

# Is the Movie Better than the Book? Differences in Engagement and Delayed Recall of Video and Text Cases in Science

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**Abstract:** In this investigation we assessed whether different formats of media influenced participants' engagement and recall of narrative cases of people diagnosed with HIV/AIDS. For each of the personal case-narratives used in the study, we designed three informationally-equivalent versions: one *video*, one *text*, and one *video + text*. Thirty participants experienced one version in each format, completed a short interview about their reactions to the stories, and completed a survey designed to measure affective and engagement responses to the stories. Participants were again interviewed six weeks later, to gauge their memory for the narratives and to gauge potential changes in their perceptions and understandings of the cases. Results indicate that the *video* and *video + text* versions of the stories led to higher levels of both engagement and sympathy with the characters, and better recall of information. Implications for the design of instructional materials are discussed.

## Introduction

If a picture is worth a thousand words, is a video worth a million? The claim that students remember “10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they see and hear” has little empirical support (Genovese, 2004, p.55). Some researchers argue that the Internet has changed the definition of literacy, given the addition of video and hypermedia. This shift has consequences for how we think about teaching and researching literacy (Bruce, 1997). Yet, there is relatively little known about the underlying processes involved in different formats of media. Does video enhance attention and thereby engagement in material? Is video somehow recalled more easily than more traditional text material? Is there a benefit for students receiving both printed texts and video simultaneously, or might this dual processing produce cognitive overload (Mayer & Moreno, 2003)?

Evaluating the effectiveness of video as an instructional medium has proven to be complicated and somewhat contentious (e.g., see the recent debate by Clark[1994a,b] and Kozma[1994]). Early studies often showed no benefit for video, mixed results, or idiosyncratic findings, leading Clark (1983) to restate a similar claim that had been made by others that “media do not influence learning under any conditions” (p. 445). Researchers who disagree with Clark might concede, at the very least, that media benefits are not simple to identify, and that media effects interact with other educational factors (e.g., contexts, goals, social processes, etc.) in complicated ways. Kozma (1994), for example argues for this contextual stance by considering media to have affordances that “... interact with cognitive and social processes” (p. 11).

Paivio's (1990) dual coding theory provides a beginning framework for understanding how multimedia information is cognitively processed. Paivio's theory which posits two separate symbolic systems – one system is attuned to verbal information including auditory processing and language, the other system is attuned to visual and spatial processing. Dual coding goes beyond making a distinction between separate processing of verbal and visual information, it also suggests there is little competition for resources when presenting visual and auditory information together, so that multimedia representations have important educational affordances; Thus, video with its visual and verbal codes might be a more effective and powerful medium for delivery of instruction material than single representation of just pictorial or verbal code.

The work of Moreno and Mayer (1999), also supports the notion that pictorial information and narration allows for the parallel processing of information via visual and verbal inputs. Mayer and his colleagues (1997, 2001), building

on Paivo's dual coding theory and Sweller and Chandler's cognitive load theory (1994), developed the cognitive theory of multimedia. According to the cognitive theory of multimedia information is easier to process in multimedia environments with on-screen narration and images. However, presenting the same information in on-screen text and video will produce a redundancy effect because the cognitive load placed on the visual channel by the text and video will make it difficult to process the information. Mayer, Heiser, and Lonn (2001) also found that using video (with irrelevant information) to elicit emotional interest in an explanation primed students to pay attention to supplemental information rather than structurally relevant information. Yet, in a review of the literature on situational interest Schraw and Lehman (2001) found that research on the use of seductive details (e.g., irrelevant information) was inconclusive but a strong research-based relationship existed between the arousal of situational interest and learning.

A few notable attempts have been made to investigate media effects while controlling for equivalent content. For example, in a study by Baggett (1979), revisions to a text version of the dialogueless movie *The Red Balloon* were made until participants could match episodes in the film with passages from the story and vice versa. The resulting structurally-equivalent forms of the story (the video and text versions) were used in a different study of memory recall. Using a cued recall approach, they found that immediately upon finishing the story, there was no effect for media – both forms of the story (text and video) led to similar patterns of recall. However, an analysis of delayed recall (7 days later) revealed much better performance for participants who had viewed the video form of the story. The text version of the story, while useful for immediate recall, led to more forgetting in just 7 days. Interpretation of these findings is based upon the work of Kintsch & van Dijk (1975), who demonstrated that stories told in words invoke schemas for processing, storing, and organizing information to come later in the story. Baggett (1979) argues that a similar schema driven process exists for stories told in video, however, these schemas differ from those used to process stories in text.

In the present study, we were interested in studying the impact of media on the design of non-fiction case materials to be used in biology courses to increase student understanding of HIV/AIDS. In particular, we were interested in going beyond detecting differences in recall of information, to study possible mechanisms to account for these differences. Accordingly, we studied students' level of engagement with the different media formats, under the premise that video may be more engaging to students (and therefore lead to better recall). Additionally, we investigated affective/emotional impact of the cases and media, reasoning that stronger emotional responses lead to better recall of information.

## **Method**

### **Participants and Materials**

Thirty undergraduate students in the college of education took part in the study and were either paid for their time or received extra credit in their course work. The participants were recruited from two classes by announcement and the participation was voluntary.

A video from National Geographic on HIV and AIDS infection that had a number of personal narratives about HIV/AIDS was chosen for this study. The stories selected for this study were selected based upon the following criteria: a) the length of time of the story b) the diversity of populations the resulting choices would produce (in terms of gender, ethnicity, economic class, etc.). The stories used in the study were: Lisa, a Caucasian, heterosexual female from an affluent background; Doug, a homosexual male from a middle-class background; and Catrice, an African-American woman from a low socio-economic background. Text versions of the story were created by creating transcripts from the videos. Since the videos were structured primarily as interviews of people telling their stories, the transcripts provided a very reasonable narrative structure for the text versions as well.

Videos were converted into QuickTime movies, and broken into two parts to allow interviewer interaction with the participant during the story. The transcripts were segmented identically. Video versions of the stories were presented on web pages with only the video showing. Text versions only had the text transcript available, along with one still image of the person. Video + Text versions of the story had the text and video side by side.

## Procedure, Instruments, and Measures

This study is reporting on one aspect of a larger study. The other instruments used but not included in this analysis include a demographic survey and a brief five question interview about their background knowledge and beliefs. This paper focuses on participants' recall of information in the cases and responses to an affective/engagement questionnaire.

Participants were randomly assigned to one of 36 possible sequences that present each of the three stories with one story from each condition (*video*, *text*, *video + text*). This assignment was to assure that each condition and story was equally likely to be presented first, second or third in the overall participant pool. After participants completed the *demographic survey*, *background knowledge and beliefs interview*, and *knowledge and interest rating*, the experimenter introduced the task, using a training video (of a different HIV/AIDS story not used in the study) to show participants how to use the computer and proceed through the narratives.

Participants then watched each of the three stories (one for each condition). During the introduction to the study they had been encouraged to stop and think aloud about their responses to the case at any point while viewing or reading about the case. Following each segment of a story, participants were prompted to talk about what they were thinking while viewing or reading about the case. (Each case was broken into two segments). The protocol analysis of this part of the study will be included in subsequent publications. After each case they completed the *affective / engagement questionnaire*. The questionnaire consists of 23 items on a 5-point Likert-type scale with opposing affective adjective pairs (e.g., excited/bored, emotional/unemotional, informed/uninformed, interested/uninterested, etc.). Fourteen of the items were in response to the prompt, "The stories made me feel ..." and the other nine were in response to "The cases were ..." (e.g., interesting/ not interesting, realistic/ unrealistic, sympathetic /unsympathetic, informative/not informative). The affective/engagement survey was used as the basis to explore the macro-level questions of media and story interactions, since this instrument was common to all stories. A principal components factor analysis with varimax rotation on ranked responses to the 23 items on the survey was conducted to identify patterns in the responses, and to reduce the number of dimensions of comparison in the analysis (for purposes of increasing interpretability and controlling overall experimental-wise error rate). The resulting factor scores were analyzed in a blocking design (using the participants repeated measures as blocks) in a 2-way ANOVA with media (*text*, *video*, *video + text*) and story (*Catrice*, *Doug*, *Lisa*) as factors. After all three stories were complete, participants completed the *structured interview* and *knowledge and interest rating*. The knowledge and interest rating asked participants to rate their knowledge about HIV/AIDS on a 1- to 7-point scale. They similarly rated their interest on the same scale.

Six weeks after experiencing the cases, the participants were interviewed about their recollection of the stories they experienced. A subset of the participants was selected for an in-depth analysis of responses to the *recall interview*. The recall interview incorporated questions such as "You've experienced three narratives about people with HIV/AIDS. What do you remember?" Responses were transcribed, and analyzed for the facts they could recall about each story. Two coders first jointly used the transcripts to generate a list of all the ideas generated by participants. From the list, the two researchers independently coded each transcript for the absence or presence of each of these ideas. Inter-rater reliability was seventy-nine percent, and disagreements were resolved by consensus.

## Results

### Affective / Engagement Measures

Seven factors were produced, and can be easily interpreted based upon the adjective pairs most heavily loaded for each factor, as described in the Table 1 below:

Factor	% of Variance	Adjectives most associated with this factor
Positive Affect	23.9	I felt: <i>Untroubled, Comfortable, Happy, Optimistic</i> The stories were:
Engagement	13.6	I felt: <i>Active, Engaged, Interested</i>

		The stories were: <i>Interesting</i>
Sympathy	8.9	I felt: <i>Sympathetic, Optimistic, Convinced</i> The stories were: <i>Sympathetic</i>
Thought Provoking	6.3	I felt: The stories were: <i>Informative, Thought Provoking</i>
Knowledgeable	6.1	I felt: <i>Informed, Knowledgeable</i> The stories were:
Realistic	5.3	I felt: The stories were: <i>Clear, Realistic</i>
Bias	4.5	I felt: The stories were: <i>Biased</i>

**Table 1:** Results of Factor Analysis

Using three-way ANOVAs (participant x narrative x media), a significant main effect was found for media on the engagement factor  $F(2,52)= 7.861, p<.001, \eta^2=.232$  and on the sympathy factor  $F(2,52) = 6.098, p<.004, \eta^2=.190$ . A pairwise comparison analysis revealed that the text condition differed significantly in terms of engagement from the video ( $p < .001$ ) and video and text conditions ( $p = .002$ ). Participants felt more engaged in the video and video and text conditions than they did in the text only condition. They also felt more sympathy while experiencing the cases in the video ( $p = .003$ ) or video and text ( $p = .005$ ) conditions than in the text only condition. A main effect was also found for case on the sixth factor  $F(2,52)= 4.851, p<.012, \eta^2=.157$ . For the sixth factor participants felt that Lisa's case was more realistic than Catrice's case,  $p = .007$  and Doug's case  $p = .014$ .

Overall, participants found that using video as a medium for presenting a case was more engaging than text. The video and video and text conditions also seemed to elicit greater feelings of sympathy from viewers. Presenting the cases in a video format seemed to make it easier for students to invest their attention and their emotions in the cases being presented. However, participants felt that Lisa's story was more realistic than Doug's or Catrice's story.

### Structured Interviews

An in-depth analysis of a subset of participants revealed that all students preferred either the video or video and text format. The participants found the video format engaging because of its ability to "bring to life" the stories of these three people who had tested positive for HIV. In reference to the use of video one student reported, "...it's a real person. It's a real mom who has three kids. It's possible to make up, but I think would take time and effort. And, then you have a visual you can see these people and their lives." Another student said, "...I guess when you see somebody bring to life a story that's happened to them...you can, I think you can pick up a lot from it."

Participants who preferred the video and text condition like it because they could rely on one format and use the other to reinforce ideas. "I think the text and video seemed the most stimulating... I could read it myself, have a general idea of what was going on and then I could use the video to reinforce what I was learning."

### Recall of Story Information

We developed a coding scheme that classified categories from students' recall comments during the second session about the narratives using a qualitative analysis. The unit of the analysis was on a phrase level according to specific narratives (i.e., Lisa, Doug, and Catrice). Categories were grouped into macro-themes: description of the individual, family (e.g., "married, kids"), medication and treatment (e.g., "takes a lot of pills"), contraction of the disease (e.g., "got it while on vacation"), the individual's outlook, and description of the media (e.g., some students recalled "a picture of the beach from the video"). Two researchers coded the transcripts for frequency of occurrence for each category and theme. The resulting frequency counts are currently being analyzed for differences between the amount

and type of information recalled by narratives, media, and between macro-themes. Students' comments during their think-a-loud will be examined in light of these findings.

Our early exploration of the data suggests students may be recalling more information in the video ( $M = 9.57$ ) and video + text ( $M = 8.86$ ) narratives than the text-only narratives ( $M = 4.57$ ). Also emerging from our early analyses is that not all cases are equivalent: participants' are almost twice as likely to recall information about Catrice and Lisa than they are about Doug. Further coding and analyses will be conducted to further examine these emerging trends in media and narrative differences. Based on our results from the affective and engagement questionnaire and the differences in engagement between conditions, we are especially interested in differences in recall between the text condition and the video and video and text conditions.

## Discussion

The use of video to present the cases used in this study had a significant impact on participants' perceptions of engagement. Participants in this study felt that cases presented in text were less engaging than cases presented via video or video and text. A preliminary analysis of a subset of participants reveals that students are recalling more information in the video and video and text conditions than the text only condition. When asked which condition they preferred none of the participants declared a preference for the text format. Results from the affective/engagement survey were collaborated by an analysis of the structured interview. Students who viewed the cases in a video format were more engaged and recalled more information. This result may have important implications for how people structure and store information in memory.

Research on individual interest has demonstrated a relationship between interest and learning (Renninger, Hidi, & Krapp, 1992). Student interest, however, does not guarantee learning will occur. Characteristics of the situation may draw students' attention to information or events (situational interest) that are not pertinent or are irrelevant. In a series of studies conducted by Harp & Mayer (1998) they found that the inclusion of irrelevant information, or "seductive details" had a negative impact on recall. Thus, how learning environments are designed to engage students is an important question for researchers. In our study students were engaged in the video and felt sympathetic towards the stories. At the same time our preliminary findings demonstrate that they recalled more information from cases presented in a video format. Our interviews provide some insight into why the video format may have been more effective. It was not just that information was being presented visually but it mattered who was presenting the information. Participants commented that they liked seeing the person telling their own story.

## Conclusion

Increasing students' engagement and recall of important material is especially critical in science, for women and other underrepresented groups. Although many female undergraduates do not perceive introductory science courses as relevant to their lives (Kardash & Wallace, 2001), the use of realistic or nonfiction cases may help them make important connections between science concepts and their lives. The nonfiction case materials used in this study were designed for biology courses to increase student understanding of an infectious disease, HIV/AIDS. Thus, these cases were designed both to increase interest in science and also understanding of this infectious disease.

Our study was interested in making these powerful stories even more powerful by presenting them in a format that is more likely to engage students. Our students found that the video and video and text formats were more engaging than a text only format. The potential video has to engage viewers is not surprising. Video has the capacity to use different modalities at the same time. The producers of videos use important filming and editing techniques, such as point of view (this is when the camera takes the perspective of a viewer of the situation) or the inclusion of digetic sound (this is sound such as music that was not captured during the original filming) to engage their viewers. Participants in our study found the video engaging due to its capacity to breathe life into these stories because it: "brings to life a story", "you can see these people and their lives", "It shows you people's emotion". Our study has important implications for the design of learning environments. It highlights the power of video to evoke situational interest and to have a positive impact on recall. More importantly, this study points out the need for more systematic research on the characteristics of various media formats and how they intersect with situational interest and learning.

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