INVESTIGATION OF INTERACTIVE VIDEO-WATCHING PATTERNS AND VIEWS BY CONTENT TYPE

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ABSTRACT

The interactive features embedded into videos have the potential to improve engagement. This study aims to investigate this engagement from different content types: academic vs. non-academic. First, the interaction patterns were examined through logs and screen recordings. Second, they were interviewed to have insights into views about the contents. Forty high school students were involved in the study. The research design of the study is an explanatory sequential mixed design. Participants were exposed to two types of interactive video content. The interactive features and design principles did not vary across videos. The findings indicated that students have smoother video-watching experiences in non-academic content and are more successful in scores collected during the interactions. In general, students expressed their views positively, but some found academic content too challenging.

KEYWORDS

Video analytics, Interactive videos, Multimedia learning

1. INTRODUCTION

People can access different forms of information, and videos are famous for delivering data ranging from daily routines to scientific studies. This is an excellent opportunity to be informed about the current trends. Still, excessive irrelevant information might overwhelm people due to unfocused/irrelevant/poorly-organized content (Mohammed et al., 2018). In other words, the user might not constantly be exposed to what s/he is looking for; instead, their cognitive load increases. Therefore, the content's type and quality might affect users' interaction with digital materials like videos.

The videos offer audio-visual content; thus, the elements' design might require special attention. For example, the absence of textual and narrative aspects of the same content might cause increased cognitive load (Clark et al., 2011). In traditional videos, the flow is linear, but the interactive ones can provide non-linear and response-based flow in addition to customized content (Delen et al., 2014). Clicking, answering questions, selecting paths, speeding, skipping, etc., are some features of interactive videos. These features can serve as the basis of video analytics to keep records of learners. Recording user behaviors via interactive features is one of the common ways of keeping users' logs in the literature (Tacchino et al., 2021). In education, video analytics were used to investigate the instruction process (Yeun et al., 2020); and the role of interactive features (Kolås, 2015; Sancheti et al., 2022).

The studies focusing on interactive videos generally tend to investigate the effects of various types of interactions on specific variables, and studies focusing on behavioral patterns were limited in number (Beloufa et al., 2019; Martins et al., 2019). This study aims to contribute to this line of literature, explicitly emphasizing perceptions of learners varied by content type. One concern of this study is based on the quality of the videos. That's why the cognitive load guidelines were used to design the interactive videos.

According to the cognitive load theory, being a novice or expert in the content can affect cognitive load (Clark et al., 2011). Based on this assumption, this study investigates if similar patterns exist when the content type differs (academic vs. every day). The interactive features embedded into videos have the potential to transform passive watching into active engagement (Kolås, 2015), but it might not guarantee the same effects across subject domains. That's why the domains in this study split into two: academic vs. non-academic. To understand the differences in their views and interaction patterns, the following research questions were investigated:

1. How do students' interaction patterns differ across two different content types?
2. How do students' views vary across two different content types regarding difficulty?

2. METHOD

This study is designed as a mixed study, and the research pattern is an explanatory sequential hybrid design (Creswell, 2012). The participants' logs, including session duration, scores, number of pauses, and so on, were collected in the quantitative part of the study. In the following stage, the interviews were conducted. The study took place at a vocational high school. The target population was 11th graders who had not registered for any computer science course. The participants (N=40) were included in the study by convenience sampling method. They were all exposed to two interactive videos: academic vs. non-academic. The educational content was selected among computer science course topics, namely "informatics ethics." The non-academic content was selected among popular computer science topics, namely "metaverse." The duration of the videos was very close to each other (app. five min.), and the design principles followed were the same.

The embedded interactive features (eight questions of the same format) were identical for both videos. The feedback for the answers was designed in the same manner. Adobe After Effects were used to produce videos, and the H5P Moodle plugin was used to embed interactions. Then, they were converted into SCORM packages and uploaded to the SCORM Cloud platform to keep records of logs. The logs and screen recordings were collected during video-watching sessions. The quantitative data were analyzed descriptively to compare the interaction patterns across videos. The interviews were conducted at the end of each session. The qualitative data were analyzed using by content analysis technique.

3. FINDINGS

3.1 Interaction Patterns

The analysis of logs and screen recordings was examined to understand the patterns of interaction. Since the data is quite massive and the researchers continue to analyze the screen recordings, a few interaction features were included for this short paper. The *duration* of the videos was approximately 5 minutes, but it became extended as there were interactive questions. The overall time depends on the user because the user can give the correct answer, move on, give the wrong answer, and either try again, view the answer, or prefer not to answer. Compared to academic and non-academic videos, the session duration was recorded longer for educational content ($M_{academic}$=12 min. 43 sec., $M_{non\text{-}academic}$=9 min. 41 sec.). The *scores* collected during the session were higher for non-academic content than the academic one ($M_{academic}$=60.94, $M_{non\text{-}academic}$=75.31). The average *correct* answers were recorded higher in non-academic content out of eight questions ($M_{academic}$=4.9, $M_{non\text{-}academic}$=6.03). The pattern was vice versa for the *incorrect* answers ($M_{academic}$=3.1, $M_{non\text{-}academic}$=1.83). Although there were very few *empty* answers, the average was slightly higher in non-academic content ($M_{academic}$=.08, $M_{non\text{-}academic}$=.20). The interaction with buttons of "*try again*" and "*show me*" were much more frequent in academic content (n_{try}=118, n_{show}=63) than that of non-academic (n_{try}=62, n_{show}=27). The comparison is presented in Table 1.

Table 1. Interaction Patterns Across Content Types

Pattern Feature	Academic	Non-Academic
Duration	12 min. 43 sec.	9 min. 41 sec.
Score	60.94	75.31
Correct Answers	4.9	6.03
Wrong Answers	3.1	1.83
Empty Answers	0.08	0.20
Try Again	118	62
Show Me	63	27

3.2 Views of Students

When students watched both contents, they were asked which one was the harder to understand. Most students found the non-academic content hard ($n_{academic}$=30, $n_{non\text{-}academic}$=10). The following excerpt exemplify the reasons students found the academic content much more complex than the other content:

> "Comparing the videos, for me, the ethics video was much more complicated. Metaverse not that much. I mean it is recent…I found interesting information." (K4)

The students explain the reason why they found non-academic content difficult as follows:

> "…because there were too many concepts and I got confused…I could not have distinguished the concepts" (K12)

To have insights from students about the features that make the interactive videos difficult or easy, they were asked to explain their thoughts about the content. The *positive* aspects were more frequently mentioned for non-academic content ($n_{academic}$=23, $n_{non\text{-}academic}$=38) as follows:

> "The issue of privacy, the privacy of personal life, the privacy of lots of things. I am happy that I have learned new things. I am also happy that it explained the things in a short time." (K8)

The *negative* aspects were more frequently mentioned for academic content ($n_{academic}$=14, $n_{non\text{-}academic}$=1). The following excerpt is an example of negative views:

> "I got nervous in ethics video because I thought that I would not achieve…I felt bad as I failed at questions." (K34)

Some students preferred *neutral* words ($n_{academic}$=2, $n_{non\text{-}academic}$=2) as follows:

> "Nothing was boring. There was nothing fun either. I watched videos to evaluate. I mean, they were not boring, at least. I mean, they were explaining something. The graphical content was good in the background. I mean, it was beyond looking at the monitor." (K12)

The details of the themes and subthemes are presented in Table 2.

Table 2. Views of Students about the Content

Thoughts	Academic (*n*)	Non-Academic (*n*)
Positive		
Entertaining	17	26
Interesting	2	3
Informative	4	6
Convenient	0	3
Negative		
Boring	5	1
Too challenging	8	0
Weird	1	0
Neutral		
Ordinary	2	2

4. CONCLUSION

The interaction patterns of participants differed in terms of certain features. It might be concluded that users showed smooth patterns of interaction during engaging with the non-academic content. They spent less time but got higher scores from the interactive questions. In addition, the percentage of correct answers in non-academic content was more than that of the academic one despite the high frequency of trying again for academic questions. In the literature, studies confirm the interactive features' contribution to achievement (Ploetzner, 2022). This study extends the literature that the level of such contributions might depend on the content exposed in the interactive videos. The same participants were exposed to two different contents, and their scores differed. Further statistical analysis can explain the differences in terms of significance. The effectiveness of interactive features might depend on perceptions (Palaigeorgiou & Papadopoulou, 2019). The overall views of participants were quite favorable for both content, but the non-academic one was favored more. Moreover, it was not perceived as complex as the academic content. Excessive unfamiliar words and context were mentioned as the distractors for both videos. As Clark et al. (2011) suggested, this might increase cognitive load, so the participants reported the videos as complex or too challenging. As interactive features were required to answer questions, some participants felt overwhelmed, which was expected to cause excessive cognitive load (Barut-Tugtekin & Dursun, 2022). On the other hand, the majority reported positive views, which might align with the previous findings of Antonis et al. (2022). This study says the preliminary analysis of the gathered data; thus, the results cannot be generalized.

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