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Orientation Videos in Online Project-Based Teacher Professional Development Short Courses: Enhancing Engagement but not Retention

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Abstract. Project-based learning (PjBL) offers a valuable framework for teacher professional development (TPD). However, the complexity of PjBL can hinder engagement and retention in asynchronous online formats, particularly in contexts with low computer literacy and limited infrastructure. Orientation videos, which combine announcements, technical demonstrations, and instructional scaffolding, can potentially decrease extraneous and intrinsic cognitive load in online TPD. This explanatory sequential (quant-qual-) mixed-methods instrumental case study explores the value of orientation videos in an online PjBL short course. Data were collected from two implementations of a six-month short course, with a focus on the second implementation, which included orientation videos. Video usage data for all 62 participants enrolled in this second implementation were collected from the video hosting platform. Additionally, 22 of the 28 participants who completed the short course, as well as 10 who dropped out, voluntarily completed a post-course questionnaire. Retention was compared between the two implementations of the short course, i.e., without and with the videos. Data were analysed with descriptive statistics and through inductive thematic analysis. Findings reveal that participants who completed the short course engaged actively with the videos, which they found clearer than equivalent text. However, the videos did not improve participant retention. Orientation videos could be a scalable design element to support engagement in online PjBL TPD. The context- or design-specific nature of the benefits observed here still needs to be determined.

Keywords: Teacher Professional Development (TPD); Project-based learning (PjBL); Asynchronous orientation videos; Engagement; Retention

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1. Introduction

Asynchronous videos appear to be suitable vehicles for providing clear instructions needed to unlock the potential of project-based learning (PjBL) in online teacher professional development (TPD). Online TPD offers advantages such as flexibility, accessibility, and lower costs compared to equivalent face-to-face courses. PjBL can improve the coherence, authenticity and effectiveness of TPD (Indriati et al., 2024; Song et al., 2025; Subiyantoro, 2024). Knowledge and skills are incrementally developed through an extended period, culminating in an authentic public product (Larmer et al., 2015). PjBL has been shown to be effective in face-to-face TPD workshops (e.g., Stott, 2025). However, online TPD through PjBL is rare due to its relative complexity (Pan et al., 2024). The cognitive load arising from this complexity must be managed through clear communication, particularly when participants have limited computer literacy skills (Kirschner et al., 2018).

High levels of cognitive load may explain why engagement and retention levels tend to be low within online TPD (Mubarak et al., 2022). Enhanced social presence, such as through incorporating interactive synchronous video classes, improves retention and engagement in online TPD courses (Belt & Lowenthal, 2023). However, synchronous video classes are largely unfeasible in developing world contexts due to low-bandwidth internet connections and intermittent electricity and internet access. Even in developed world contexts, the flexibility of asynchronous videos makes them appealing (Lowenthal et al., 2020). However, the impact of asynchronous videos on engagement and retention in online PjBL TPD short courses is unknown.

Lowenthal (2022) categorises asynchronous videos as announcement (explaining the course requirements), instructional (teaching the content), and feedback (responding to student work) videos. University students in the United States of America found instructional and feedback more helpful than announcement videos. The reason they gave for this was that they found reading announcements quicker than watching a corresponding video (Lowenthal, 2022). However, for people with lower ICT skills, an announcement video that demonstrates how to use information and communication technologies (ICTs) to meet the course requirements is more effective than reading equivalent text (Beaunoyer et al., 2020). Teachers in the developing world tend to have limited ICT skills (Chisango & Marongwe, 2021). In fact, the extent of technical guidance needed for an online TPD for lower ICT-literate participants may be considered beyond the scope of the announcement video category.

For this reason, the term *orientation videos* is used in this article to extend Lowenthal's (2022) announcement category to include technical guidance for accessing information, completing tasks, and orienting participants with respect to the course components' relationship to one another. This study aims to investigate these types of videos to inform their inclusion in PjBL TPD short courses. To achieve this aim, the study is guided by the main research question:

1. What value do orientation videos bring to online teacher professional development short courses designed according to project-based learning principles?

Two successive implementations of an 80-hour, six-month-long, fully online, asynchronous PjBL short course are investigated to answer this question. This short course aimed to develop the skills of South African schoolteachers in creating and implementing online lessons. The first of these implementations (see Stott, 2022), which did not use orientation videos, suffered high dropout rates. Participants in this first implementation suggested that orientation videos may help improve retention and engagement. This research focuses on the second implementation of this short course. This second implementation occurred a year after the first, and it did include orientation videos. The research is guided by the following sub-research questions related to this context:

1. How did the participants use the orientation videos?
2. To what extent did the videos affect retention levels?
3. What were the participants' perceptions of the orientation videos' role in their engagement in the short course?

2. Literature Review and Theoretical Referents

2.1 Teacher professional development

In-service TPD is valuable for advancing teacher knowledge, particularly in terms of how to utilise new pedagogies and technologies they may not have been exposed to during their initial teacher training (Barbour & Hodges, 2024). TPD takes on a variety of forms in various places in the world, with short courses being popular in many countries (Ostinelli & Crescentini, 2024). In South Africa, where this study was conducted, the Short Learning Programme (SLP) is a type of short course that awards participants university credits. SLPs are therefore subject to the same quality control as university modules. They are therefore more rigorous and span a longer period than typical teacher workshops.

The greater rigour and time duration of SLPs enhance their potential impact (Desimone, 2009), but also increase their dropout rates (Stott, 2022). The short course under investigation in this study is an SLP. However, given the greater universality of the term short course internationally, it is referred to as a TPD short course in this article. Online short courses are particularly susceptible to disengagement and dropout by participants with lower technological skills and access (Rahmani et al., 2024). Yet, the flexibility and reduced cost of online relative to face-to-face short courses incentivise attempts to enhance engagement and retention, such as through the integration of instructional videos.

2.2 Instructional videos

Instructional videos can support a teacher to operate within their Zone of Proximal Development during TPD (Major & Watson, 2018). Asynchronous videos are particularly useful in supporting self-directed and self-paced TPD, since sections of videos can be rewatched as required (Marsh & Mitchell, 2014). Short (1-6 minute) videos that develop a single skill are effective at promoting microlearning in a flexible manner during online TPD (Kohnke et al., 2024).

However, these potential benefits of instructional videos to TPD are dependent on the design quality of the video (Rismark & Sølvberg, 2019). Mayer's (2009) seminal work on multimedia learning includes a list of Presentation Principles, derived from extensive empirical research and embedded within Cognitive Load Theory (Sweller, 2011).

The concepts of biologically primary and secondary knowledge, as well as cognitive load management, are related to Cognitive Load Theory. These theories justify the inclusion of orientation videos in a TPD short course and were used to interpret the findings in this study.

2.3 Biologically primary and secondary knowledge

Biologically primary knowledge offers little cognitive load and is learnt inductively through social interaction (Kirschner et al., 2018). Examples include interpreting facial and vocal expressions and body language. In contrast, most formal education aims to develop secondary knowledge, which entails a significant cognitive load and requires explicit instruction. The lower the knowledge and skill level of the learner, the more dependent they tend to be on the use of primary knowledge to help them acquire secondary knowledge (Kirschner et al., 2018).

2.4 Cognitive load management

Effective instructional design requires that the extrinsic and intrinsic loads be reduced. High levels of extrinsic and intrinsic load lead to student frustration, which can encourage students to drop out (Stiller & Bachmaier, 2017). Furthermore, reducing extrinsic and intrinsic load frees up cognitive space for generative cognitive processing, which is required for meaningful learning (Fiorella & Mayer, 2021). Generative processing is also related to engagement, satisfaction, and sustained self-directed learning (Meyer et al., 2023). The extrinsic load that videos offer can be reduced by avoiding seductive details that detract from the desired learning (Sundararajan & Adesope, 2020).

It is easier to enhance clarity and efficiency, thereby reducing intrinsic load, in asynchronous videos compared to synchronous ones (Bahiyah, 2023). This is because scripting, teleprompter use, and editing are possible with asynchronous video creation. It is difficult to distinguish a video's contribution to the various types of cognitive activity from video-usage activity alone (Costley et al., 2021). For this reason, in this study, video-usage activity data were supplemented with data on the students' perceptions of the videos' contribution to their learning, guided by Engagement theory.

2.5 Engagement theory

There are four types of student engagement: skill, emotional, participation and performance engagement (Handelsman et al., 2005). Skill engagement refers to carefully listening to, watching and reading the study material, staying up to date, revisiting work to ensure understanding, being organised and taking good notes. Emotional engagement is evidenced through applying effort, finding ways to make the material relevant and interesting, and a desire to learn. Participation engagement involves actively enjoying and participating in online interactions

and discussion forums, while also getting to know and helping fellow students. Finally, performance engagement refers to doing well in assessments.

3. Methodology

This is a pragmatically conducted explanatory sequential (quant-qual-) mixed-methods instrumental case study (Creswell & Creswell, 2017). Transparent contextual and methodological reporting enhances warrantability (Plowright, 2011) and enables readers to abstract insights relevant to their context (Stake & Visse, 2023).

3.1 Sample and Ethical Considerations

For two consecutive years, the Free State Department of Basic Education officials sent invitations to all teachers in their province to participate voluntarily, at no cost to themselves, in a fully online, asynchronous short course hosted by the University of the Free State. Population sampling was employed, with varying sample sizes resulting from ethical and pragmatic constraints, as explained in the data collection section. The bulk of the data was collected from 22 participants (13 female, 9 male), with an average age of 41. These 22 participants voluntarily answered the final questionnaire after completing the 2nd year's short course.

Slightly over half (13) taught at low quintile schools, i.e., those serving poorer communities, which comprise 80% of South African schools. The university offered a more basic short course, focusing on using WhatsApp in remote teaching, parallel to this one. A higher proportion of teachers from low quintile schools opted for this more basic short course as they found it more suitable for the context of their learners and their own ICT skills and access levels. Figure 1 shows video usage data for the participating teachers per device type. The clear preference for cell phone access corresponds to considerably higher cell phone than desktop access by teachers in the developing world (Stott, 2022).

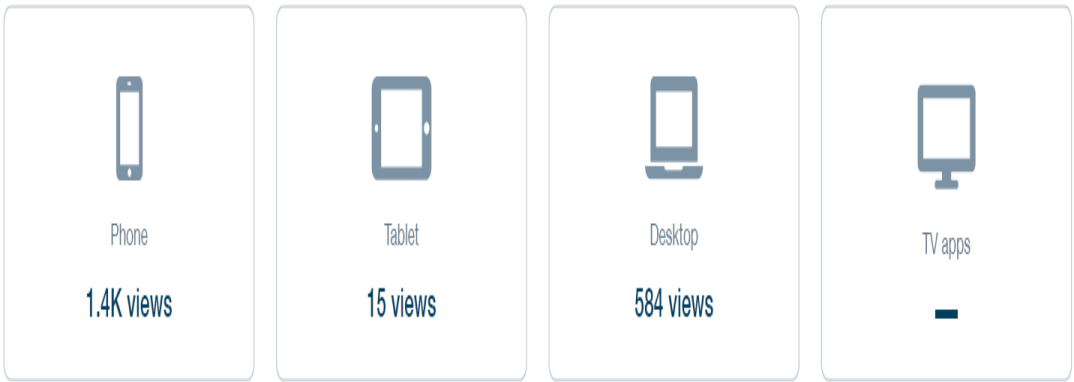


Figure 1: Video usage data per device type

All questionnaires were completed anonymously, with consent given. Ethical clearance (UFS-HSD2020/1790/163) was obtained from the relevant committee prior to the commencement of data collection.

3.2 Intervention

The fully online, externally funded Teach Online short course aimed to empower South African teachers with moderate to advanced ICT skills to teach any subject fully or partly online. The main facilitator has over 30 years of teaching experience and has designed and conducted several blended short courses. A panel of experienced university employees, each with over 20 years of teaching experience, including experience integrating ICTs in their teaching, moderated the short course design, suggesting improvements and validating the final product. The university's quality assurance committee then evaluated and approved it. Between the first and second implementations of the Teach Online short course, the main facilitator created the orientation videos that are the focus of this study.

Additionally, one member of the moderating panel joined as an additional facilitator in the second implementation. The Teach Online short course's website, which includes all the videos referred to in this article, is freely accessible at www.ufs.ac.za/TeachOnline. However, access to the short course's Google Classroom was restricted to registered participants.

The structure and assessments of the short course, as well as the positioning of each of the 12 orientation videos in the short course, are summarised in Table 1. The short course design and implementation were informed by literature on the characteristics of effective online TPD courses, as explained below, organised according to the seven principles of Gold Standard PjBL (Larmer et al., 2015):
(1) Everything done in the short course is focused by the general *driving question*: How can we teach effectively online? Each participant customises this to a subject and topic of their choice for one of the classes they are currently teaching.

(2) The answer to this driving question is incrementally built up through eight units over six months, thus requiring *sustained inquiry*, known to enhance TPD effectiveness (Desimone, 2009).

(3) The participants are expected to implement their culminating online lessons with their learners, adding *authenticity*, since teachers need to perceive TPD as practically relevant to their teaching for meaningful engagement and professional uptake (Hınız & Yavuz, 2024; Popova et al., 2022).

(4) *Voice and choice* are catered for. The participants choose their topics and all the learning and teaching materials they include in the lessons they design, since personalisation and flexibility improve TPD effectiveness (Bragg et al., 2021). To encourage participation (voice), several Padlets and Google Docs are used as discussion forums throughout the short course, incentivised through individual marks being allocated to engagement quantity and quality. Such practice is known to enhance cognitive and behavioural engagement in online learning (Getenet & Tualaulelei, 2023).

(5) Each activity is formatively and summatively assessed, with most of these requiring participants to *reflect* on their learning and evolving online lesson, against specific criteria focused on in that unit, since guided reflection improves

teachers' ability to notice good practice (Jenset et al., 2024), and enhance pedagogical learning from TPD (Bragg et al., 2021).

Table 1: The module, orientation videos, and assessments of the Teach Online Short Course

Module	Videos	Description	Dates	Formative assessment	Summative assessment	Weight
Orientation Getting started Module overview	1 | Orientation 2 | Website overview 3 | Getting started | Google Classroom 4 | Module overview	Participants set up a Gmail account, join the Google Classroom, introduce themselves, and explore the short course website.	14 /05-01/06	• Send a screenshot of the website • Enter Google Classroom • Introduce yourself		
1 Introduction	5 | Introduction	Participants share teaching and learning ICTs they are already using.	01/06 – 13/06	• Padlet: The resources I'm already using	Choose and analyse two apps appropriate for your culminating online lesson.	5%
2 Pedagogy	6 | Pedagogy	Participants watch videos and read notes on the implications of cognitive load theory for teaching with ICT, as well as the criteria for meaningful learning from ICTs.	13/06 – 27/06	• Pedagogy activity 1 and Padlet: Active, intentional, constructive learning • Padlet: Reduce distractions • Activity: Aid selection of key items • Padlet: What I think	Comprehension of the unit's content. Reflection of learning and application to teaching contexts.	5% 10%

				• Types of questions : Activity		
3 Communication platforms	7 | Communication platforms	Participants are exposed to various ICTs for communicating with learners, receiving learners' work and providing feedback, and enabling peer discussion. Google Classroom.	27/06-11/07	Padlet: Communication platforms	Set up a communication platform (preferably Google Classroom) and submit screenshots of this. Participants are encouraged to populate this throughout the next units with resources for their culminating online lesson.	Formatively assessed
4 Sourcing information	8 | Sourcing information	Participants learn how to search effectively in Google and YouTube, and to explore websites and videos applicable to the subject they teach.	11/07 –25/07	Padlet: Information sources	Choose one text and one video resource. Write instructions on how learners should use these. Evaluate these resources against the relevant pedagogical principles presented in Module 2.	10%
5 Activities	9 | Activities	Exposure to and evaluation of online	25/07–08/08	Padlet: Activity sources	Complete a structured template for one	10%

		learning activities, writing instructions, and planning feedback.			activity for the culminating online lesson.	
6 File management	10 | File Management	Good online and offline file management techniques. Google Drive.	08/08–22/08	Activity	Set up folders in Google Drive. Share documents with various permissions.	10%
7 Movie-making	11 | Movie-making	Introduction to creating videos (optional unit).	22/08–03/09	Flipgrid: Post your teaching movie		Formatively assessed
8 Implement and reflect	12 | Implement and reflect	Implementation of, and reflection on, an online lesson.	04/09 – 31/10		Culminating online lesson and reflection.	50%

(6) The short course facilitators provide formative feedback (*critique*) for each unit's formative and summative assessment, allowing participants to continually *revise* their evolving online lesson. Oyarzun et al. (2021) found that teaching presence drives social and cognitive presence in online courses. They also found that timely instructor feedback and responses to individual queries, along with a warm, inviting, and accessible tone, are crucial to course success. Not only did the facilitators make every effort to provide formative feedback in such a manner, but the presenter also focused on using a warm and inviting tone in the orientation videos.

(7) The culminating online lesson that each participant produces serves as the *public product* of the PjBL process. Not only is it public in that participants are expected to enact it with their learners and reflect on its effectiveness, but also, all participants are encouraged to view one another's online lessons at the end of the short course to get ideas from one another.

3.3 The orientation videos

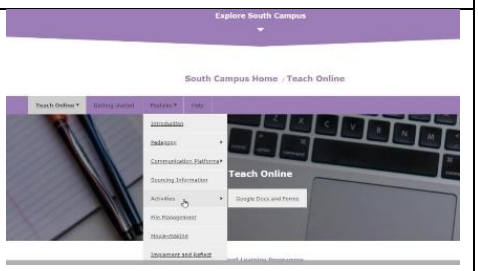
Between the first and second implementations of the short course, 12 roughly 10-minute orientation videos were created. The first four videos explain the short

course's requirements, provide an overview, and demonstrate how to navigate the website and access and use the short course's Google Classroom. The next eight videos each explain what is required in their corresponding modules. These scripted videos were performed with a teleprompter and edited to include supporting visuals and keywords. The videos are hosted on Vimeo (www.vimeo.com), which includes some editing tools, such as chapters, for easier navigation.

Table 2 provides a summary of each chapter within one of these videos to exemplify the videos' design, purpose, and appearance. This summary suggests that these videos do not fit neatly into Lowenthal's (2022) video categories. Although they largely comprise announcements (information about the expectations and structure of the module), all of which were also provided textually on the short course's website and in its Google Classroom, they also include technical guidance and pedagogical highlights. Technical guidance is also provided textually on the website, but these formats are not equivalent, as the videos demonstrate the processes. The pedagogical highlights may be considered instruction, except that they only highlight key aspects of the instruction provided in other formats on the short course's website.

Table 2: Details of an example video: Module 5: Activities

Section	Time	Message and categorisation	Screenshot example
Welcome	00 – 00:58	Purpose of this module and its place in the whole (*Announcement*)	
Introduction	00:58 – 2:26	Uploading a traditional worksheet loses the interactivity and collaborative opportunities that activities designed for the online environment afford. PhET as an example of interactive, and Kahoot! as collaborative, affordance. (*Instruction*)	

Promote effective engagement	2:26 – 3:48	Where to find information on the short course website about online tools to create interactive, collaborative activities. Caution: Design and use these according to the pedagogical principles covered in Unit 2. (*Technical guidance, Announcement*)	
Ideas	3:48 – 4:37	Reminder of use of Google Forms, Google Docs and Padlet in this short course, and where to find resources to guide creating these. (*Technical guidance, Announcement*)	
Summative assessment	4:37 – 6:12	The summative assessment required for this unit: purpose and requirements, where to access it on Google Classroom, and the rubric used. How to submit. (*Technical guidance, Announcement*)	
Recap	6:12 – 7:31	Summary of the main points made in this video and how this unit relates to previous and future units. (*Instruction, Announcement*)	

The screenshots given in Table 2 illustrate how the videos were designed according to Mayer's (2009) Presentation Principles. For example, consistent with the Multimedia Principle, by using both text and images, the videos utilise both working memory channels. The multimedia used includes pictures, the teacher's facial expressions, body language, and verbal input, as well as some summarising text. The recap slide illustrates how the Coherence and Redundancy Principles were applied. As can be seen by watching the video (accessible at http://www.vimeo.com/kovsies/activities), the six bullets shown in the recap screenshot appear separately as they are discussed. This incremental display of

summarising keywords manages the limited space of working memory by reducing extraneous and intrinsic cognitive load.

Using keywords rather than full sentences in the text also reduces the extraneous cognitive load that occurs from information redundancy resulting from providing both verbal and written text. Furthermore, the fact that this incremental display is synchronised with the verbal explanation aligns with the Temporal Contiguity principle. Highlighting techniques used illustrates how the Signalling Principle was applied. For example, the section of video before the ideas screenshot demonstrates the cursor movements needed to navigate the short course website. The summative assessment screenshot illustrates the use of a video annotation feature, where a red square is drawn around the button to be pressed. Furthermore, playing any of the videos accessible from Table 1 will reveal that a conversational tone is used by the visible human teacher, consistent with the Personalisation and Modality Principles.

Finally, the Segmentation Principle was applied in several ways. The eight icons used to represent the eight modules, visible in the Welcome screenshot, illustrate one of these. Each video begins and ends by positioning the video within these eight modules and explaining how it relates to other modules. The six sections given in Table 2 correspond to the six electronically divided chapters of the video. As a viewer hovers over the video timeline, the title of the corresponding chapter is revealed, allowing the viewer to easily locate the point in the video they wish to jump to. Short interludes are inserted between each chapter to further clarify the segmentation. These interludes consist of standard visuals and music, together with the unique title of the chapter.

3.4 Data collection

Retention numbers were extracted throughout the two implementations of the short course. The remaining data (video usage and questionnaires) refer only to the 62 participants enrolled in the second implementation. Anonymous video usage was obtained from the platform (Vimeo) where the videos were hosted. Different post-course questionnaires, hosted on Google Forms, were answered by volunteers from those who completed (n = 22) and dropped out (n = 10) of the short course. Recruitment for answering these questionnaires was conducted via WhatsApp and email, which were sent to the entire population (n = 28 completed, 34 dropped out).

Table 3 summarises the questionnaire data collected. Likert-scale items were modified from questionnaires developed and validated by Costley et al. (2021) and Handelsman et al. (2005), as well as items created specifically for this research. Handelsman et al.'s (2005) questionnaire measures skill, emotional, participation and performance engagement. Costley et al.'s (2021) questionnaire was created to expose high levels of extraneous and intrinsic cognitive load, indicative of poor video creation, but they found that sometimes positive responses rather indicated generative processing. Consequently, additional questionnaire items were

included in this study to assess the participants' perceptions of the clarity and value of the videos.

Table 3: Summary of the questionnaire-based data collected

Group	Number (/Total possible)	Quantitative data	Relevant research question	Qualitative data: Responses to open-ended questionnaire items asking:	Relevant research question
Completed	22 (/28)	Responses to Likert-scale items regarding video-usage (modified from Costley et al. (2021)	1	How did you use the videos?	1
		Role of videos in retention and engagement	2 3	What role did the videos play in your retention and engagement in the short course?	2 3
Dropped out	10 (/34)	Responses to Likert-scale items regarding reasons for dropout	2	Reasons for dropout	2
				What could we have done differently to prevent dropout?	2

3.5 Data analysis

Descriptive statistics, particularly frequency distributions of the Likert options, were used to analyse the quantitative data. Inductive thematic analysis was performed on the qualitative data (Braun & Clarke, 2006). This involved grouping open-ended responses that shared common views, labelling and selecting articulate representative examples for each. Microsoft Excel was used for both the quantitative and qualitative analysis.

4. Findings

Three themes emerged regarding the use and value of these orientation videos: (1) active repeated viewing; (2) no effect on retention due to external limiting factors; (3) enhanced engagement due to videos being easier to understand than text.

4.1 Active repeated viewing

The participants used the videos actively, watching them to a high degree, rewatching sections, and utilising active engagement strategies. This claim is supported by the high number of views evident from the video hosting platform, as well as participants' self-reported viewing behaviour and cognitive engagement.

The considerably higher number of times each video was viewed than the number of active participants at the time of the short course (see Table 4) indicates repeated viewing behaviour. The moderate (58%) to low (29%) mean view percentages suggest that only sections were watched and rewatched, although the data lacks information about which sections these were. A considerable increase in viewership, despite a decrease in participant numbers, is noticeable in videos 5 and, particularly, 6. This may be explained by the fact that the first four videos were introductory and not associated with an assessment task. The particularly high viewing numbers for video 6 may be related to the low mean percentage of viewing and to the greater complexity of the module (Pedagogy) that this video corresponds to. Participants may have managed the cognitive load associated with the Pedagogy module's complexity by watching only short sections at a time.

The lower viewing times of later videos may be attributed to declining participant numbers due to dropouts. Inferences that can be made from Table 4 are, however, limited. For example, although the high numbers of views relative to participants suggest multiple viewing, this does not necessarily mean active engagement during viewing. For this reason, participants' questionnaire responses are discussed below to augment and triangulate the findings presented in Table 4.

Table 4: Usage data per video, extracted from the Vimeo.com hosting platform

Video	Number of times played	Number of downloads	Mean percent of video that was viewed (%)	Number of participants who completed the associated module
1	133	1	48	62
2	179	1	42	62
3	174	4	33	62
4	171	2	29	62
5	218	4	42	56
6	335	7	30	48
7	254	5	43	42
8	138	1	49	42
9	109	1	44	36
10	92	9	56	33
11	87	1	53	25 (optional module)
12	113	5	58	30

Most of the 22 participants who answered the questionnaire after completing the short course reported fully watching, then rewatching sections, for all the videos (**Error! Reference source not found.**). This self-report of high viewing levels and repetitive viewing corresponds to the deductions made from the video hosting platform data presented in Table 4. However, the self-reported claims of full video watching appear inconsistent with the moderate to low mean viewing percentages in Table 4. Some bias towards positive self-reporting is to be expected.

However, multiple reviews of short sections would drive the mean viewing percentage down, even if the general practice was to watch the whole video in addition to rewatching sections. Additionally, the qualitative data revealed that

the introductions and endings, which were somewhat similar across the videos, were often skipped. It is likely, though, that participants did not interpret skipping such repetitive sections as constituting incomplete viewing. Additionally, if a viewer were to watch a video over multiple sessions, the exported analytics would log this as several partial views, whereas the participant would likely report a full viewing. As with the viewing data in Table 4, however, the self-reported viewing data in Figure 2 does not indicate whether the high levels of video usage were coupled with high levels of generative cognitive processing. To mitigate this shortcoming, data regarding self-reported cognitive processing are presented next.

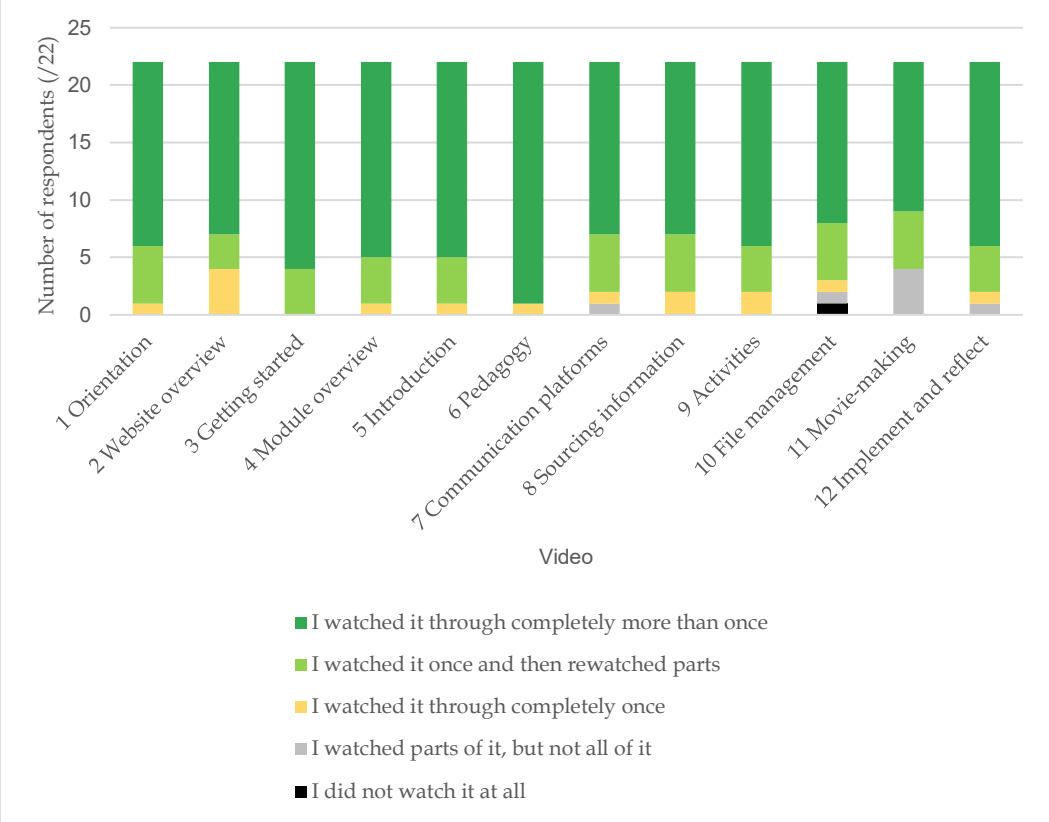


Figure 2: Self-reported extent to which participants who completed the short course watched each video (n=22)

Figure 3 displays participants' self-reported video engagement strategies. The options 'often' or 'very much' are taken as indicating considerable engagement, while 'rarely' and 'never' are taken as minimal engagement in a strategy. Approximately three-quarters of these participants reported having to rewatch parts of the video to fully understand it, and more than half reported having to scan their eyes back and forth between the text and images and pause the video to read something in it. The prevalence of these strategies suggests that the participants were either using active viewing techniques or experienced extraneous cognitive load resulting from poor video design (Costley et al., 2021).

Meanwhile, the low prevalence of needing to look away from the screen or stop listening to focus on it likely suggests that the video design quality was high (Costley et al., 2021). In addition to this empirical evidence, theoretical support for the design quality of the videos was given in the Intervention section. However, additional data are needed to empirically distinguish between the two possible explanations for the first three bars of data in Figure 3, namely, active processing or poor video design quality. This additional data was obtained from both the Likert responses and the open questionnaire response items.

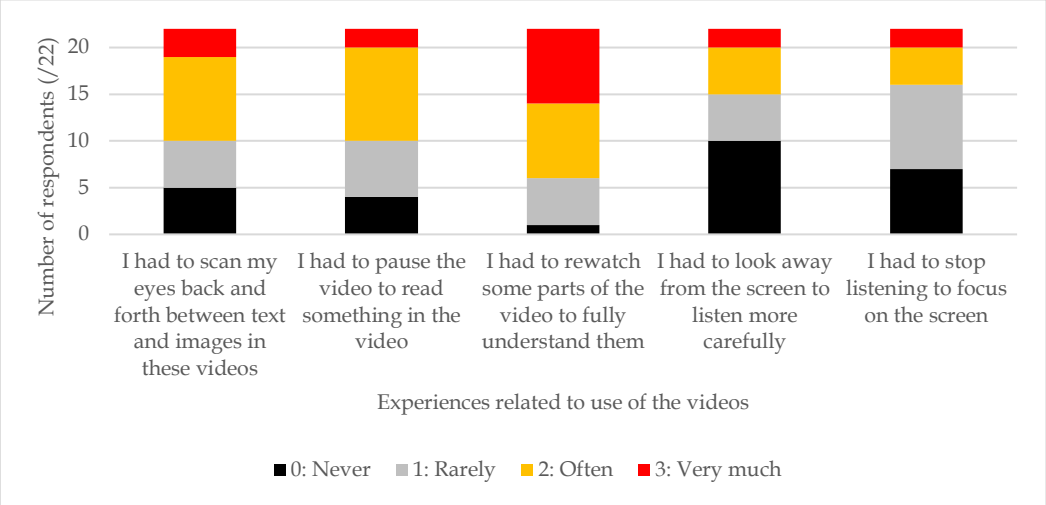


Figure 3: Experiences related to the use of the videos, related to cognitive load and active engagement (n=22)

Figure 4 gives participants' views related to their perceptions of the quality of the videos. Most participants disagreed with all statements except the second one, with which they strongly agreed. The trends shown in Figure 4 indicate that participants utilised both the text and videos provided in the short course. They found the videos useful because they were clearer than the corresponding text and they provided additional information. These trends are confirmed in the qualitative data, for example:

> *"I knew exactly what was expected of me, even though I had to play the movies more than once to comprehend better. Being a novice at teaching online, these videos used appropriate language and conciseness to convey the instructions. They made it easier for me to grasp the second time around because of the clarity in explaining tasks."* (Participant 3)

This participant attributed their need to watch the videos multiple times to their inexperience with online teaching, while praising the videos for their clarity. Additional insights from the qualitative data will be presented in Section 4.3.

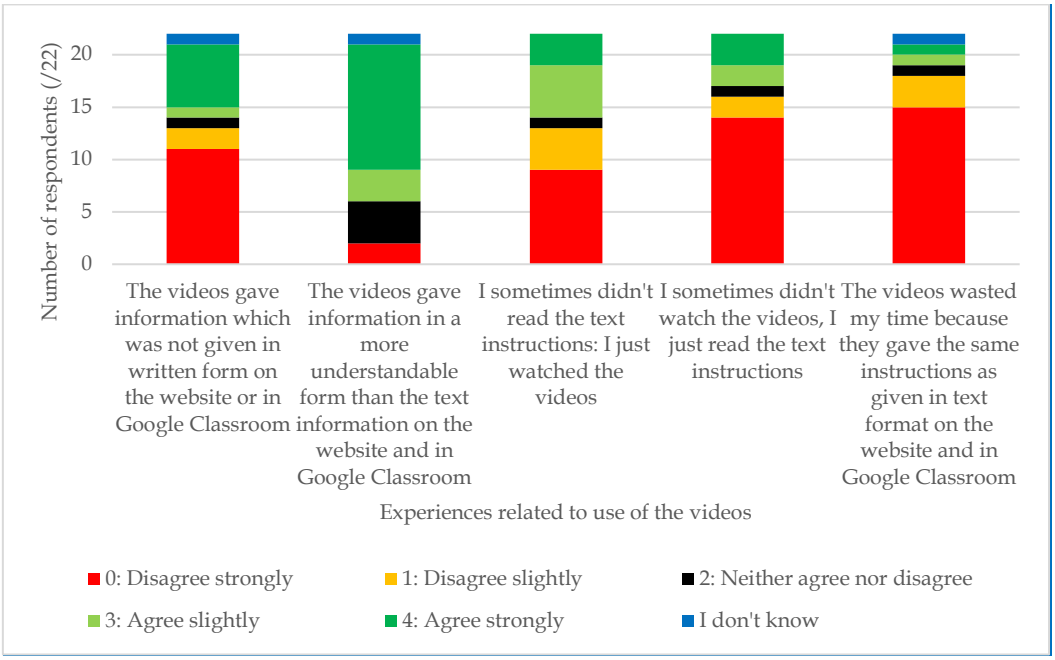


Figure 4: Experiences related to video quality and the use of the videos and text (n=22)

4.2 No effect on retention due to external limiting factors

The apparently similar trends in retention statistics across the short course for its two implementations (Figure 5) suggests that including the videos in the second year did not affect retention.

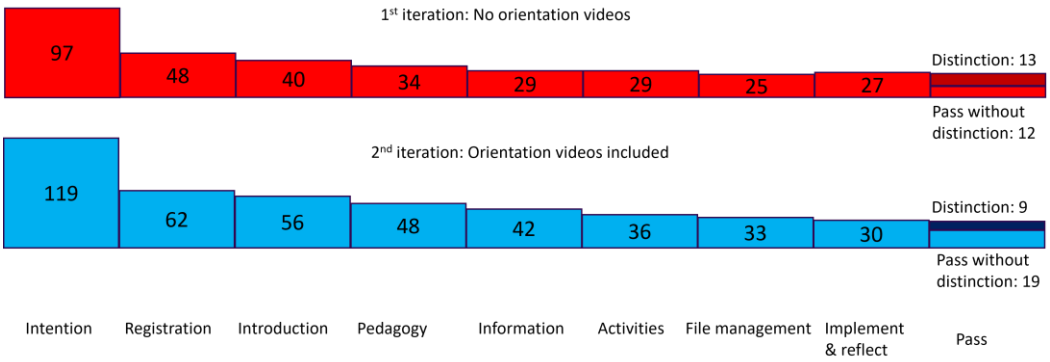


Figure 5: Number of participants active in the short course for its two implementations

However, including the orientation videos was not the sole difference between the two implementations. Although the substance of the short course design remained unchanged, its appearance altered since it was moved from the free Google Sites platform to integration within the hosting university's website. An additional facilitator also joined. These and other uncontrollable variables render invalid a causal claim that including the videos would have retained high dropout rates if Figure 5 were the only relevant data available.

Therefore, additional questionnaire data (n=10) were collected regarding reasons for dropping out. Chief reasons were personal circumstances ("I had personal

challenges that consumed much of my time"), time pressures, technical difficulties, such as difficulties with internet and device access ("I had no access to the internet and did not have the relevant device to connect to the internet"), demotivation because their learners did not have access to the internet, and difficulties in submitting the documents needed for their registration. A few did, however, indicate that the course was too demanding, for example:

> *"The course material is a challenge because it is a lot to go through. I suppose my age is also a factor. But still, I would have been able to do it if I had more time on my hands."* (Dropped out Participant 2)

The participants' responses to what could have been done to keep them in the course further indicated that factors external to the course's design were limiting:

> *"Pressure was on my side, the course was well structured, and enough time was given to complete tasks."* (Dropped out Participant 9)

> *"Nothing really, you did your best even after retrieving my email, I saw that you kept in contact and gave me a second chance to finish, but I saw the emails late."* (Dropped out Participant 4)

4.3 Enhanced engagement due to videos being easier to understand than text

Unlike the irrelevance of the videos to the participants who dropped out, the completing participants considered that the videos contributed significantly to their being able to navigate the required ICTs, knowing what was expected of them, and to their successful short course completion (Figure 6).

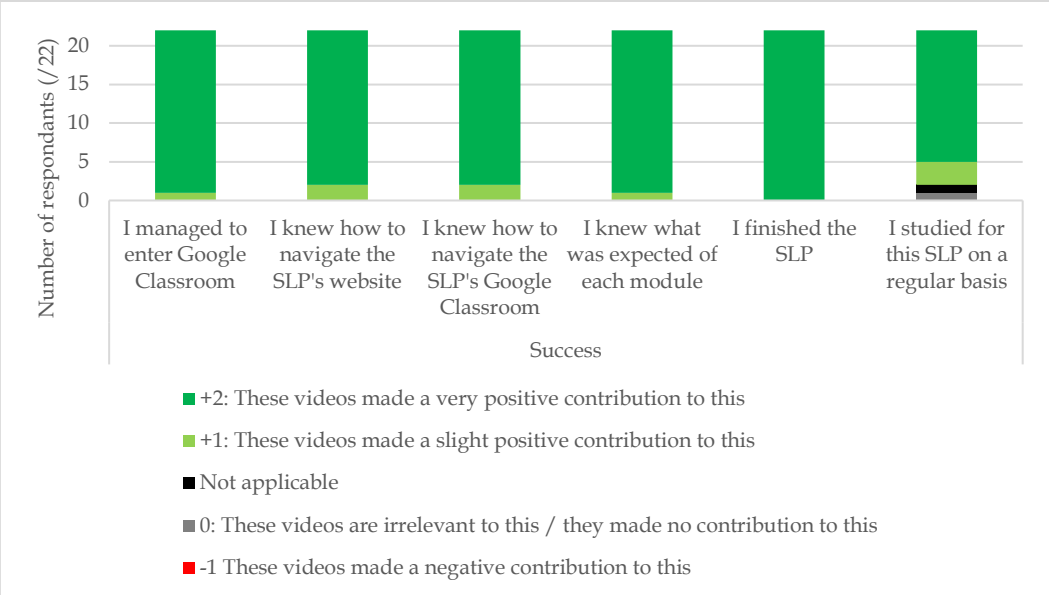


Figure 6: Completing participants' perceptions of the role that the videos played in engagement (n=22)

The participants' Likert responses regarding their experiences with the orientation videos (Figure 7) suggest that they found the videos gave information in a more understandable form than the corresponding text, although they generally used both.

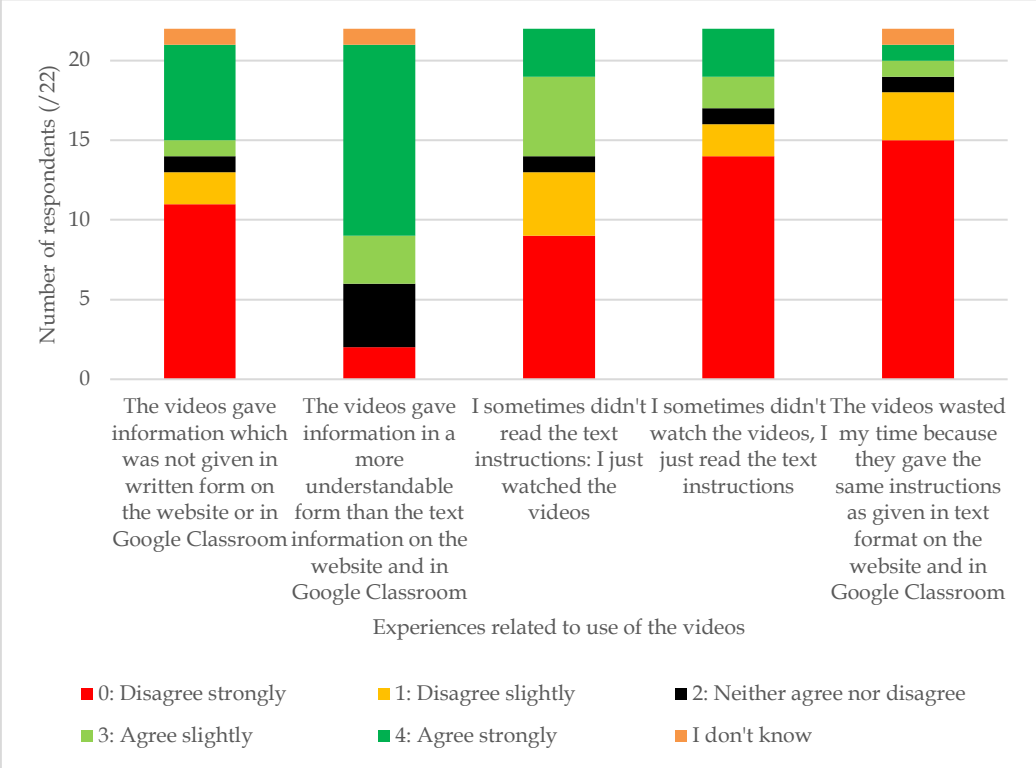


Figure 7: Experiences related to the use of the videos (n=22)

The qualitative findings regarding participants' perceptions of the videos' roles in their engagement correspond to those derived from the Likert responses (Figure 8). General positive perceptions were indicated for almost all items ("It made it come alive", "They are a source of information, and they enabled me to be independent and confident in using technology in teaching"). In one area, however, perceptions were not positive. This was the perception that the videos were irrelevant to interaction with other students ("I do not think the movies themselves contributed to getting to know others and engaging on discussion forums").

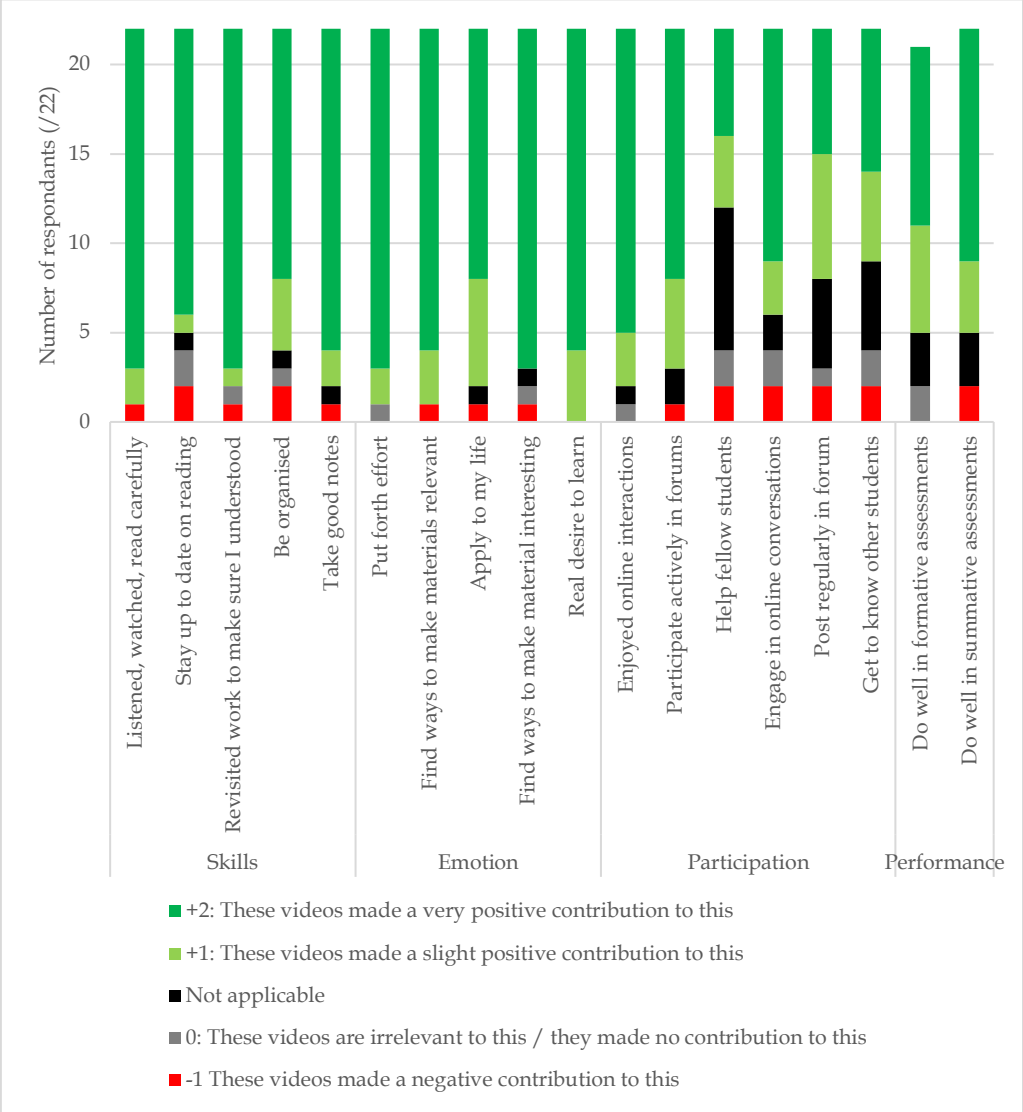


Figure 8: Experiences related to the use of the videos regarding their contribution to engagement in the course (n=22)

Table 5 provides a more comprehensive summary of the qualitative analysis, consistent with the quantitative findings that support the value of the videos in promoting clarity and engagement.

Table 5: Analysis of the open responses regarding completing participants' experiences engaging with the videos and the value they added (n=22)

Category	Count	Example
The videos improved understanding relative to the text	10	I loved the movies because sometimes it is easier to understand something when someone says it or shows you because part of these movies showed you what to do on your computer
The videos introduced and gave an overview of topics and expectations	6	• The movies gave me an overview, as well as detail to what was expected of me. • The movies explained what should happen very well. The text resources was very helpful to confirm what should be done or used a quick recap of the movies.
The videos were well presented	4	I think the Presenter did a fantastic job, everything was clear and focused and really added understanding of the module.
The videos were attention-grabbing and enjoyable	2	The attention was captivated and the fact that the text can appear on the left or right of the presenter. The zooming in and out of text was great... Attention grabber.
Other	2	The movies I watched showed me many applications to start and try out.

5. Discussion

The purpose of this section is to answer the main research question: What value do orientation videos add to online teacher professional development short courses designed according to project-based learning principles? This is answered through an assertion:

> *Assertion: Orientation videos enhance student engagement within online project-based learning teacher professional development short courses, particularly through improving instruction clarity relative to text. Orientation videos do not affect retention.*

The video example given in Table 2 includes generic announcements (i.e., the structure and expectations of the course), demonstrations of technical instructions, and instructional highlights. These are considered a unique category of video outside of Lowenthal's (2022) three (announcement, instruction and feedback). The term orientation videos is proposed. The participants' active and clearly effortful engagement, including rewatching selected sections of the orientation videos, possibly further justifies distinguishing these types of videos from Lowenthal's (2022) announcement category. This is because Lowenthal found that students considered announcement videos redundant, preferring to read equivalent written announcements. The participants in this study, in contrast, found that these orientation videos contributed considerably to their

active engagement in the short course, with the videos being clearer than the corresponding written text.

Enhanced clarity results from reducing extrinsic and intrinsic cognitive load through reducing irrelevant information and enhancing the accessibility with which essential information is portrayed, respectively (Mayer, 2022). Reducing extrinsic and intrinsic cognitive load frees up working memory for generative processing, evidenced by active engagement that results in deep learning (Fiorella & Mayer, 2021). The contribution of this added clarity to participants' learning corresponds to Meyer et al.'s (2023) findings that clarity and structure are critical components for teacher satisfaction in, and changed professional practices from, online TPD.

It is possible that clarity provided by orientation videos is particularly needed in an online PjBL short course, given its relative complexity and associated intrinsic and extrinsic cognitive load (Pan et al., 2024). The high degree of authenticity, voice, and choice in PjBL adds cognitive load. Furthermore, participants must continually consider their current learning in the context of the culminating product, self-reflecting and refining this incrementally developed project at all points in the process (Larmer et al., 2015).

Contrary contextual explanations are, however, possible for this study's finding of the enhanced clarity that the participants experienced from these orientation videos. Firstly, since the participants were largely from more communal cultures, the use of biologically primary knowledge, such as spoken language, facial expressions and body language, may be more necessary for leveraging the biologically secondary knowledge conveyed in these videos (Kirschner et al., 2018) than would be the case for participants from more individualistic cultures.

Secondly, the participants had relatively low computer literacy skills. A visual demonstration of technical procedures (e.g., navigating a website or locating the submit button in Google Classroom) provides clearer information than an equivalent list of written instructions for a person with low computer literacy (Kirschner et al., 2018). This is the case even though the reverse is likely true for someone of higher computer literacy skills (Kirschner et al., 2018), a phenomenon called the expert reversal effect (Kalyuga et al., 2009).

Further research would therefore be needed to determine whether participants from the developed world, such as those in Lowenthal's (2022) study, would also benefit from orientation videos integrated into an online PjBL short course. Additionally, the value of orientation videos in other online TPD settings could be researched. Finally, the finding that the orientation videos did not reduce dropout is unsurprising. Firstly, it appears that circumstances outside the design features of the short course were the primary factors that resulted in dropout. Such factors are estimated to account for 90% of dropouts in online courses in developed world contexts (Greenland & Moore, 2022), with the more challenging conditions for TPD in the developing world (Popova et al., 2022) likely to raise this value. Secondly, the participants reported that the orientation videos were

irrelevant to social interaction, which is the course design dimension generally considered influential in retention (Belt & Lowenthal, 2023).

6. Conclusion

This study examines the potential of orientation videos to enhance participant engagement and retention in asynchronous online project-based learning (PjBL) teacher professional development (TPD) short courses. The term 'orientation videos' is proposed for videos that combine announcements, structural overviews, technical support, and instructional cues. The findings suggest that relative to equivalent text, orientation videos significantly improved clarity and reduced the extrinsic and intrinsic cognitive load that participants experienced.

The resulting cognitive load management facilitated participants' generative processing through active engagement in all the categories measured except social participation. Further research could investigate the efficacy and feasibility of supplementing asynchronous orientation videos with synchronous video sessions to enhance social participation and engagement, and whether this approach may improve participant retention. However, the videos' lack of impact on retention did not appear to indicate limited efficacy of the videos. Instead, participants who dropped out of the TPD generally attributed their dropping out to external and social factors beyond the control of the TPD's design.

Orientation videos may be a valuable design feature for complex online learning environments, particularly when learners encounter cognitive or technical barriers. Future research should investigate whether these benefits are generalisable to other online TPD and other PjBL contexts. As online TPD continues to expand globally, the strategic use of orientation videos may offer a low-cost, scalable means of supporting learner engagement, if not retention, across diverse educational contexts. This study suggests that orientation videos could enhance the feasible and effective implementation of powerful pedagogies such as PjBL in online TPD.

7. Conflict of Interest

The author has no conflicts of interest to declare.

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