

**The Impact of Digital Learning Platforms on Student Engagement
and Academic Performance in Higher Education**

Elizabeth Elie

Department of Educational Technology, New Jersey City University

EDTC 806: Research Methods in Educational Technology

Dr. Christopher Shamburg

August 15, 2026

Purpose of the Study

This quantitative study examines whether undergraduate students who use digital learning platforms more frequently earn higher grades, and whether student engagement accounts for that relationship. Three variables are measured: platform use, defined as activity recorded in the learning management system; student engagement, defined as behavioral, emotional, and cognitive involvement in coursework; and academic performance, defined as final course grade. The study also asks whether digital literacy changes the strength of the link between platform use and engagement.

Understanding how digital technologies affect measurable learning outcomes matters because institutions continue to invest heavily in them. Learning management systems and online collaboration tools are now standard in higher education, yet evidence on whether their use translates into measurable achievement remains mixed.

Recent research supports this concern. A systematic review of learning analytics in higher education reported that increased involvement in the learning management system, measured through activity in learning tasks, click frequency, or connection time, is a promising predictor of academic success (Hernández-Campos et al., 2025). At the same time, a systematic review of correlates of academic performance in fully online higher education found that achievement was most strongly associated with motivation and self-regulation rather than platform activity alone (Chung et al., 2022). This tension is the gap the present study addresses: platform use appears to matter, but probably through the engagement it produces rather than on its own.

Digital literacy is included as a moderator because students differ in their capacity to use digital tools productively. Ng (2012) defined digital literacy across cognitive, technical, and

social-emotional dimensions, and more recent evidence indicates that students' digital capability is associated with both engagement and attainment (Limniou et al., 2021; Zakir et al., 2025). Two students with identical login counts may therefore engage very differently depending on their digital skill.

Research Questions

1. To what extent is frequency of digital learning platform use associated with student engagement among undergraduates?
2. To what extent is student engagement associated with academic performance, measured as final course grade?
3. Does student engagement mediate the relationship between platform use and academic performance?
4. Does digital literacy moderate the relationship between platform use and student engagement?

Significance of the Study

This study is significant because it provides quantitative evidence on the effectiveness of digital learning platforms in higher education. As institutions continue to invest in educational technology, determining whether that investment produces measurable gains in engagement and achievement is essential to justifying continued spending and to designing courses well.

Several recent quantitative studies establish that these relationships are worth examining. McKenna et al. (2024) used learning management system data mining to quantify online engagement across first, second, and third year undergraduates, comparing online access with both attendance and performance, and found that engagement increased markedly with year level. Teng and Wang (2021) found that educational technology tools significantly affected the

behavioral, emotional, and cognitive dimensions of student engagement. Du Plooy et al. (2024), reviewing personalized adaptive learning in higher education, documented effects on both academic performance and engagement while noting variation in how engagement is operationalized across studies.

Taken together, this body of work demonstrates the importance of digital platforms in shaping learning outcomes. It also reveals what remains unresolved. Platform use, engagement, and achievement are typically studied in pairs rather than within a single model, and the conditions under which platform use converts into engagement are not well specified. By combining these variables into one quantitative framework and testing digital literacy as a moderating condition, this study addresses that gap and contributes to both educational technology theory and institutional practice.

Research Design

This study uses a quantitative correlational design with mediation and moderation analysis. No variable is manipulated; the design measures naturally occurring variation in platform use, engagement, digital literacy, and course grades at a single point in a semester, and tests the strength and direction of the relationships among them.

Specifically, the study will correlate three measures. The independent variable is platform use, operationalized as a composite of learning management system activity across one semester: total logins, total time on task, and number of course items accessed. The mediating variable is student engagement, measured as the total score on the engagement questionnaire described below. The dependent variable is academic performance, operationalized as the final percentage grade in the target course, obtained from institutional records rather than self-report. The

moderating variable is digital literacy, measured as the total score on the digital literacy subscale of the same questionnaire.

Pearson correlation will establish the bivariate relationships between platform use, engagement, and final grade. Multiple regression will then test whether platform use predicts final grade once engagement is entered, and the PROCESS macro will test engagement as a mediator and digital literacy as a moderator of the platform use to engagement path. Grades and platform analytics are drawn from institutional records, which avoids the self-report bias that affects studies relying entirely on student perception (Chung et al., 2022).

Participants

Participants will be undergraduate students enrolled in courses that use a learning management system as a required component. A target sample of 150 to 300 students provides adequate statistical power for regression with four predictors. Participants will be recruited from a single institution across multiple disciplines, and only students who consent to release of their platform analytics and final grade will be included.

Data Collection Instruments

Data will be collected from two sources rather than four, keeping the design manageable within a single semester and avoiding redundant measures of the same construct.

- A single online questionnaire, administered once at the end of the semester. It contains two established subscales: an engagement measure covering the behavioral, emotional, and cognitive dimensions described by Fredricks et al. (2004), and a digital literacy measure based on the cognitive, technical, and social-emotional dimensions defined by Ng (2012) and applied in recent higher education research (Zakir et al., 2025). Both use a five-point Likert format.

- Institutional learning management system records, which supply both the platform use composite (logins, time on task, items accessed) and the final course grade. Using system logs for platform use follows the approach taken by McKenna et al. (2024) and avoids asking students to estimate their own activity.

Variables

- Independent variable: use of digital learning platforms (learning management system activity composite).
- Mediating variable: student engagement (questionnaire score).
- Dependent variable: academic performance (final course grade).
- Moderating variable: digital literacy (questionnaire subscale score).

Data Analysis

Analysis will proceed in four steps:

- Descriptive statistics to summarize the distribution of each variable and check assumptions of normality and linearity.
- Pearson correlation to test the bivariate associations named in research questions one and two.
- Multiple regression to test whether platform use predicts final grade after engagement is accounted for.
- Mediation and moderation analysis, using the PROCESS macro, to test research questions three and four.

Definitions

- Digital learning platforms: online systems such as learning management systems used to deliver course materials and support interaction.

- Student engagement: the degree of a student's involvement in learning activities, comprising behavioral, emotional, and cognitive dimensions (Fredricks et al., 2004).
- Academic performance: quantifiable indicators of academic success; in this study, the final percentage grade in the target course.
- Digital literacy: the ability to learn and solve problems using digital technology, across cognitive, technical, and social-emotional dimensions (Ng, 2012).
- Mediating variable: a variable that explains the mechanism connecting an independent and a dependent variable.
- Moderating variable: a variable that changes the strength or direction of the relationship between two other variables.

Limitations

This study has several limitations. First, engagement and digital literacy are measured by self-report, which introduces the possibility of response bias (Fredricks et al., 2004). Using institutional records for platform use and grades reduces but does not eliminate this concern. Second, the focus on undergraduates at a single institution limits generalizability to graduate populations or to other institutional contexts. Third, the correlational design cannot establish causation; a positive association between platform use and achievement does not demonstrate that platform use produces achievement.

Fourth, external variables including student motivation, self-regulation, course design, and instructor effectiveness may influence the outcome and are not controlled. This limitation is substantive rather than incidental, since Chung et al. (2022) found motivation and self-regulation to be the strongest correlates of achievement in online higher education. Any association observed here may therefore be partly attributable to variables outside the model. Finally,

platform activity counts measure quantity of interaction rather than quality, and recent learning analytics research cautions that total clicks and logins are weaker predictors than purposeful, strategic use (Hernández-Campos et al., 2025).

Delimitations

This study is limited by design to undergraduate students enrolled in courses that use digital learning platforms. It concentrates on four variables, platform use, engagement, academic performance, and digital literacy, and deliberately excludes other possible influences such as socioeconomic background and prior academic achievement in order to keep the model testable. The study is also restricted to quantitative methods and does not collect qualitative data such as interviews or open-ended responses, which means it can establish whether relationships exist but not why students engage as they do.

Assumptions

This research rests on several assumptions. It assumes that respondents answer the questionnaire truthfully and accurately. It assumes that the engagement and digital literacy instruments are valid and reliable measures of the constructs they name (Fredricks et al., 2004; Ng, 2012). It assumes that platform usage statistics fairly represent how students interact with digital resources, an assumption that recent analytics research qualifies but does not reject (Mehrvarz et al., 2021). Finally, it assumes that the statistical procedures selected are appropriate for examining the relationships among these variables.

References

- Chung, J., McKenzie, S., Schweinsberg, A., & Mundy, M. E. (2022). Correlates of academic performance in online higher education: A systematic review. *Frontiers in Education*, 7, 820567. <https://doi.org/10.3389/feduc.2022.820567>
- Du Plooy, E., Casteleijn, D., & Franzsen, D. (2024). Personalized adaptive learning in higher education: A scoping review of key characteristics and impact on academic performance and engagement. *Heliyon*, 10(21), e39630. <https://doi.org/10.1016/j.heliyon.2024.e39630>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109. <https://doi.org/10.3102/00346543074001059>
- Hernández-Campos, M., Gonzalez-Torres, A., & García-Peñalvo, F. J. (2025). Learning outcomes evaluation through learning analytics systems in higher education: A systematic literature review. *SAGE Open*, 15(2). <https://doi.org/10.1177/21582440251347374>
- Limniou, M., Varga-Atkins, T., Hands, C., & Elshamaa, M. (2021). Learning, student digital capabilities and academic performance over the COVID-19 pandemic. *Education Sciences*, 11(7), 361. <https://doi.org/10.3390/educsci11070361>
- McKenna, B. A., Wehr, J. B., & Kopittke, P. M. (2024). Quantifying online engagement at three levels of undergraduate study. *Cogent Education*, 11(1), 2345939. <https://doi.org/10.1080/2331186X.2024.2345939>
- Mehrvarz, M., Heidari, E., Farrokhnia, M., & Noroozi, O. (2021). The mediating role of digital informal learning in the relationship between students' digital competency and their

academic performance. *Computers & Education*, 167, 104184.

<https://doi.org/10.1016/j.compedu.2021.104184>

Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>

Teng, Y., & Wang, X. (2021). The effect of two educational technology tools on student engagement in Chinese EFL courses. *International Journal of Educational Technology in Higher Education*, 18(1), 27. <https://doi.org/10.1186/s41239-021-00263-0>

Zakir, S., Hoque, M. E., Susanto, P., Nisaa, V., Alam, M. K., Khatimah, H., & Mulyani, E. (2025). Digital literacy and academic performance: The mediating roles of digital informal learning, self-efficacy, and students' digital competence. *Frontiers in Education*, 10, 1590274. <https://doi.org/10.3389/feduc.2025.1590274>