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Future-Focused:

Educating in an Era of Continuous Change

Quiz me if you can: What interactive video engagement data tells us about achievement

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In an era of increasingly asynchronous and self-regulated professional learning, understanding what drives engagement and achievement is critical. This study explores the impact of interactive video content on learner engagement and academic performance in the capstone unit of a Graduate Certificate in Learning and Teaching (Higher Education). Introduced in 2024, the video-based innovation aimed to streamline the learning experience for a growing cohort of mature-age, success-oriented educators balancing multiple professional and personal commitments. Drawing on learning analytics from Canvas LMS and EchoVideo, the study investigates how video views, quiz completions, and other digital behaviours correlate with overall course grades. Findings reveal that video engagement—particularly viewing and interacting with quizzes—has a stronger positive correlation with academic success than traditional metrics like page views or participations. Notably, 58.5% of learners watched at least one video, and 48.8% completed at least one quiz, suggesting meaningful uptake. These insights underscore the value of well-designed, feedback-rich video content in fostering deeper engagement and improved outcomes in professional learning contexts. The study offers timely recommendations for designing scalable capstones responsive to the complex realities of today's higher education professionals.

Keywords: interactive video; video quiz; video-based learning; capstone; professional learning

Introduction

This study builds on previous research (de-identified, 2024) into the experiences of professional learners with online, self-regulated, asynchronous learning. Supported by an EchoImpact grant, a video-based innovation was introduced into the final unit (capstone) of a four-unit Graduate Certificate in Learning and Teaching (Higher Education) (GCLT) in Semester 2, 2024. The trial involved a cohort of 41 learners, progressing through the stages of brainstorming, developing and refining their individual projects in alignment with their teaching practice and career aspirations. The videos were scripted by the convenor and produced using Echo360 platform. The quizzes were purposed with providing instant feedback in relation to learners' individual projects, feedback scenarios developed in alignment with the unit's overall structure and themes.

As GCLT primarily attracts established and/or emerging Higher Education (HE) interested in elevating their teaching practice, this cohort tends to be success-oriented but also pragmatic, juggling full-time employment, research and family responsibilities. This complexity creates unique dynamics, with GCLT convenors having to balance the expectations of learners, who are often their colleagues, with fairness and collegial respect. In this study, professional learning defined as a mindful, continuous approach to upskilling mature-age learners (Scherf, 2018), with GCLT purposed with building teaching excellence among university staff.

First taught in 2023, the capstone *Learning and Teaching Project* replaced a Scholarship of Teaching and Learning (SoTL) elective in the GCLT's previous iteration. Despite consistently high learner satisfaction and winning a teaching excellence award, GCLT's pre-2023 structure of two compulsory and four elective units proved unsustainable due to resourcing challenges. Reimagined as a four-unit degree, with the capstone offered annually, GCLT entered transitioned into a more streamlined professional earning experience. However, the structure change also led to increased enrolments across all units, nearly doubling in the capstone alone: from 21 learners in 2023 to 41 in 2024.

The capstone delivered as seven modules over the 12-week semester is grounded in independent study and deep reflection, also incorporating group collaborations for peer review and feedback. While learners able to brainstorm their projects or troubleshoot any issues in individual or group consultations with the convenor, most of their learning is asynchronous. Additionally, synchronous bi/weekly live lectures are hosted by the convenor on Collaborate Ultra, focusing on key topics and assessments. Historically, live lectures have been poorly attended, leading to unsustainable volumes of email queries and demand for consultations. Lecture recordings were also irregularly perused, likely due to their length and difficulty of locating them.

Following the first semester of capstone delivery, synchronous content was reduced to essential-only, with interactive videos produced to enable learner engagement and reflection. The videos were expected to a). increase attendance of the remaining live lectures and the viewing of recordings, and b). reshape learner engagement by providing instant feedback. To preempt commonly asked questions in the unit, each videos included an interactive feedback quiz.

To understand the impact of the interactive videos on engagement and achievement, evaluation began in 2025 after securing an ethical clearance. The impact of the capstone's iteration as a SoTL unit previously studied (de-identified, 2024), the new phase of this research focuses on the interactive videos as an engagement tool. The study draws on analytics from Canvas Learning Management System (LMS) and EchoVideo, combing various clickstream data generated through learner online activity. Most of this data is aggregate, but some contain user-specific information which has been de-identified for this research. The paper begins with reviewing relevant literature concerned with online learning, engagement and experiences of professional learners as well as evidence-based studies into interactive video-based learning, then the study's methodology and method are explained, and findings are presented. This is followed by a discussion, presenting recommendations for effective capstone learning design.

Literature review

Learners in online university settings: Motivations, expectations and experiences

Low engagement and high attrition are common challenges in online learning. Martin & Borup (2022) list main factors enabling online engagement, namely communication, interaction, presence, collaboration, and community. Learner capacity for self-regulation is another significant factors of achievement in online learning (de-identified, 2017), and so is meaningful and effective design, with learners finding interactive assignments, thought-provoking question prompts and real-world scenarios most engaging (Buelow et al., 2018). Further factors like a presence of an engaging educator, learner confidence as well as external factors such as lifeload are also found to be important (Farrell & Brunton, 2020).

Less is known about professional learners in online settings. These learners are mature-age, but while they face typical mature-age learner challenges associated with family, work and financial commitments, their motivations are unique and their learning experiences grounded deeply in their teaching (and/or professional) practice. While professional learners in HE are generally well motivated (Salmon et al 2016), they are not immune to the challenges of low engagement. It is perhaps unsurprising that while the capstone at the centre of this research has demonstrated consistently high completion rates over the years, learner engagement, as measured by participation in online learning activities, remained low. This pattern was exacerbated by the lasting effects of the COVID-19 pandemic, characterised by diminished learner attention and difficulties with self-organising (García-Morales et al 2021), with learners' personal commitments placing additional demands on their time and energy (Kara et al 2019).

Nonetheless, online professional learning remains central to upskilling and maintaining teaching excellence in universities. As previous research (de-identified 2024) demonstrates GCLTs play a vital role in this process. However, more work is to be done in streamlining effective learning designs to not only ensure learners complete the degree but have an engaging and rewarding experience along the way.

The role of capstones in consolidating professional learning

Purposed with consolidating and synthesising knowledge and skills acquired throughout the program, capstones support learners as they develop a project or portfolio. A pathway between university studies and the profession (Cullen, 2017), capstones are important for final-year learners as this is when they solidify their professional identities and transition into the world of work. Capstones support this transition by creating meaningful opportunities for learners to strengthen their lifelong learning skills and by enabling their career development and planning (McNamara et al, 2011). Many but not all capstones are research based and informed by project-based and problem-based learning, immersing learners in industry simulations as they are instructed to design client briefs and other artefacts (Dunlap, 2005).

Capstones also face unique challenges. Their somewhat limited nature means students may be assessed on how they demonstrate their knowledge and skills at the expense of them attaining "well-developed personal and professional identities [and] solid reflective practices" (Cullen, 2017, p.89). Capstones' distinctive nature also causes assessment challenges (McCormack et al., 2011). The recent shift (Barkatsas & McLaughlin, 2021; da Silva-Ovando et al, 2025) toward authentic assessment in capstones further demonstrates how conventional assessments methods may not be appropriate for capstones, especially given the ongoing impact generative artificial intelligence has on written assessment.

While research into capstones in undergraduate and postgraduate coursework education is robust, less is known about capstones in professional learning, especially in degrees like GCLT. Further, little is known about how GCLT capstones are structured, delivered and assessed, and what impact they have on learners' teaching practice. As Blanford et al. (2019) show, capstones in professional learning within HE are unique in that they sit at the "nexus of developing professional [and] industry-specific competencies" (p. 45), hence creating a challenge for universities which must ensure capstones allow learners to develop a range of hard and soft skills in alignment with the industry expectations. The industry in question being HE and with learners already embedded in this system as educators, capstones in HE professional learning programs must not only upskill learners but empower them in their career progression within a notoriously complex and rigid system.

Interactive video-based learning

As the majority of GCLTs and similar professional learning in HE are delivered fully online (de-identified 2025), video-based learning (VBL) is an important piece of the effective learning design puzzle. The VBL scholarship is extensive, evolving rapidly after digital video CDs became widespread the mid-1990s (Sablić et al, 2021). Systematic reviews of VBL demonstrate its positive impact on learning, especially when video elements are integrated within existing teaching methods (Noetel et al., 2021), and also interactive and not too lengthy (Sablić et al, 2021). The latter research also emphasises three key design elements to be taken into account when creating an effective learning tool: "student's cognitive load, non-cognitive elements that affect student engagement and features that promote active student learning" (p. 1070). Interactive videos which follow the multimedia principles (Mayer 2002) and include embedded quizzes asking students thought-provoking questions are found to be of most use to the learner (Midtiby et al, 2017).

The innovation: Video development process

Three interactive videos were scripted by the convenor and produced using Echo360 platform to help learners conceptualise and develop their individual projects. By engaging with the embedded interactive quizzes within the videos, learners were expected to receive immediate feedback and guidance. The videos were not compulsory and un-graded activities. Having EchoVideo embedded into the Canvas LMS ensured an overall seamless integration process, with the videos organically and aesthetically blending into the unit's design. The video placements in the capstone were determined based on key milestones in learners' individual projects. The first video, *What makes a compelling pitch?*, was embedded into the second module of the capstone and focused on guiding students as they reflected on their teaching and learning and/or professional backgrounds to brainstorm project ideas. The second video, *Approaches to Scholarship of Teaching and Learning: What approach is right for my project?*, directly followed the first, elaborating on the ideas from Module 3; the final video, *Dissemination channels: What works best for my project?*, was embedded into the penultimate week of the semester as to segue into a deeper reflection on the lasting impact of individual

projects. Table 1 demonstrates the videos' presence in the capstone's structure, while Table 2 gives an overview of the videos based on their length and the location of the interactive quiz.

Table 1: Interactive Videos in the Capstone Unit's Overall Design

Module #	1. *Getting Started*	2. *Developing Your Project Pitch*	3. *Networking and Reflecting*	3 (cont.) *Developing Your Project Plan*	4. *Working on Reflective Essay*	5. *Creating a Comprehensive Project Plan*	6. *Dissemination of Outputs*	7. *Next Steps*
Semester Timeline (12 weeks)	1 & 2	3 & 4	5	6	7 & 8	9 & 10	11	12
Interactive Echo360 Videos		Video 1: *What makes a compelling [project] pitch?*	*Video 2: Approaches to Scholarship of Teaching and Learning: What approach is right for my project?*				Video 3: *Dissemination channels: What works best for my project?*	
Synchronous live lectures	Welcome to Learning and Teaching Project		Peer Reviews Explainer	Q&A	Assessment 2 Explainer		Assessment 3 Explainer	
Assessments		Project Pitch		Peer reviews		Reflective Essay (group)		Project implementation plan

Table 2: Interactive videos overview: Length and timing of interactive quiz

Video	**V1 What makes a compelling pitch**	**V2 Approaches to Scholarship of Teaching and Learning: What approach is right for my project**	**V3 Dissemination channels: What works best for my project?**
Overall length (min)	2 min 55 sec (2.9 min or 175 seconds)	3 min 01 sec (3.01 min or 181 seconds)	2 min 35 sec (2.58 min or 155 seconds)
Timing of the interactive quiz	At 2 min 25 sec [toward end of the video]	At 1 min 55 sec [second half of the video]	At 1 min 48 sec [second half of the video]

To analyse video engagement patterns as well as general clickstream analytics within the capstone, all data was manually extracted from Echo360 and Canvas LMS platform and entered into an Excel spreadsheet. Insights gleaned are presented next.

Evaluation

Methodological approach and method

Defined as "the electronic record of Internet usage" (Bucklin & Sismeiro, 2009), 'clickstream' first entered the research vocabulary in the 1990s, in time becoming deeply entwined with the idea of learning analytics. The latter's foundational premise is that academic achievement (and the likelihood of the learner's failure) can be 'predicted' based on the learner's behaviour online. Despite the critique of such assumptions (de-identified, 2023), there is still value in analysing clickstream data as it can help draw conclusions to inform redesign decisions and potentially improve student experience. Others have written about the benefits (and challenges) of using clickstream data in student engagement research (Baker et al, 2020; Bodily et al, 2017), establishing and refining it as a method within an interpretative methodological approach.

This study draws on clickstream data from the capstone in GCLT, utilising the pre and post innovation comparative approach and drilling down into learner engagement patterns with interactive videos. Behavioral clickstream analytics generated as a result of learners accessing the videos form the main data set for study. This data is contextualised within general engagement patterns in the unit, such live lecture attendance viewing of lecture recordings.

Findings

After extracting the clickstream data from Echo360 platform and Canvas LMS, it was analysed in two ways: a). comparatively, between pre-innovation and post-innovation semesters, and b). via Excel for trends and correlations. While Canvas LMS data was based on learner-only activity, Echo360 video and quiz uptake data included some staff data (e.g., that of learning designers in charge of quality assurance). The latter was excluded from the comparative analysis of learner engagement in LMS in relation to Echo360 engagement, but because it was embedded as aggregate data (Table 2) in Echo360 data, it was impossible to extract from this data set, though it was minimal and therefore deemed negligible for the purpose of this study.

Live attendance and viewing of recordings

When comparing engagement patterns between pre and post innovation semesters, key differences were observed in the attendance of live lectures and viewing of the subsequent recordings. With the reduction of live lecture number from 9 to 5, even though the percentage of learners turning up for the live lectures dropped in 2024 compared to 2023, the actual number of attendees increased by about 24.24% (though some of it is likely due to the larger cohort size in 2024) (see Figure 1). On the other hand, there was a significant increase (of nearly 250%) in learner engagement with recordings of live lectures (Figure 2).

Notably, while nearly all (6 out of 7 available) lecture recordings in the pre-innovation semester were downloaded by learners at least once, no recordings of the post-innovation lectures were downloaded at all. As the number of lecture attendances and the viewing of recordings increased dramatically, it is likely that in the innovated capstone structure, students received enough guidance from streaming the lectures and also from making use of other resources for review and revision (e.g., interactive videos).

Table 3: Engagement patterns compared, 2023-2024

S2, 2024 Post innovation N=41			S2, 2023 Pre innovation N=21		
Synchronous lectures	**Views of Recordings (as % of the cohort)**	**Live Attendance (%)**	**Synchronous lectures**	**Views of Recordings (as % of the cohort)**	**Live Attendance (%)**
[1] Welcome	33 (80%)	13 (32%)	[1] Welcome	8 (38%)	6 (28%)
[2] Peer Reviews Explainer	25 (61%)	7 (17%)	[2] Assessment 1 Explainer*	12 (57%)	5 (24%)
[3] Q&A	Not recorded	3 (7%)	[3] Peer Reviews Explainer	5 (24%)	6 (28%)
[4] Assessment 2 Explainer	25 (61%)	3 (7%)	[4] Approaches in SoTL*	4 (19%)	5 (24%)

[5] Assessment 3 Explainer	27 (66%)	4 (10%)	[5] Assessment 2 Explainer	8 (38%)	5 (24%)
			[6] Assessment 2 Q&A	Not recorded	4 (19%)
			[7] Assessment 3 Explainer	14 (66%)	6 (28%)
			[8] Project dissemination*	6 (28%)	3 (14%)
			[9] Reflection	Not recorded	2 (9%)
Averages	27 (67%)	6 (14%)		8 (38%)	4 (22%)

*Indicates live sessions replaced by interactive videos

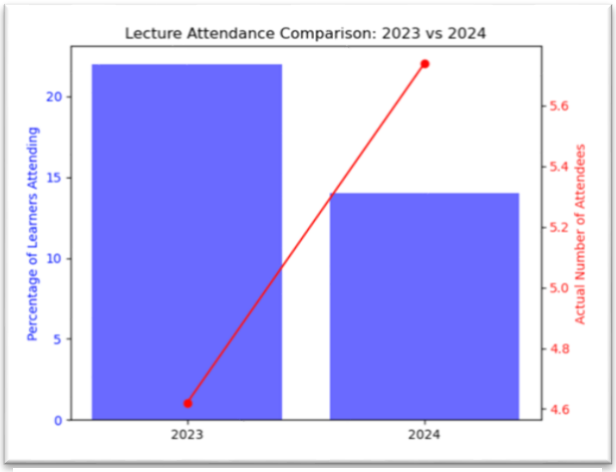

Figure 1: Engagement pattern (live attendance)

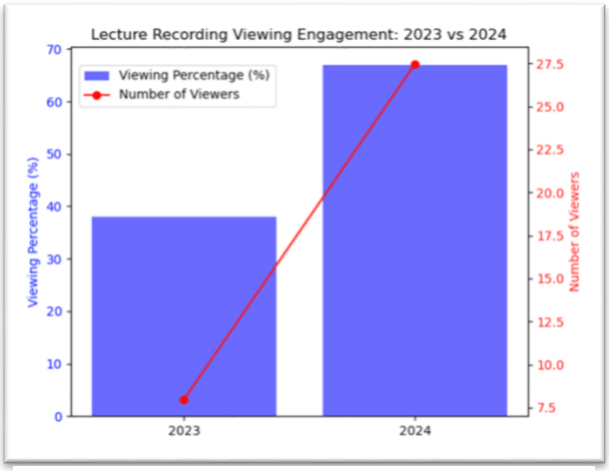

Figure 2: Engagement pattern (recording viewing)

Engagement in interactive videos

Engagement data from three Echo360 interactive videos was analysed for trends and correlations in the context of general engagement and achievement trends in 2024. The overall course grade and the rate of on-time assessment submission were compared with video engagement trends, as well as with other types of engagement in the unit (namely, LMS page views and participations, the latter referring to a number of times a learner interacted with key elements of the unit's online design). The overall achievement rate was also analysed in relation to video engagement and quiz completion statistics. Table 4 provides an overview of key video engagement data points used in this analysis.

Table 4: Echo360 Interactive Quiz Videos: Design and Learner Engagement, 2024, N=41

Video Analytics	**V1 What makes a compelling pitch?**	**V2 Approaches to Scholarship of Teaching and Learning: What approach is right for my project**	**V3 Dissemination channels: What works best for my project?**
Length (min)	2 min 55 sec	3 min 01 sec	2 min 35 sec
Location of the interactive quiz	At 2 min 25 sec [toward end of the video]	At 1 min 55 sec [second half of the video]	At 1 min 48 sec [second half of the video]
Total Views	23	19	16
Authenticated Views	19	18	13
Total View Time	45 min 41 sec	46 min 35 sec	30 min 03 sec
Average Play-Through	68%	81%	73%
Average View Time	01 min 59 sec	02 min 27 sec	01 min 52 sec

Downloads	0	0	0
Quiz: % of 'Submitted' (total response rate)	44%	70%	58%
Quiz, % of 'Seen, no response'	15%	9%	5%
Quiz, % of Unseen	41%	22%	37%

As Figures 3, 4, and 5 show, videos attracted consistent views, though engagement diminished toward the end of the semester. Of 41 learners, 58.54% watched at least one video and 48.78% completed at least one quiz. Of note here is that learners could (and did) engage with Videos 1 and 2 multiple times over several months, as Video 3 was made available to learners in the last month of the semester, naturally the viewing of this video was limited to one month.

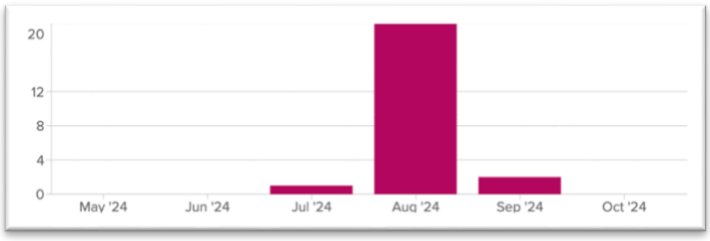

Figure 3 Video 1 views distribution, S2, 2024

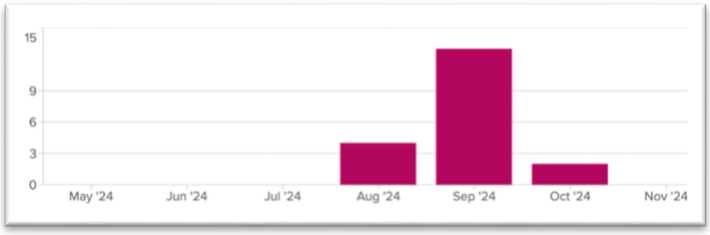

Figure 4: Video 2 views distribution, S2, 2024

Figure 5: Video 3 views distribution, S2, 2024

Achievement pattern changes post-innovation

Table 5 demonstrates key changes between 2023 and 2024 in terms of overall grade achieved, as well as changes between average LMS page views and participations. While the two latter indicators remained mostly unchanged between pre and post-innovation cohorts, the most significant change was in the overall grade achieved. Though still within the HD range, the decrease in the average grade was likely due to the cohort size increase. As a side note, the capstone unit—and the GCLT overall—historically has high HD/D distribution due to the unique features of this cohort, as described earlier.

Table 5: Comparative achievement patterns, 2023-2024

Year	Average overall grade	Average overall page views on Canvas LMS	Average overall participations on Canvas LMS
2023 (S2), N=21	92 (HD)	742	12
2024 (S2), N=41	88 (HD)	794	13

The analysis of correlation coefficients between the overall course grade and the number of views for each of the three videos showed a moderate positive correlation between watching videos and achieving higher course grades—especially for Videos 1 and 2.

With the three videos analysed together, video views had a significantly stronger correlation with overall course grade than LMS page views and participations combined.

When analysing the relationships between assessment submission trends (that is, whether assessments were submitted on time), course grades, and video engagement, negative correlations found for each of the three videos suggested that learners who watched more videos or spent more time watching them were less likely to submit assessments on time.

In regards to what had the most significant impact (measured via correlation coefficient) on the overall course grade, when compared between the videos, LMS pages views and participations, watching Video 2 had the strongest positive correlation with overall course grade (+0.36), suggesting it may have had the most meaningful impact on student performance.

In relation to interactive quizzes in the videos, when analysing correlation coefficients between overall course grade and whether learners completed the quizzes for each video, completing Video 1 and 2 quizzes shows a moderate positive correlation with higher course grades, while Video 3 quiz completion had a weaker (though still positive) correlation. This suggests that engaging with quizzes—especially early in the course—may be linked to better academic outcomes.

Conclusion and discussion

This evaluation produced valuable insights into the impact of interactive video on learner engagement and academic performance in a capstone within a GCLT. The videos enhanced learner experience by boosting interactions in the unit and, arguably, simulating a stronger presence of the convenor in the unit, as aligns with relevant research (Farrell & Brunton, 2020; Martin & Borup, 2022). Quizzes embedded into the videos contained thought-provoking questions as suggested by evidence-based research into effectiveness of online designs (Buelow et al., 2018). In the context of research into the role capstones plays in learner transition into the profession (Cullen, 2017; Dunlap, 2005; McNamara et al., 2011), videos fulfilled their intended purpose of guiding learners to reflect on about their projects in the context of the capstone, with nearly 60% of leaners watching at least one video and 48.78% completing at least one video quiz.

While overall course grades remained mostly unchanged from 2023 to 2024, looking at correlations between grades and different types of clickstream data, video views had a significantly stronger correlation with overall course grade than LMS page views and participations combined. This suggests that watching the videos is a more meaningful indicator of academic success in this unit than general platform activity.

Negative correlations found for each of the three videos in relation to assessment submission trends (that is, whether assessments were submitted on time) may indicate that learners who needed help the most when preparing their assessments were also most likely to utilise the videos, which still speaks to the usefulness of the videos, even if these learners were also most likely to need an extension for their assessments.

From the convenor perspective, the interactive quiz development tool process proved intuitive and relatively easy to use, saving convenor's time and creating good quality and aesthetically pleasing videos which did not appear 'overproduced'. Despite the initial plan of trialing videos with vastly different timed locations of the

interactive quiz (e.g., start, middle, and end), during the video scripting process it became apparent the quizzes needed to be scheduled toward the middle or end of the videos, after students were provided with at least basic details about the topics being discussed. This resulted in having two videos with the quiz located in the second half of the footage and one video with the quiz scheduled toward the end.

The intent to create shorter videos proved difficult in practice, with the videos averaging 170 seconds (2 min 50 seconds). It also proved time consuming to transform rich and complex content of the modules into short videos, this process requiring some tight scripting and multiple production takes until acceptable quality was achieved. However, now that the videos have been produced, they are a reusable resource that future cohorts will benefit from without requiring additional work from the convenor.

Considering the significant cohort increase in 2024, changes in engagement trends must be taken in the whole-of-GCLT context. However, while the percentage of learners attending live lectures dropped in 2024, the 24.24% increase in actual attendance is significant. Further, the dramatic increase (of nearly 250%) of learner engagement with recorded lectures is of note as it demonstrates the 'less is more' principle, with learners likely valuing the live lectures (and recordings) more when less of them were offered but each was packed with useful material and exemplars. Further, the overwhelming increase of learners viewing the recordings indicates that the reduced number of live lectures, combined with the introduction of interactive videos, may have significantly increased the value of the available resources, hence attracting higher learner engagement in the unit as a whole.

Previous findings from similarly designed studies do not contradict the outcomes of this evaluation: without knowing the specifics about learners (e.g., what motivates them, how they approach the learning process, etc.) it is difficult to draw causational parallels between clickstream and achievement. High achievers will likely succeed academically regardless of learning design, technology used, or various types of support offered or not offered (or even *despite* support if support is negatively perceived by the learner (de-identified, 2015). However, the study offers new ideas for effective capstone designs in online learning, with short, interactive videos scheduled early on in the semester and in sync with the overall unit content proving engaging and effective for professional learners.

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