Learning online: what does digital academic engagement look like

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Abstract

Student habits of engagement across hybrid learning models appears to be a critical and global challenge. Previous attempts to analyse student behaviour focus on survey data and student opinion. These are valuable tools and have allowed us to interrogate the trend of declining engagement and attendance in recent years. We will present our early observations on the patterns of digital and physical engagement for a first-year, undergraduate biosciences cohort and how these patterns relate to the attainment metrics for the same cohort. In previous studies students have ranked lecture capture as a highly desirable tool for accessibility and engagement. From our early observations it appears that in person and digital engagement trends seem to correlate and that lecture capture alone is not acting as a suitable alternative to in person lectures.

Introduction

Declining student attendance and engagement in higher education has emerged as a significant concern following the rapid shift to online teaching provision during the Covid-19 Pandemic. Herein we understand student engagement to mean physical attendance at in person live events (data pending), and interaction with online lecture recordings. Although evidence suggests the trend predates the pandemic, many university staff report that it was during this period they first observed markedly empty lecture theatres—a pattern not always reflected in digital records of in-person attendance.

In-person attendance and active engagement are widely associated with improved attainment and retention among undergraduates (Nordmann et al., 2019), although the extent to which this reflects a causal relationship remains uncertain. Evidence also suggests that the strength of this association diminishes as students' progress through their academic years (McKenna et al., 2024).

A recent Lancaster University Management School report (Rolls et al., 2024) examined the multifaceted nature of in-person student engagement, identified a range of internal and external motivational factors common among undergraduates. Of note was the suggestion that flexible, digital forms of delivery—such as lecture capture and resource-based Virtual Learning Environments (VLEs)—may influence students' decisions about in-person attendance.

A less explored question concerns the extent to which online engagement behaviours parallel and/or influence offline participation. Recorded lectures are valued by students for a range of reasons. Foremost among these are enhanced accessibility for individuals with disabilities, opportunities to recover missed content, and the capacity to revisit material for improved comprehension (Veiga et al., 2025). Such resources are particularly advantageous for students with additional learning needs and for those whose first language is not English, as they provide the flexibility to review and process complex information at an individual pace.

While extensive research documents the value students place on digital learning resources, less attention has been paid to their actual engagement patterns (Nordmann et al., 2019; Veiga et al., 2025). This raises important questions: To what extent do students' behaviours

align with their expressed attitudes, and what specific practices would characterise a truly digitally engaged learner? Addressing these questions is essential for understanding the gap between perception and practice in digital education

To approach these questions, we analysed digital engagement metrics from a first-year undergraduate cohort in the 2023/24 academic year with the aim to compare these observations with in-person attendance records for the same period. Our analysis reveals consistently low engagement with recorded lectures. Notably, online resource use, particularly lecture capture, shows a sharp increase in the weeks immediately preceding examinations—suggesting assessment proximity remains the primary driver of digital engagement. This finding aligns with previous research (see McKenna et al., 2024) and provides the rationale for a deeper analysis of the relationship between online and in-person engagement patterns in future stages of the project.

Participant and Study Context

The study examined the digital engagement behaviours of first year undergraduate students (n= 208) enrolled in biomedical and life sciences programmes during the 2023–2024 academic year. All participants were registered for the same core set of modules across all three academic terms, providing a consistent basis for comparing engagement patterns.

Data Sources

Engagement data were obtained from two primary institutional learning platforms: Moodle, the university's virtual learning environment (VLE), and Panopto, the lecture capture system. Data requests to the institution's learning technologists team yielded a dataset comprising more than 500,000 individual interaction records collected over the academic year.

Data Processing

Interaction records were categorised into two main types: (1) lecture capture engagement, defined as the number and duration of Panopto video views, and (2) engagement with other Moodle-based resources, including the retrieval of documents, participation in quizzes, and contributions to discussion forums.

Analytical Rationale

The scale and granularity of this dataset allow us to examine not only overall engagement volumes but also the timing, distribution, and modality preferences of student learning behaviours. By integrating these digital metrics with in-person attendance records (data not yet available at the time of writing), the study will provide an opportunity to assess whether patterns of online activity mirror, supplement, or diverge from face-to-face engagement. In the absence of full attendance data, however, our current analysis is limited to profiling student interaction with a single digital resource—lecture recordings—over one academic year. As this represents the first phase of the project, we will continue to track and analyse engagement data from the same cohort as they progress through their studies.

Ethical approval

The project was submitted for ethical approval via the FHM Research Ethics Committee and approval has been granted for this project under the FHM REC Reference: FHM-2024-4812-DataOnly-1.

Results

Lecture Capture Aggregate Usage

The students in this study were enrolled in five core modules delivered sequentially across the academic year, BIOL111 followed sequentially by BIOL112, BIOL113 BIOL114 and then BIOL115. Each module included 12 recorded lectures, all of which were accessible via the institution's lecture capture system, Panopto**.** For each module, the total cohort viewing time was aggregated to provide a measure of overall engagement with lecture recordings. Analysis of these data **(fig 1).** Students devoted more time to viewing recorded content in earlier modules and less time in later modules.

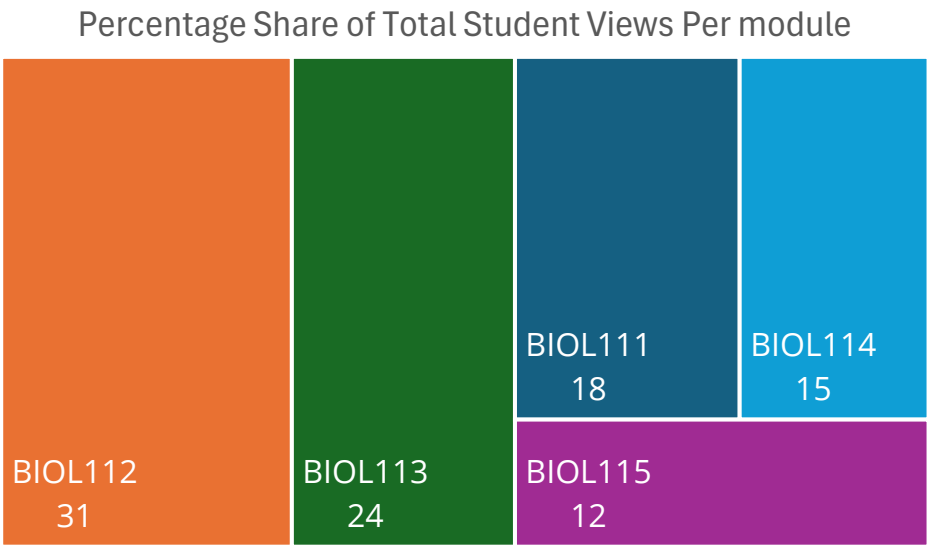
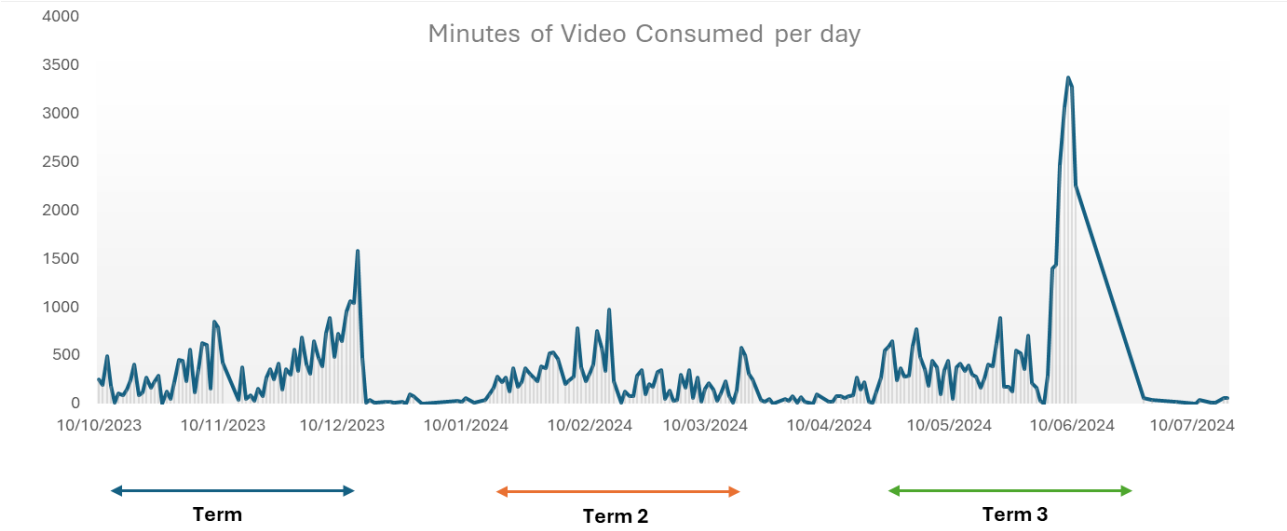


Figure 1: Percentage attention per module. Calculated as time spent viewing Panopto per module over total time spent viewing Panopto. Earlier modules tend to receive more attention in terms of participant view time.

Lecture Capture: Demand across the academic year

Taking lecture capture engagement data across the academic year, we see that demand is generally low and punctuated with spikes in engagement that closely precede summative assessment deadlines **(figure 2).** The largest spike in usage occurring shortly before the summer assessment period (10th – 15th June 2024). We also close to zero usage across the



winter and spring break periods.

Figure 2: The total minutes of lecture content consumed by each day between October 2023 and October 2024.

Daily usage data from the lecture capture platform broadly follows the same pattern, with clear variation across the academic year. Peak engagement occurred during term time with up to 33 unique users per day during assessment periods **(figure 3)**.

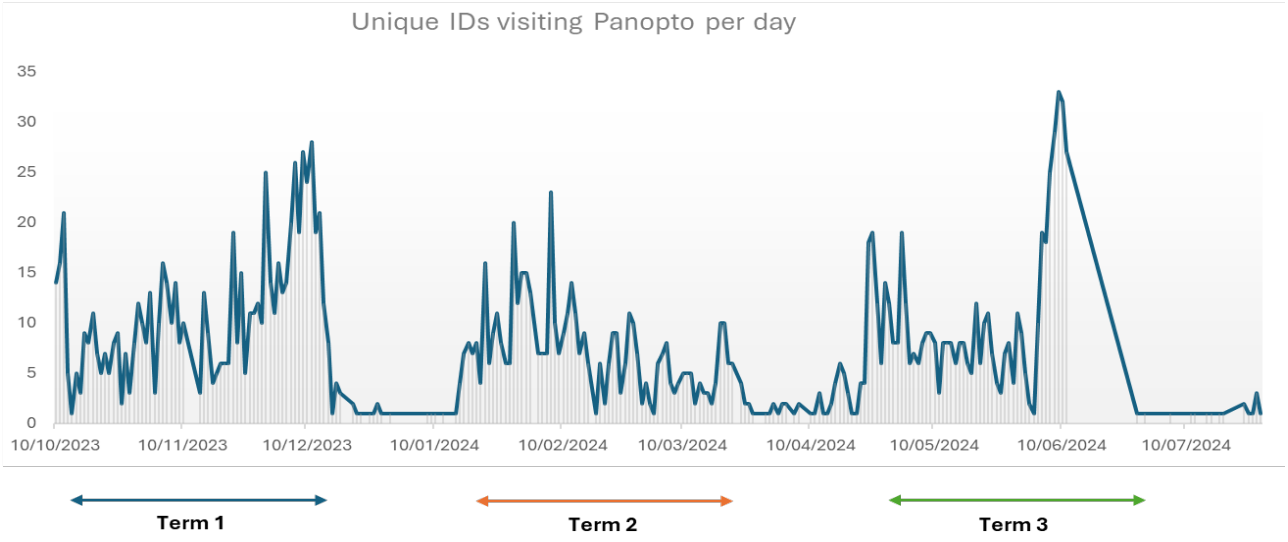


Figure 3: Unique visitors (student ID) to Panopto per day during the 2023 to 2024 academic year.

Analysis of unique ID's visiting Panopto per module showed very limited use of lecture capture across the board. We observe on average, around 80% of our students accessing fewer than two out of twelve recordings per module **(Figure 4)**. Between 44% - 51% of these students registered no engagement with Panopto over the course of the year.

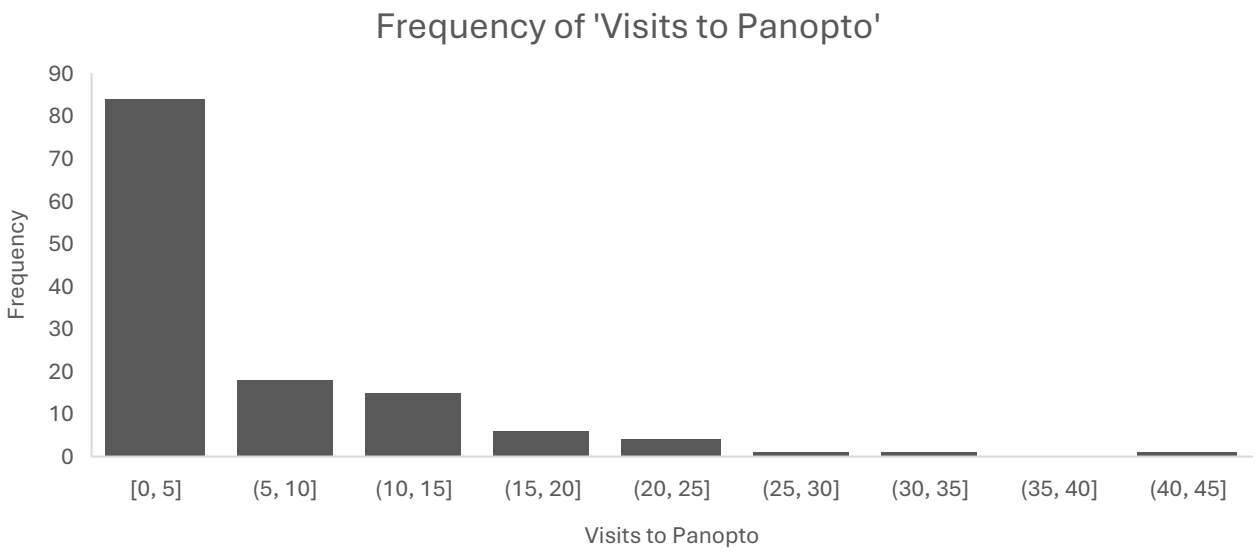


Figure 4: Frequency of repeat visitors to Panopto for BIOL modules. 82% of students enrolled on these modules visited Moodle less than 5 times during the academic year.

Conclusion

This study represents the preliminary stage of a longitudinal project that will follow the same undergraduate cohort across all three years of their degree programme. Future analyses will incorporate in-person attendance data, enabling direct comparisons between physical and digital engagement patterns.

Our initial findings indicate substantial variability in digital engagement behaviours. A small subset of students engage consistently with lecture recordings and online resources, but the majority demonstrate sporadic and irregular patterns of use. This variability suggests that online resources are not functioning as direct substitutes for face-to-face teaching; rather, students appear to engage with digital content opportunistically, often in response to assessment pressures rather than as part of routine study practices.

These results highlight an important gap between the perceived value of digital resources and their actual uptake. The emerging picture is not one of online learning replacing in-person participation, but instead one of underutilisation, where the mere availability of digital resources does not guarantee their sustained use. Understanding whether this represents a temporary adjustment, a shift in learning culture as students' progress or a more systemic disengagement will be a key focus as the study progresses.

We aim to use the data gathered in this study to build a clearer picture of the digital footprints that students leave across a range of academic activities and outcomes. Beyond analysis for its own sake, our goal is to translate these insights into practical strategies that support meaningful engagement. To this end, we will work with educators and decision-makers to design tools and practices that not only respond to current patterns of digital and in-person participation but also actively foster more consistent and effective engagement. Looking ahead, we also plan to extend our analysis in collaboration with the student wellbeing team, enabling us to identify when and where engagement metrics may provide early warning signs of potential student withdrawals.

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