at all instrumental in their skill development. The students encountered identical questions in the post assessment in order to accurately compare their gained knowledge.

Both classes, both cohorts

Overall, from the total of 58 students that completed the post-assessment, there was a 15% improvement on their score, from an average of 72% to 87% across both ARH 355 and ARH 358, combining both groups that used Pressbooks and Realizeit (Group 1 and Group 2). Five students had no change on their score, and five other students had poorer scores on their post assessments. However, 48 students improved their scores, and of those who improved, their average rate of

improvement was 21%. Therefore, 83% of the students who completed the information literacy modules, no matter the platform, saw improvement.

Assessment of student bibliographies

There are limitations to what can be assessed about student learning based on the comparison of scores from pre and post-assessments alone. Based on work by Laura W. Gariepy, Jennifer A Stout, and Megan L Hodge, it was believed that a bibliographic analysis would add another dimension to this comparative study, and address how IL concepts were used in an authentic assessment activity.²⁰ The inclusion of the three types of assigned resources was the measure of a successful bibliography, with a maximum score of three.

The table below demonstrates the successes of the students in each evaluation area, broken down between Group 1, 2, and between ArH 355 and ArH 358:

Pre and Post Assessment across courses and groups, including bibliography assessment

ArH 355: Medieval Monsters	Pre-Assessment	Post-Assessment	Bibliographies (out of 3 possible points)
Group One (Pressbooks)	70%	84%	2.769
Group Two (Realizeit)	70%	89%	2.5
ArH 358 Medieval Magic and Science in Art	Pre-Assessment	Post-Assessment	Bibliographies (out of 3 possible points)
Group One (Pressbooks)	70%	85%	2.545
Group Two (Realizeit)	79%	92%	2.714

Ultimately, students were successful in their bibliography assignment, with an average score of 2.6 out of 3. Averages by class and group cohort produced nearly identical results. Identifiable problems arose in some instances for students. For example, in several bibliographies, students cited a book review rather than the scholarly book itself. Because this was a preliminary bibliography, it could be posited that sources were still being sought out rather than delved into at that stage in the research process, but it seemed to be a common observable shortcut. Occasionally there was no citation of a primary source; a somewhat common omission. However, many secondary sources include photos of original works of art or illuminated manuscripts, and therefore it is possible that students are using those resources to relate to and interpret original material. Future research might explore this area more definitively. Even with these observed challenges, students overwhelmingly demonstrated proficiency in identifying relevant library resources.

The Adaptive Element:

This study did not conclude that there was any measurable correlation between delivery platform and student learning outcome. As discussed in the literature review, this is not the case for every trial of personalized or adaptive learning experience. Other studies have shown the benefits of this technology for certain students by discipline, demographic, population, and so forth. However, such results were not proven in this study. From the evidence collected in these classes, the researchers cannot conclude that the adaptive platform was a useful addition to the students' experience. As noted by FitzGerald, et al.²¹, learning is often perceived as a deeply individual and personal experience. While this makes a

²⁰Laura W. Gariepy, Jennifer A Stout, and Megan L Hodge, "Using Rubrics to Assess Learning in Course-Integrated Library Instruction," *portal* 16, no. 3 (2016): 491.

²¹ Elizabeth FitzGerald, Ann Jones, Natalia Kucirkova, and Eileen Scanlon, "A Literature Synthesis of Personalised Technology-enhanced Learning: What Works and Why," *Research in Learning Technology* 26 (2018): 11.

solid case for the use of adaptive and personalized learning platforms, it also highlights the challenges in designing the most flexible and effective adaptations.

Researchers in higher education will doubtlessly continue to explore the utility of adaptive learning platforms and whether they prove useful to future content delivery. Of central importance is the extent of adaptive intervention. Ultimately, this will require a considerable investment of time and design skill on the part of the instructor to craft the possible ways in which their students will encounter course material.

Conclusion

It was observed from the collected assessments and bibliographies in both courses, the IL module itself was successful. Students demonstrated measurable improvements in 83% of cases, and of those, that average was a 21% improvement from their pre-assessment to post-assessment scores. This exemplifies the positive impact of information literacy instruction when it is scaffolded into the student experience, is discipline specific, and responsive to course objectives.

What this study could not conclude, however, was whether the Pressbooks group or the Realizeit group experienced any comparative advantage. The adaptive aspect of our course delivery did not demonstrate any significant change in student learning outcomes. While the students in the adaptive group did see a slightly higher rate of improvement (3% higher than the control group), the main conclusion to be highlighted in this paper is the significant improvement of students in *both* cohorts after completing the learning modules. The delivery mechanism did not appear to matter.

One limitation of this study was that it was impossible to explore the full range of operational choices of the software as grounds for comparison. In this study, a student would get canned reminders to complete sections of the module if they were left undone, and if a student performed poorly on a given section, canned referrals to suggested optional readings would appear. The interventions can be more personalized, which is an appealing aspect of the software, but proved too time intensive for the instructor to implement beyond very general reminders and further readings. This is worth highlighting, as there is the initial outlay of time and labor to consider when choosing adaptive systems.

A second limitation of the study was that there was no demographic information collected about the students. This was by design, as the study was fully anonymized to the researcher, but it might have been instructive to know if there were performance indications based on demographic indicators. This might help to ensure that the course design and learning outcomes were serving all students or if the presentation of concepts were less inclusive or accessible to certain students.

Further studies of adaptive learning systems would be meaningfully improved with student input and evaluation, which was originally planned for this study but never executed. Inquires in this area are driven by the desire to serve students at their point of need and contribute to their disciplinary knowledge, critical thinking, and lifelong learning. If adaptive software can meet student needs in an impactful way, then it is worth the investment of time and resources.

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