# Judging a Video by its Cover: Do Video Style, Length, and Format Affect Students' Willingness to Watch an Instructional Video?

Daniella Liendo Romero

Educational Sciences Master's Thesis

Student number: 7017278

First assessor: Vincent Hoogerheide

Second assessor: Eva Janssen

Word count: 7412

Date: 26/06/2022

## Abstract

Increasingly, university students are watching publicly available videos to complement or replace compulsory course materials. However, the factors that lead students to select one instructional video over another are still unknown. This study investigated the importance of three design factors that could affect students' willingness to watch an instructional video: video style, length, and format. Video style refers to the presentation format, such as the presence/absence of an instructor and layout of the video. Video length consists of the duration, while format indicates whether the video is presented as a whole or divided into smaller chunks. One hundred one students participated in the study, choosing 20 out of 80 video thumbnails varying in the above variables, and answering questions to explain their reasoning. The analysis showed a significant medium effect for video style, favoring Khan-style. The main cited reasons were that the presence of an instructor is distracting, it is suitable for certain topics, and visuals enhance comprehension. As for video length, no statistically significant effects were found regarding a video being 6 or 10 minutes long. A small significant effect was found for video format, favoring not-segmented videos. These were preferred because of their suitability for certain topics, a lack of need to divide initially short videos, and the practicality of having the information in one place. Based on the findings, it is advisable to create Khan-style videos and not divide them if they are already short.


*Keywords:* student preferences, instructional videos, video length, video style, video format

**Judging a Video by its Cover: Do Video Style, Length, and Format Affect Students' Willingness to Watch an Instructional Video?**

The appearance of Web 2.0 marked the beginning of user-generated content available on the internet. Since then, platforms such as YouTube have increasingly hosted entertainment and instructional videos. The latter pursues the objective of helping people learn targeted material and is widely used in education and training in both formal and informal settings (De Koning et al., 2018; Fiorella & Mayer, 2018). In Higher Education, students use public domain instructional videos to complement or even replace (video) lectures. For instance, in a study by Pettit and McCoy (2017), students reported being less likely to watch an instructor-created video if an outside resource was available.

Research has shown that instructor-created and curated videos can increase students' engagement and retention (Buzzetto-More, 2015). However, when faced with open platforms such as YouTube or Khan Academy, learners must select their own videos. In this regard, the factors that affect students' willingness to choose one video over another are still unknown. While there are scarce studies investigating the popularity of instructional videos and students' preferences (e.g., Shoufan & Mohamed, 2017; Ten Hove & Van der Meij, 2015), most recent empirical research has focused on the characteristics of effective instructional videos (e.g., Hoogerheide et al., 2016; Richter et al., 2018).

Based on different theories, such as the Cognitive Theory of Multimedia Learning, researchers have outlined the characteristics of instructional videos that increase learning outcomes and motivation (De Koning et al., 2018). Some examples of well-documented design features that yield significant results are breaking a lesson into self-paced segments (Andrade et al., 2015; Fiorella & Mayer, 2018), signaling important information within a video (Mutlu-Bayraktar et al., 2019; Richter et al., 2018) and using narration instead of on-screen text (Chen & Yen, 2019). Nevertheless, including these attributes does not guarantee

that students will select the videos, engage with them, or maintain attention (Choe et al., 2019; Ketsman et al., 2018; Kizilcec et al., 2014). This situation leads to a dilemma, as phrased by Brame (2016): "if students do not watch [the] videos, they cannot learn from them."

Thus, the study of students' willingness to choose an instructional video complements the guidelines on video effectiveness. For teachers and designers, the findings could be considered to increase the likelihood of students studying from the videos they create and curate. In settings like the flipped classroom, where one of the main concerns is whether students will watch the pre-class videos (Gouia & Gunn, 2016), this line of research could provide helpful information. Additionally, it could open the door for educational interventions that teach students how to select valuable learning materials based on essential characteristics for learning and motivation.

Based on the problem described above, the current study aims to explore the characteristics of an instructional video that increase Higher Education students' willingness to select it. Specifically, it will be assessed whether the video's style, length, and format affect the likelihood of students' selecting the material.

**Theoretical Framework**

Even though past research has not focused on the factors that affect students' willingness to select an instructional video, two related lines of research have been explored. First, researchers have assessed students' satisfaction, preferences, and engagement with video lectures. Second, the popularity of publicly available videos has been evaluated. These studies focus on the perception of students after watching instructional videos. Therefore, their results could shed light on the factors that students consider before selecting an instructional video to learn from.

One exemplar study from the first line of research gathered student feedback about the factors deemed essential or non-essential in video lectures (Pettit & McCoy, 2017). Students regarded clear explanations, the ability to speed up, organization, and concise content as essential features. On the other hand, they identified music, objects moving on-screen, tables of contents, and suggested readings as non-helpful characteristics.

Similarly, Choe et al. (2019) conducted an empirical study comparing student satisfaction levels yielded by eight lecture-style videos. Students were asked to watch, rate, and comment on each video style. All the videos complied with Mayer's multimedia principles but differed in how the information was presented (e.g., using a learning glass or slides, classic recording of a classroom lecture). According to the results, video styles regarded as personal, engaging, and evoking positive affective responses were rated higher than those considered impersonal and unfamiliar.

Other self-reporting studies have found that satisfaction with video lectures can differ according to course year and the measurement time (i.e., during or after the examinations) (Chester et al., 2011). In addition, the usefulness of the video might also play a role, as students state a preference for demonstrations that could not be performed in the classroom, applied theory, animated exemplifications, and alternative explanations of challenging concepts (Alpert & Hodkinson, 2019).

The second line of research has been explored less frequently with methods such as analyzing the number of likes of educational videos on YouTube and their characteristics. Researchers have concluded that popular public domain videos share certain characteristics: higher resolution, faster speaking rate, more than one presentation style (i.e., using slides, demonstration), a native English speaker as the instructor, less background noise, more background music, and more frequent presence of static pictures (Shoufan & Mohamed, 2017; Ten Hove & Van der Meij, 2015).

To summarize, past research on satisfaction and preferences of instructional videos has focused on two categories of videos: instructor-created video lectures and public domain videos. Several variables have been related to the increase in student satisfaction, such as video style, length, quality, language, music, usefulness, and the presence of pictures or music (i.e., Alpert & Hodkinson, 2018; Choe et al., 2019; Gouia & Gunn, 2016). However, the body of research has pointed chiefly toward the first two factors. In the following paragraphs, the variables "video style" and "video length" will be defined and described. The variable "video format" has also been included due to its theoretical relevance.

## Video Style

Video or production style refers to the format in which the information is presented in an instructional video. The variation of video style has been found to impact several learning-related outcomes, such as student recall, satisfaction with the course and the instructor, perceived learning, and enjoyment (Poquet et al., 2018). Due to its relevance, different studies have identified pertinent video styles and compared their effectiveness, relation to satisfaction, and student preferences. Nonetheless, there is no clear taxonomy on the types of videos available. Table 1 summarizes the categories identified by three major studies on the topic.

**Table 1.**

*Proposed Taxonomies of Video Styles*

| | **Choe et al. (2019)** | **Chen and Wu (2015)** | **Guo et al. (2014)** | **Proposed name** |
|---|---|---|---|---|
| 1 | Classic Classroom | Lecture capture | Classroom Lecture | Classroom Lecture |
| 2 | Weatherman | Picture-in-Picture | | Picture-in-Picture |
| 3 | Learning Glass | | | Learning Glass |
| 4 | Pen Tablet | | Khan-Style | Khan-Style |

| | | | | |
|---|---|---|---|---|
| 5 | Talking Head | Voice over presentation | | Talking Head |
| 6 | Slides On/Off | | PowerPoint slide presentations | Slide Presentations |
| 7 | | | Talking Head | Instructor Head-Shot |

*Note*. From the Choe et al. (2019) study, only didactic videos were considered since non-didactic videos are used exclusively as supplemental material.

The first category, Classroom Lecture, refers to a recording of the instructor standing near a monitor displaying PowerPoint slides or a whiteboard. The instructor can interact with the material, unlike in the Picture-in-Picture category, where the image of the instructor and the slides are overlaid in post-production editing. The Learning Glass style consists of a glass that serves as a whiteboard. Because of the see-through quality of the glass, the instructor is still visible. Moreover, the Khan-style video style refers to using a digital tablet to create drawings with a voiceover. The following two styles are very similar: both show PowerPoint slides; nevertheless, the Talking head video shows a small video of the lecturer at the same time as the slides, while in the Slide Presentation, either the lecturer does not appear or appears not simultaneously with the slides. Finally, the Instructor Head-Shot style refers to a recording of the instructor giving a lecture while sitting at a desk.

According to surveys by Choe et al. (2019), Learning Glass was the highest-ranked style in terms of student satisfaction. The other video styles, namely Classroom Lecture, Picture-in-picture, Khan-style, Talking Head, and Style Presentation, did not differ significantly. When measuring sustained attention, Chen and Wu (2015) did find differences between Talking-Head, Classroom Lecture, and Picture-in-picture styles. In this study, Talking Head showed the highest mean for sustained attention. Finally, Guo et al. (2014) also found differences between the assessed video styles' engagement levels. Their findings suggest that informal Instructor Head-Shot and Khan-style videos are more engaging than

Classroom Lecture and Slide Presentation styles. While these studies differ in certain aspects, it is essential to note that most styles that show higher satisfaction scores show the instructor's face. In the report of students, this video feature is perceived as more educational (Kizilcec et al., 2014). Similarly, video producers consider that a human face provides a more "intimate and personal" feel (Guo et al., 2014).

This effect aligns with postulates of the Cognitive Theory of Multimedia Learning. Specifically, it relates to the Embodiment Principle, which states that people learn more deeply from multimedia when the instructor displays high embodiment, that is, when they use hand gestures, maintain eye contact, draw graphics by hand while talking, or manipulate objects from a first-person perspective (Mayer, 2020). Out of the seven styles of videos described above, six show embodiment characteristics. The outlier consists of the Khan style. Since it does not show an on-screen agent, the instructor's voice in sync with the drawing in the video is the only human-like element. According to the theory of Multimedia Learning, the effectiveness of Khan-style videos could be increased by showing the hand of the instructor while they draw. While two experiments have shown that this style might hurt learning (Fiorella & Mayer, 2016), they are still trendy among students (Pettit & McCoy, 2017).

**Video Length and Format**

Frequently, students report the length of a video as a factor that might lead them to choose not to view a video lecture (Pettit & McCoy, 2017; Sablić et al., 2021). Based on factors such as production costs, concision of the content, short attention spans, and engagement time, a general guideline for instructional videos advises reducing the length as much as possible (Brame, 2016). According to a study where 6.9 million MOOC video viewing episodes were analyzed, videos should be presented in segments of up to 6 minutes to maintain engagement (Guo et al., 2014). To further strengthen the argument, the authors

found that for MOOC videos longer than 9 minutes, students only watched the first half and hypothesized that shorter videos contain higher-quality instructional content because of the challenge implied in synthesizing complex topics.

On the other hand, studies that analyzed video lectures' viewings have shown that the preferred length could be as long as 60 minutes (Alpert & Hodkinson, 2019; Pettit & McCoy, 2017). The disparity between studies could be explained by stating that different intentions, expectations, and settings could lead to different video viewing patterns (Lagerstrom et al., 2015). For instance, watching a video as a supplementary resource could result in a different engagement time than watching the same video as a mandatory resource within a university course. Similarly, Geri et al. (2017) showed that the median engagement time could be increased to 10.81 minutes by adding interactivity to the videos. Considering the different conditions under which students interact with videos, Lagerstrom et al. (2015) recommend that a maximum video length should be 12-20 minutes. Another practical piece of advice is to divide the video into small chunks.

Dividing the video into small parts relates to the Segmentation Principle of the Cognitive Theory of Multimedia Learning. According to this principle, people learn better when a complex multimedia message is broken into smaller chunks that the learner can control (Mayer, 2020). Several experimental studies state the effectiveness of adequately segmented instructional videos (i.e., Mayer & Chandler, 2001; Sung & Mayer, 2013). However, how this relates to engagement, satisfaction and preferences has yet to be analyzed.

**Present Study**

The current study explores the extent to which video style, length, and format affect students' willingness to watch an instructional video. For each variable, two values were compared. First, concerning video style, a Khan-style video was compared to a Talking head style video. These were selected because of the low cost of production and technology

needed to create them, combined with their potential to yield high satisfaction results according to previous research (Choe et al., 2019; Guo et al., 2014). Second, regarding video length, the comparison was held between 6 and 10 minutes of video duration. These values were selected because several studies have pointed out that 6 minutes is the maximum engagement time with a video (i.e., Guo et al., 2014). However, other researchers consider the 6-minute rule a myth and argue that students prefer and endure videos of 10-12 minutes (Alpert & Hodkinson, 2019; Lagerstrom et al., 2015). Lastly, regarding video format, the values were determined as a not-segmented video compared to a video segmented into three chunks. The reasoning behind it was practical since it suited the length of the videos.

Additionally, the study explored how video style, length, and format interact with each other and the reasons behind students' selections. To achieve the desired outcomes, mixed methods were used: a combination of quantitative and qualitative designs (Ivankova et al., 2006). The quantitative portion consisted of a quasi-experimental design with 20 series of forced-choice tasks. In forced-choice tasks, participants are presented with stimuli that vary in one dimension and are required to choose one of them based on a given instruction (Ratcliff et al., 2018). According to Deneve (2009), this is an adequate method to study decision-making processes. On the other hand, the qualitative portion included six open-ended questions to explore the reasoning behind the choices made during the quantitative section.

# Method

## Participants

The number of participants was determined by an a-priori power analysis conducted with the G*Power Statistical Power Analysis Software (Faul et al., 2007). When inputting the desired power of 0.8, a small effect size (0.3) according to Cohen (1988), and one degree of freedom, the required sample size was set to 88.

Convenience sampling was used to recruit participants. The sample consisted of 101 students from Peruvian and Dutch universities. The post hoc power analysis conducted with the same parameters as the a-priori analysis showed a statistical power of .85, which exceeds the current practice of running studies with 80% power (Brysbaert, 2019).

## Ethical Considerations

The Faculty's Social and Behavioral Sciences' Ethics Review Committee approaved the study. The ethical standards included providing participants with an information letter and informed consent form. Both documents emphasized that participation was voluntary and that withdrawal was possible at any point of the data collection.

## Demographic Information

Students who agreed to participate in the study provided the following demographic information: age, gender, study program, course level, and course year. The mean age was 24.37 (*SD* = 5.36). 45.60% of the sample identified themselves as male, 51.50% as female, and 3% as non-binary. Regarding their course level, 61.40% were enrolled in an undergraduate program, while 32.70% were enrolled in a postgraduate program. Lastly, the course year distribution was as follows: 38.60% were in their first year, 22.80% in their second year, 23.80 in their third year, 4% in their fourth, fifth, and sixth year, and 4% in another year.

## Materials

All materials were presented using the survey platform Qualtrics (www.qualtrics.com).

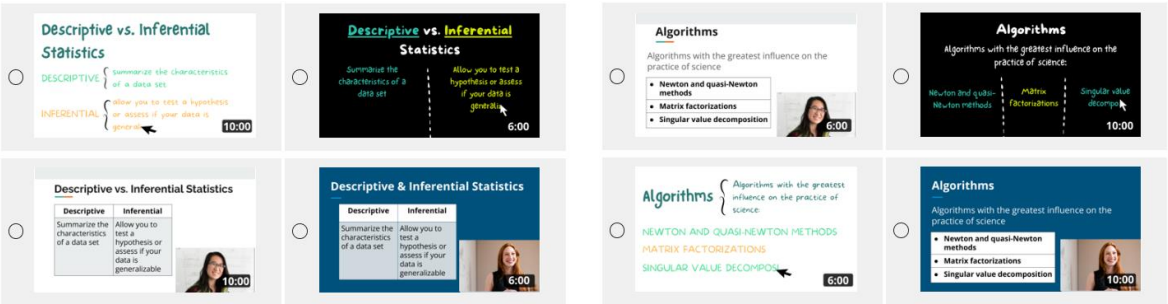
## Video Thumbnails

In total, 80 video thumbnails were created for the study. The thumbnails were divided into five domains with two topics per domain: Language (Common Phrases in French, Greetings in German), Business (External Debt, Tax Regulations), Social Sciences (The Byzantine Empire, The Five Major World Religions), Natural Sciences (Types of Carbohydrates, Genetic Mutations), and Mathematics and Statistics (Descriptive vs. Inferential Statistics, Algorithms). The common feature of the topics is that they account for declarative knowledge, facts and information that can be recollected by memory (Anderson, 1976).

For each topic, eight videos were created to represent all the possible combinations of style (Khan style or Talking head), length (6 minutes or 10 minutes), and format (segmented or not segmented). To control for specific design features of the thumbnails, such as the physical appearance of the instructor and background image, the second topic from each domain served as a counterbalance (see Figure 1).

**Figure 1**

*Side-by-Side View of Two Topics Within the Same Domain*



**Cover Story**

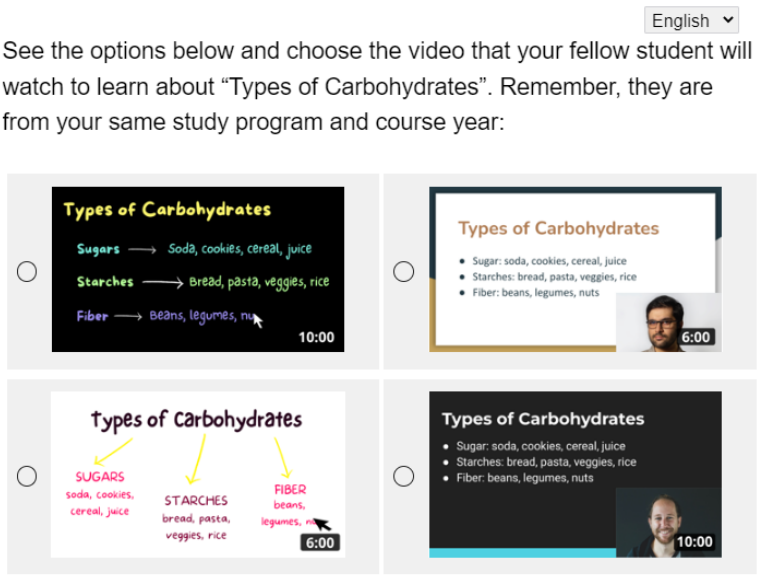
The cover story aimed to ensure that participants selected the videos as they would in a real-life situation, increasing the study's validity. The cover story read: *"Read the following instructions carefully: According to the information you provided on the previous page, we will pair you with a fellow student who matches your study program and year. In the next sections, we will ask you to choose videos that this student will need to watch and study to pass an exam. We will provide options, and you will need to choose one of them.".*

**Forced-choice Tasks**

Participants were presented with two forced-choice tasks per topic. The first task aimed to explore how the willingness to select an instructional video is affected by video length and style. Hence, the choice consisted of selecting one of four videos that accounted for all the possible combinations between video length and style (see Figure 2).

**Figure 2**

*First Task for Topic 7 "Types of Carbohydrates"*

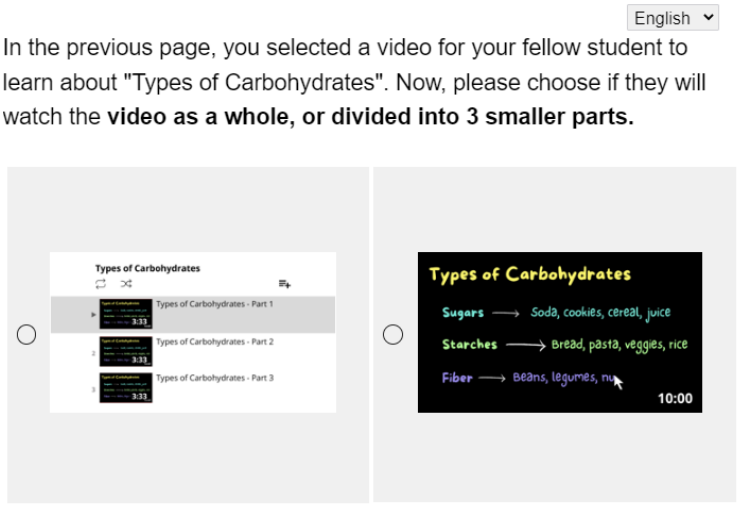



As a complement, the second choice aimed to explore how the willingness to select an instructional video is affected by its format. In that sense, the second choice involved

choosing between the video selected in the first task, which was not segmented, and a playlist with three shorter and segmented videos (see Figure 3).

**Figure 3**

*Second Task for Topic 7 "Types of Carbohydrates"*




***Open-ended Questions***

After completing the forced-choice tasks for all the topics, participants were presented with a short review of their choices and six open-ended questions. Each question aimed to explore the reasoning behind their preference for a particular style, length, or format in one or more opportunities (e.g., *"If you selected a video with a visible instructor one or more times, can you explain in detail why?"*).

**Procedure**

The study was conducted in one session. Participants received a link to complete the questionnaire in Qualtrics. The first three sections of the questionnaire included the information letter, informed consent form, and demographic information form. Subsequently, they were presented with the directions and the cover story. To ensure that they read them carefully, a time requirement was set where participants needed to spend at least 20 seconds on the page before moving on to the next section. Immediately after the time passed, they

were presented with the forced-choice tasks in random order. Then, participants saw an overview of their answers and answered the six open-ended questions. Lastly, a disclosure page was shown where the cover story was revealed, along with a brief explanation of its importance. At this stage, participants could withdraw their data if desired.

## Data Analysis

The data were analyzed using different methods. In the case of quantitative data, it was analyzed both manually and using the IBM SPSS Statistics Software. The main statistical tests used were chi-square goodness of fit tests and Phi Coefficient measures. On the other hand, qualitative data were analyzed using content analysis.

### *Chi-square Goodness of Fit Tests*

The chi-square goodness of fit test explores the presence of a statistically significant difference between an observed set of frequencies and an expected set of frequencies (Siegel & Castellan, 1989). In this case, the observed set of frequencies consisted of the number of times each value (e.g., Khan style, Talking head) was selected. Meanwhile, the expected set of frequencies consisted of the distribution attributable to chance, that is, a 50%-50% proportion.

To compute the frequencies, the choices for each of the ten topics were coded as a dichotomous variable (i.e., 6-minute/10-minute, Talking head/Khan style, Segmented/Not-Segmented). Next, the data were analyzed on a sample level. The frequency of times that each value was selected across all topics and participants was calculated. In that sense, the possible scores ranged from 0-1010. For each variable, these frequencies were compared to the expected distribution that would occur by chance (505-505). The confidence level was set for all cases at 95%, and the calculation was performed manually.

The chi-square goodness of fit test was deemed appropriate because of the compliance of its two assumptions (Siegel & Castellan, 1989). First, observations need to be independent,

meaning that the occurrence of one observation does not depend on the occurrence of another. In this case, the likelihood that a participant selected a value (e.g., Khan style) was not dependent on the selection of another value (e.g., 6-minute) nor on the selection of another participant. Hence, the first assumption was met. In addition, the second assumption states that each expected frequency must be higher than 5 for variables with two categories. Since the expected frequency was 505, the second assumption was also met.

After calculating the chi-square goodness of fit tests, the effect size was measured using Cohen's *w*. According to the author's criteria, a *w* value of 0.10 indicates a small effect size, 0.30 indicates a medium effect size, and 0.50 indicates a large effect size (Cohen, 1988).

### *Phi Coefficient Measures*

The phi coefficient measures association between two binary variables (Yule, 1912). Hence, it was used to look for correlations between the three study variables (video length - video style, video length - video format, video style - video format). The test is appropriate for use when two assumptions are met: both variables are dichotomous, and at least one is nominal. In this case, the three variables had been previously coded as dichotomous. Therefore, they were both nominal and dichotomous.

After computing the phi coefficient measures, the effect size was determined according to the following criteria: a $\Phi$ value of 0.10 indicates a small effect size, 0.30 indicates a medium effect size, and 0.50 indicates a large effect size (Cohen, 1988).

### *Content Analysis*

The responses from the open-ended questions were qualitatively examined to analyze further the variables that yielded significant results in the chi-square goodness of fit tests. The selected research method was content analysis since it helps identify patterns across qualitative data, usually leading to frequency counts of recurring themes (Ryan & Bernard, 2000).

The first step towards conducting the content analysis was to skim through the responses to identify recurrent themes. Next, each response was broken down into up to two manageable codes. For instance, if the student answered: "I feel like the person being visible might distract from the video content itself," the assigned code was "instructor distracts." Subsequently, similar codes were grouped into categories, such as "Visible instructors distract or take up screen space." Finally, the number of times each category was present was counted, and the percentage was calculated based on the total number of responses.

### *Chi-Square Goodness of Fit Tests by Topic*

The content analysis results led to the addition of the chi-square goodness of fit test to analyze the variables segmented by topic. The three variables were tested independently with the expected proportion set at the chance level. Lastly, the effect size was calculated using Cohen's criteria: 0.1 indicates a small effect size, 0.3 indicates a medium effect size, and 0.5 indicates a large effect size (Cohen, 1988).

## Results

The main ad-hoc research question aimed to determine how video style, length, and format affect students' willingness to select an instructional video. Additionally, the study sought to answer how video style, length, and format relate to each other and the reasons behind students' preferences. Based on the analysis results, an additional post-hoc research question was posed: How do the willingness to choose an instructional video and its relation to style, length, and format vary by domain? In the following paragraphs, the findings regarding these questions are presented.

### Video Style

A chi-square goodness of fit test was conducted to assess whether the proportion of choices of Khan style and Talking head videos differed from the hypothesized distribution (50%-50%). The analysis showed that the proportions were significantly different from the expected distribution attributable to chance, $X^2(1, N = 1010) = 105.22$, $p < .001$. The calculation of Cohen's *w* revealed a medium effect size (0.32) (Cohen, 1988). Additionally, the proportion of students who selected a Khan-style video was higher than that of students who selected a Talking head video.

**Table 2.**

*Distribution of Observed and Expected Frequencies for Video Style*

| Values | Observed | Expected |
|---|---|---|
| Khan Style | 668 | 505 |
| Talking Head | 342 | 505 |

*Note.* Observed frequencies reflect the times each value was selected across all topics ($N$ = 10) and participants ($N$ = 101) with a maximum score of 1010. Expected frequencies account for the hypothesized proportion attributable to chance (50%-50%).

### Video Length

Subsequently, a chi-square goodness of fit test was performed to determine whether the proportion of choices of 6-minute and 10-minute instructional videos was significantly different from the proportion attributable to chance. The results showed that the observed distribution was not significantly different from the expected distribution, $X^2(1, N = 1010) = .67$, $p = .413$. Cohen's *w* calculation also revealed a negligible effect size (0.026). In other words, the frequency distribution of the variable "video length" was not significantly different from a distribution attributable to chance. Therefore, it is not possible to state that video length, specifically a video lasting 6 or 10 minutes, affects students' willingness to select an instructional video.

**Table 3.**

*Distribution of Observed and Expected Frequencies for Video Length*

| Values | Observed | Expected |
|---|---|---|
| 6-minute | 492 | 505 |
| 10-minute | 518 | 505 |

*Note.* Observed frequencies reflect the times each value was selected across all topics ($N = 10$) and participants ($N = 101$) with a maximum score of 1010. Expected frequencies account for the hypothesized proportion attributable to chance (50%-50%).

**Video Format**

A chi-square goodness of fit test was performed to determine whether the proportion of choices of segmented and not segmented instructional videos was significantly different from the expected distribution. The results showed that the proportions of the two values significantly differed from the distribution attributable to chance, $X^2(1, N = 1010) = 44.50$, $p < .001$. A small effect size was detected (0.21) according to Cohen's *w* criteria (1988). In addition, the proportion of students who selected a not-segmented video was higher than that of students who selected a segmented video.

**Table 4.**

*Distribution of Observed and Expected Frequencies for Video Format*

| Values | Observed | Expected |
|---|---|---|
| Segmented | 399 | 505 |
| Not-segmented | 611 | 505 |

*Note.* Observed frequencies reflect the times each value was selected across all topics ($N$ = 10) and participants ($N$ = 101) with a maximum score of 1010. Expected frequencies account for the hypothesized proportion attributable to chance (50%-50%).

**Association Between Video Style, Length, and Format**

Three Phi coefficient measures were conducted to explore the association between the study variables. When analyzing the relationship between video length and video style, the correlation was not statistically significant, and the effect size was negligible. The same result was found regarding the relationship between video style and video format. On the other hand, the correlation between video length and video format was statistically significant and showed a small effect size. The relationship was positive, meaning that the choice of not-segmented videos is associated with a 6-minute video length, while the choice of segmented videos is associated with a 10-minute video length.

**Table 5.**

*Phi Coefficient Values for the Association Between Video Style, Length, and Format*

| Measure | Length*Style | Style*Format | Length*Format |
|---|---|---|---|
| Phi | .007 | .047 | .111* |

*$p < 0.01$

**Reasons Behind the Selections**

The content analysis of students' responses allowed to identify the main reasons behind their choices. The three most cited themes for each statistically significant variable are summarized below.

***Video Style***

When asked to explain why they chose a Khan-style video over a Talking head style video, the three more cited themes were the following: visible instructors distract or take up screen space, Khan style is better suited for some topics, and the use of visuals facilitates understanding.

**Visible Instructors Distract or Take up Screen Space.** 21% of participants reported that their preference for Khan-style videos was due to the absence of an instructor since it can distract them from the content or use screen space that could otherwise be used more efficiently. For instance, a student stated: "It is not always important to have a visible instructor as it can sometimes be distracting or take up valuable screen space from the subject you are learning about."

**Khan Style is Better Suited for Some Topics.** 18% of students indicated that they selected Khan-style videos because their characteristics fit a particular topic better. For example, one student reported: "I find it easier to learn about history by looking at maps, and the same goes for chemistry schemes," while another stated: "Some topics require a more visual approach without an instructor, like math."

**The Use of Visuals Facilitates Understanding.** 18% of students reported that their preference for Khan-style videos was based on the use of visuals, such as pictures, animations, diagrams, annotations, and arrows. In their perception, these factors contributed to a better understanding of the content. For instance, a student reported: "It really makes the difference when there are animations explaining the process helping me to imagine what I am

learning," or in the words of another student: "When the video has a visual representation of the information, it is easier to understand."

### *Video Format*

When asked to explain the reasoning behind their preference for Not-segmented over Segmented videos, students reported three main themes: not-segmented videos are better suited for some topics when videos are short, it is preferable not to segment them, and it is easier to have all the information in one place and time.

**Not-Segmented Videos Are Better Suited for Some Topics.** 24% of students stated that they selected a not-segmented video because it specifically suited the topic they were trying to learn. For example, one answer read: “For some topics, I think it makes more sense to watch it all at one time. Maybe because it is more of a cohesive topic that seems weird to split up”.

**When Videos Are Short, it is Preferable Not to Segment Them.** 22% of students mentioned that the original videos were already short. In that case, they did not find it necessary to segment them into smaller chunks. For instance, a student reported:

> "Most lectures (...) are around an hour or longer. Then it would be nice to split the videos into smaller segments. However, anything smaller than maybe 10-15 minutes is too short, and most ideas link together better when talked about side by side."

**It is Easier to Have All the Information in One Place and Time.** 22% of students stated that it is more practical to have all the content in one video and consume it in one sitting. Some of the attributions were that it facilitates recapping and studying. For instance, a student reported: "I find it easier to have all [the] information in one place. Having to watch multiple videos for information is not convenient".

### Variability by Domain

The content analysis showed that a particular style and format could be perceived as more suitable for certain topics but not others. To test this statement, three chi-square goodness of fit tests were performed. The aim was to explore whether the proportions of participants who selected a particular value differed by knowledge domain.

Regarding video style, the observed proportions significantly differed from the expected proportions in every domain, except for Language. Additionally, the descriptive data showed higher scores for Khan style in every domain. In the case of video length, the observed proportions did not significantly differ from the expected proportions in any case. Lastly, the observed proportions concerning video format differed significantly from the expected proportion attributable to chance in every domain. The descriptive data showed that not-segmented videos were preferred in every domain.

**Table 6.**

*Chi-square Coefficients Divided by Domains*

| Domain | Video Style | Video Length | Video Format |
|---|---|---|---|
| Language | .970 | 3.347 | 12.376* |
| Business | 38.337* | .020 | 5.069* |
| Social Sciences | 28.594* | .713 | 15.525* |
| Natural Sciences | 41.901* | .970 | 8.733* |
| Mathematics & Statistics | 15.525* | .000 | 5.069* |

* $p < 0.05$

## Discussion

The study's findings showed that video style and format affected students' willingness to choose an instructional video, while video length did not. However, a small correlation was found between video length and format. The general analysis results held true when segmenting the data by domain. Concerning video style, significant differences that favored Khan-style videos were found in every domain except for Language. Regarding video format, significant differences favoring not-segmented videos were found in all the domains. Lastly, the lack of significant differences concerning video length was sustained across all domains.

### Preferences for Video Style

As was stated above, video style affected students' willingness to watch an instructional video, with Khan style being preferred more frequently. The most cited reason for preferring a Khan-style video over a Talking head video was the physical presence of an instructor. Students stated that it distracts them from the content of the video and that it occupies screen space that could be better utilized. Another reported advantage of Khan-style videos is the use of visuals since it facilitates a better understanding of the topic. Some of the visual elements included the layout of the text, colors, structure (e.g., two columns), diagrams, animations, and annotations.

The third most relevant reason behind the preference for Khan-style videos was their suitability for certain topics. One quotation from a student provides insight into the matter: "I did it [not choosing a Khan style video] just in one case because in the case of languages I like to see a person teaching. For me, it is essential to observe the way that they express themselves". A significant number of participants indicated similar statements, suggesting that they choose the video style depending on the topic or domain. However, this was not supported by the statistical analysis. When the choices were segmented by domain, Khan

style was still preferred in every domain except for Language, where no significant differences were found.

The general findings are in line with past studies suggesting the potential of Khan-style videos to yield high scores for satisfaction and engagement (i.e., Dart, 2019; Guo et al., 2014). Specifically, the explanation regarding the instructor's presence being perceived as a distractor from the content is widely supported by past research. Eye-tracking experiments have shown that the instructor's image attracts significant visual attention, leading to students splitting their attention between the instructor and the content (Kizilcec et al., 2014; Wang & Antonenko, 2017). The split-attention effect is likely to hinder comprehension and learning. Hence, it is reasonable to believe that students choose Khan-style videos to increase the likelihood of maintaining focus and understanding the content.

However, a body of research also supports the instructor's presence as a positive influence on perceived learning and satisfaction. This effect is often attributed to a human face being associated with a more intimate and personal feel (Brame, 2016; Guo et al., 2014). Nevertheless, a human face is not the only social cue capable of yielding this effect. Other aspects present in Khan-style videos, such as the human voice of the instructor, the conversational tone, and the hand movements, can create the feeling of a social partnership between the instructor and the learner (Mayer, 2020). The sense of partnership may affect how students approach the material, leading them to add increased effort to understand the contents. In that sense, Khan-style videos are not necessarily at a disadvantage concerning providing social cues and a personal feel.

**Preferences for Video Length and Format**

This study showed that an instructional video being 6 or 10 minutes long did not affect students' willingness to watch it. On the contrary, the format affected the willingness to watch the video, with not-segmented videos being preferred more frequently. One of the

main reasons behind this preference was the practicality of having all the information in one place, as it poses benefits for studying or rewatching the video. Another reason was that students considered the original videos to be short in length; therefore, they did not feel the need to divide them into shorter parts. This finding suggested that video format and length could be related. The statistical analysis supported this hypothesis, finding an association between selecting a 10-minute video and a segmented format, and selecting a 6-minute video and a not-segmented format. Among other relevant themes that surged, students reported that not-segmented videos were better suited for some topics. However, the statistical analysis did not support this statement: not-segmented videos were preferred regardless of the domain.

The lack of effect of video length on students' willingness to watch an instructional video has been found in at least one previous study (Shoufan and Mohamed, 2017). However, most past research states that duration is one of the leading reasons why students choose (not) to watch a video (e.g., Boateng et al., 2016; Pettit & McCoy, 2017). This pattern has been found consistently, although, the average preferred length has significantly varied between studies and participants within the same study (Alpert & Hodkinson, 2019). In other words, what students consider to be a "long" or "short" video is highly subjective and attributable to different factors, such as the presence of interactivity (Geri et al., 2017) or the context in which the video is presented (i.e., online course, YouTube, classroom) (Lagerstrom et al., 2015). Therefore, the lack of statistically significant differences could be attributed to the high variability of students' preferences regarding this variable.

Additionally, it is possible that the selected values (6 and 10 minutes) were perceived as "short," and the difference in length was not enough to consistently choose one over the other. Some answers to the open-ended questions support this hypothesis. For instance, one student reported: "All these videos were already very short. Most lectures (...) are around an hour or longer. Then it would be nice to split the videos into smaller segments. Nevertheless,

anything smaller than maybe 10-15 minutes is too short". This statement also illustrates the potential relationship between video length and format. While not-segmented videos were preferred across all domains, it is possible that the choice was affected by the videos being similar in length and perceived as "short."

In consequence, a study design where multiple durations are proposed could shed light on the preference for video length and format. In the present study, the compared values were selected to stay within the limits of average sustained attention (12-15 minutes). However, it seems that comparing shorter videos with those with the duration of a canonical lecture (50-75 minutes) could help to clarify the issue. For example, Humphries and Clark (2021) compared the preference for videos lasting less than 5 minutes, 6-10 minutes, 11-20 minutes, and up to 60 minutes finding statistically significant differences.

In sum, these findings point out that there might be conditions under which a not-segmented video is preferred over a segmented one, such as when the videos are originally short. Additionally, given that rewatching a video has been identified as a common study practice in several fields (e.g., Ranga, 2017), the perceived practicality should be considered when investigating the preference for video length and format.

**Student Preferences and Video Effectiveness**

The current study was conducted to fill a research gap regarding students' preferences for instructional videos. One of the related theories that helped shape the study was the Cognitive Theory of Multimedia Learning (CTML). This theory outlines evidence-based characteristics of instructional videos that increase learning outcomes and motivation (De Koning et al., 2018). It was expected that students were aware of the effects of these characteristics and would select instructional videos accordingly.

On the one hand, the preference for Khan-style videos seems to be aligned with two principles: coherence and signaling. Respectively, these principles state that people learn

better when extraneous material is not included and when cues are added to direct the learner’s attention to the relevant information (Mayer, 2020). Students' responses suggested that they were aware of the effects of the coherence principle on their comprehension since they reported that the instructor's image distracts them from the content. Similarly, elements such as annotations, underlining words, the use of colors, and text layout to denote importance appeared to be valued by students since they enhance learning.

On the other hand, the preference for Khan-style videos could appear to contradict the embodiment principle. According to this principle, people learn more deeply when on-screen agents display human-like characteristics (Mayer, 2020). However, embodiment refers to more elements than the mere inclusion of a face. For instance, the human-like voice of the instructor, the handwriting, and the movements needed to create the annotations within a Khan-style video also represent examples of embodiment.

Lastly, the preference for not-segmented videos challenges the expectations drawn from the segmentation principle, which states that people learn more deeply when the material is broken into smaller, more digestible chunks (Mayer, 2020). It was expected that students preferred segmented videos due to their potential to enhance learning. Together with the study's limitations, this finding suggests that there could be conditions under which not-segmented videos are preferred.

**Limitations and Future Research**

It is possible to note certain limitations and directions for future research within the current study. First, the video length values (6 and 10 minutes) seemed too close to each other and perceived as "short," which could have affected students' choice of length and format. Therefore, for future studies, it is recommended to use a different study design that ideally compares more than two distinct values or ranges. Specifically, it would be desirable that at

least one value stays below the 6-minute threshold while another approaches the length of a traditional lecture (50-75 minutes).

Furthermore, the study's ecological validity could be enhanced. Even though it is an improvement from previous studies, which mainly focused on posteriorly gathering student feedback, the selections are still not occurring in a real-life setting. Hence, future research could assess students' preferences in an authentic setting, such as a semester-long Higher Education course. The videos created for the course could be designed by controlling style, length, and format. Subsequently, the views and median engagement times could be assessed.

Finally, the study found a discrepancy regarding the interaction between the knowledge domain of the video and the selection of a specific length, style, or format. Students reported that this influenced their selections; however, the statistical analysis did not support these statements. Future research could confirm whether a relationship exists between the preferred style, length, format, and the videos' domains. Other factors that exceeded the scope of the present study but would be valuable additions could be previous expertise, self-efficacy beliefs, and perceived difficulty of the topics.

**Practical Implications and Conclusion**

In closing, this study noted that video style and format affected students’ willingness to watch an instructional video. Based on the findings, it would be advisable that instructional video creators, including lecturers, record Khan-style videos more frequently than Talking head videos. In Higher Education settings, this would be a shift from the traditional practice that would likely require technical training for teachers. However, it could improve students' concentration and comprehension while maintaining a social partnership. In terms of video length, it is not possible to state practical advice since no significant effects were found for the variable in terms of 6 or 10 minutes. Nonetheless, the more frequent selection of non-segmented videos and the interaction between video length and format substantiates the

recommendation of presenting videos as a whole when the duration is equal to or shorter than 10 minutes.

Recognizing that following these guidelines is not possible in every case due to production costs, lack of technical skills, or specific characteristics of particular topics, an alternative could be to disclose the discrepancy to students. In other words, the educational institution could communicate why the material might not be attractive at first glance while still being effective for learning. Thus, potentially increasing the perceived value of the material and students' willingness to watch it.

This study contributes to the limited body of research investigating students' preferences and the factors that lead them to watch an instructional video. It provides insight into the characteristics that students consider when selecting a video and the reasons behind their choices. In that way, it sets the ground for confirmatory research and quantitative studies that could be based on these preliminary findings.

## References

Alpert, F., & Hodkinson, C. S. (2019). Video use in lecture classes: current practices, student perceptions, and preferences. *Education + Training*, *61*(1), 31–45. https://doi.org/10.1108/et-12-2017-0185

Anderson, J. R. (1976). *Language, memory, and thought.* Hillsdale, NJ: Erlbaum.

Andrade, J., Huang, W.-H. D., & Bohn, D. M. (2015). The impact of instructional design on college students' cognitive load and learning outcomes in a large food science and human nutrition course. *Journal of Food Science Education*, *14*(4), 127–135. https://doi.org/10.1111/1541-4329.12067

Boateng, R., Boateng, S. L., Awuah, R. B., Ansong, E., & Anderson, A. B. (2016). Videos in Learning in Higher Education: Assessing Perceptions and Attitudes of Students at the University of Ghana. *Smart Learning Environments*, *3*(1), 8. https://doi.org/10.1186/s40561-016-0031-5

Brame, C. J. (2016). Effective Educational Videos: Principles and Guidelines for Maximizing Student Learning from Video Content. *CBE—Life Sciences Education*, *15*(4), es6. https://doi.org/10.1187/cbe.16-03-0125

Brysbaert, M. (2019). How Many Participants Do We Have to Include in Properly Powered Experiments? A Tutorial of Power Analysis with Reference Tables. *Journal of Cognition*, *2*(1). https://doi.org/10.5334/joc.72

Buzzetto-More, N. (2015). Student Attitudes Towards The Integration Of YouTube In Online, Hybrid, And Web-Assisted Courses: An Examination. *Journal of Online Learning and Teaching*, *11*(1). 55-71

Chen, C. M., & Wu, C. H. (2015). Effects of different video lecture types on sustained attention, emotion, cognitive load, and learning performance. *Computers & Education*, *80*, 108–121. https://doi.org/10.1016/j.compedu.2014.08.015

Chen, C.-Y., & Yen, P.-R. (2019). Learner control, segmenting, and modality effects in animated demonstrations used as the before-class instructions in the flipped classroom. *Interactive Learning Environments*, *0*(0), 1–15. https://doi.org/10.1080/10494820.2019.1572627

Chester, A., Buntine, A., Kathryn, K., & Atkinson, L. (2011). Podcasting in Education: Student Attitudes, Behavior and Self-Efficacy. *Educational Technology & Society*, *14*(2), 236-247

Choe, R. C., Scuric, Z., Eshkol, E., Cruser, S., Arndt, A., Cox, R., Toma, S. P., Shapiro, C., Levis-Fitzgerald, M., Barnes, G., & Crosbie, R. H. (2019). Student Satisfaction and Learning Outcomes in Asynchronous Online Lecture Videos. *CBE—Life Sciences Education*, *18*(4), https://doi.org/10.1187/cbe.18-08-0171

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Dart, S. (2019). Khan-Style Video Engagement in Undergraduate Engineering: Influence of Video Duration, Content Type and Course. *Proceedings of the 31st Annual Conference of the Australasian Association for Engineering Education (AAEE 2020)*.

De Koning, B. B., Hoogerheide, V., & Boucheix, J.-M. (2018). Developments and trends in learning with instructional video. *Computers in Human Behavior*, *89*, 395–398. https://doi.org/10.1016/j.chb.2018.08.055

Deneve, S. (2009). Bayesian decision making in two-alternative forced choices. *Handbook of Reward and Decision Making*, 441–458. https://doi.org/10.1016/b978-0-12-374620-7.00021-2

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191.

Fiorella, L., & Mayer, R. E. (2016). Effects of observing the instructor draw diagrams on learning from multimedia messages. *Journal of Educational Psychology*, *108*(4), 528–546. https://doi.org/10.1037/edu0000065

Fiorella, L., & Mayer, R. E. (2018). What works and does not work with instructional video. *Computers in Human Behavior*, 89, 465–470. https://doi.org/10.1016/j.chb.2018.07.015

Geri, N., Winer, A., & Zaks, B. (2017). Challenging the six-minute myth of online video lectures: Can interactivity expand the attention span of learners? *Online Journal of Applied Knowledge Management*, *5*(1), 101–111. https://doi.org/10.36965/ojakm.2017.5(1)101-11

Gouia, R., & Gunn, C. (2016). Making mathematics meaningful for freshmen students: investigating students' preferences of pre-class videos. *Research and Practice in Technology Enhanced Learning*, *11*(1). https://doi.org/10.1186/s41039-015-0026-9

Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement. *Proceedings of the First ACM Conference on Learning @ Scale Conference*. https://doi.org/10.1145/2556325.2566239

Hoogerheide, V., Van Wermeskerken, M., Loyens, S. M. M., & Van Gog, T. (2016). Learning from video modeling examples: Content kept equal, adults are more effective models than peers. *Learning and Instruction*, *44*, 22–30.

Humphries, B., & Clark, D. (2021). An examination of student preference for traditional didactic or chunking teaching strategies in an online learning environment. *Research in Learning Technology, 29*. https://doi.org/10.25304/rlt.v29.2405

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods*, *18*(1), 3–20. https://doi.org/10.1177/1525822x05282260

Ketsman, O., Daher, T., & Colon, J. (2018). An investigation of effects of instructional videos in an undergraduate physics course. *E-Learning and Digital Media. 15*(16), 267-289. https://doi.org/10.1177/2042753018805594

Kizilcec, R. F., Papadopoulos, K., & Sritanyaratana, L. (2014). Showing face in video instruction. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. https://doi.org/10.1145/2556288.2557207

Lagerstrom, L., Johanes, P., & Ponsukcharoen, U. (2015). *The Myth of the Six-Minute Rule: Student Engagement with Online Videos* Paper presented at 2015 ASEE Annual Conference & Exposition, Seattle, Washington. doi:10.18260/p.24895

Mayer, R. (2020). *Multimedia Learning* (3rd ed.). Cambridge: Cambridge University Press. doi:10.1017/9781316941355

Mayer, R., & Chandler, P. (2001). When learning is just a click away: Does simple user interaction foster deeper understanding of multimedia messages. *Journal of Educational Psychology, 93,* 390-397. DOI: 10.1037//0022-0663.93.2.390

Mutlu-Bayraktar, D., Cosgun, V., & Altan, T. (2019). Cognitive load in multimedia learning environments: A systematic review. *Computers & Education, 141.* https://doi.org/10.1016/j.compedu.2019.103618

Pettit, R., & McCoy, L. (2017). A descriptive, cross-sectional study of medical student preferences for vodcast design, format, and pedagogical approach. *BMC Medical Education, 17*(89). DOI:10.1186/s12909-017-0926-z

Poquet, O., Lim, L., Mirriahi, N., & Dawson, S. (2018). Video and learning: A systematic review (2007-2017). *LAK'18: International Conference on Learning Analytics and Knowledge*. https://doi.org/10.1145/3170358.3170376

Ranga, J. S. (2017). Customized Videos on a YouTube Channel: A Beyond the Classroom Teaching and Learning Platform for General Chemistry Courses. *Journal of Chemical Education*, *94*(7), 867–872. https://doi.org/10.1021/acs.jchemed.6b00774

Ratcliff, R., Voskuilen, C., & Teodorescu, A. (2018). Modeling 2-alternative forced-choice tasks: Accounting for both magnitude and difference effects. *Cognitive psychology*, *103*, 1–22. https://doi.org/10.1016/j.cogpsych.2018.02.002

Richter, J., Scheiter, K., & Eitel, A. (2018). Signaling text–picture relations in multimedia learning: The influence of prior knowledge. *Journal of Educational Psychology, 110*(4), 544–560. https://doi.org/10.1037/edu0000220

Ryan, G. W., & Bernard, H. R. (2000). Data management and analysis methods. In N. K. Denzin & Y. S. Lincoln (Eds.), Handbook of Qualitative Research (2nd ed., pp. 769-802). Thousand Oaks, CA: Sage.

Sablić, M., Mirosavljević, A., & Škugor, A. (2021). Video-Based Learning (VBL)—Past, Present and Future: an Overview of the Research Published from 2008 to 2019. *Tech Know Learn, 26*, 1061–1077. https://doi.org/10.1007/s10758-020-09455-5

Siegel, S., & Castellan, N. J. (1989). *Nonparametric Statistics for the Behavioral Sciences* (2nd ed.). Singapore: McGraw-Hill.

Shoufan, A., & Mohamed, F. (2017). On the likes and dislikes of YouTube's educational videos. In S. Zilora (Ed.), SIGITE '17: Proceedings of the 18th Annual Conference on Information Technology Education (pp. 127–132). *Association for Computing Machinery (ACM)*. https://doi.org/10.1145/3125659.3125692

Sung, E., & Mayer, R. E. (2013). Online multimedia learning with mobile devices and desktop computers: An experimental test of Clark's methods-not-media hypothesis. *Computers in Human Behavior, 29*(3), 639–647. https://doi-org.proxy.library.uu.nl/10.1016/j.chb.2012.10.022

Ten Hove, P., & Van der Meij, H. (2015). Like it or not. What characterizes YouTube's more popular instructional videos? *Technical Communication*, *62*(1), 48–62

Wang, J., & Antonenko, P. D. (2017). Instructor presence in instructional video: Effects on visual attention, recall, and perceived learning. *Computers in Human Behavior*, *71*, 79–89. https://doi.org/10.1016/j.chb.2017.01.049

Yule, G. U. (1912). On the Methods of Measuring Association Between Two Attributes. *Journal of the Royal Statistical Society*, *75*(6), 579. https://doi.org/10.2307/2340126