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This study investigates the effects of narrative presentation format on sixth-graders' comprehension of and motivation for reading a story. Digital games have become increasingly popular for school-aged children (Pew Research, 2008), and several researchers suggest that video games and game play involve important literacy skills (e.g., Gee, 2003; Squire, 2005) and may be viewed as a "constellation of literacy practices" (Steinkuehler, 2007, p. 302). Acknowledging that the format of narratives, delivered via comic books, graphic novels, traditional print, video games, and so on can affect motivation and comprehension, a study was designed in which 67 sixth-grade students in New York City were presented with a similar story in three formats: within a Nintendo DS adventure game (Game Group, GG, $n = 23$); as a comic book (Comic-book Group, CG, $n = 23$), and as a book (Book Group, BG, $n = 21$).

It was hypothesized that a narrative-based video game format could generate high motivation scores due to the popularity of video games in general as well as the novelty of playing a video game in a school setting. In addition, the video game used in this study includes challenges that rely on a need to read and understand its narrative as a central element of game play. This could also enhance motivation and interest in the narrative, and provides an overt sense of purpose for reading. Further, the supportive graphic elements in a video game and in comic books could enhance both literal and inferential understanding.

However, most statements about the motivational value and possible learning outcomes of playing video games is often done in sweeping terms, without important caveats that video games represent many genres (e.g., first-person shooters, role-playing games, multiplayer games, adventure games), are played in many contexts and on many platforms (e.g., in schools, at home, with friends, on mobile devices, on large screens), and that factors such as free choice of game vs. forced choice may all influence motivation to play and learning outcomes. In short, research is needed to carefully examine games in their specific contexts, as related to claimed learning outcomes. Being mindful, therefore, that, "Not everyone is a gamer... and assuming that games can be lumped into one genre and that all students enjoy playing video games is not appropriate" (Kinzer, 2010, p. 55) this study examines outcomes related to narrative understanding and motivation to play within a specific game genre (an adventure game played on a mobile, Nintendo DS platform), compared to outcomes from a more traditional, narrative text and the same narrative presented in a comic book/graphic novel.

Following a brief discussion of relevant background, subsequent sections of this paper present the study's results and discuss their implications relative to two central research questions:

(1) Is there a difference in motivation and perceived story interest when it is presented within a popular and commercially available video game, a comic book, or a traditional novel?, and (2) Is there a difference in the comprehension of a narrative when it is presented within a popular and commercially available video game, a comic book, or a traditional novel?

BACKGROUND

According to Luke (2000), traditional forms of literacy remain necessary though not sufficient for effective participation in a network society, as facility with digital forms of literacy become fundamental for participation and communication. Similarly, Kellner (2006, p. 5) argues that traditional print literacy becomes increasingly important in the digital age, Kamil, Borman, Dole, Kral, Salinger, & Torensen (2008) suggest that far more advanced literacy skills are required of current (and future) generations compared to previous generations, and strong arguments have been made to redefine literacy to include but go beyond conceptions of print-based literacy practices (e.g., Leu, 1997; Kinzer & Leander, 2003; Ito, Baumer, Bittanti, Boyd, Cody, Herr-Stephenson, & Tripp, 2009). Central to all such arguments is the acknowledgment of the need to understand what is read at both literal and inferential levels (Leu, Zawilinski, Castek, Banerjee, Housand, Liu, & O'Neil, 2007; see also, Partnership for 21st Century Skills, 2009).

Data continue to indicate that reading proficiency in elementary school children is of great concern. For example, the 2009 National Assessment of Educational Progress in reading reported that 68% of eighth-grade students fell below the proficient level in their ability to comprehend the meaning of a text at their grade level (National Center for Educational Statistics, 2010). In response, a wide variety of approaches, strategies, curricula, teaching methods, teaching materials, and administrative structures have been investigated in hopes of improving the nation's literacy rate, in both traditional texts and in online reading. Of these important lines of research, two are most relevant to the current study: (1) recommendations to "increase student motivation and engagement in literacy learning" (e.g., Kamil et al., 2008, p. 9), and (2) recommendations to focus on the integration of literacy and technology as teaching tools and to understand required reading practices in digital environments (e.g., Leu et al., 2007).

Thus, the current study is centered on three premises. The first premise is that motivation is a crucial aspect of literacy; students need to be motivated to read and motivation has an effect on comprehension. The second premise is that children like playing video games. Statistics show that most middle school students, from a wide variety of backgrounds, enjoy playing video games. The third premise is that many types of video games require a great deal of literacy in order to play, due to their reliance on narrative conventions.

Motivation to Read

Motivation is a key component of reading. Research has shown that a person reads a word or comprehends a text not only because she can do it, but because she is motivated to do it (Guthrie & Wigfield, 2000); one has to be able to read as well as *want* to read. Motivation factors play a critical role in the development of literacy skills in middle childhood and beyond (Guthrie, Wigfield, Metsalaet, & Cox, 1999). Unfortunately, a growing body of evidence suggests that students in the middle school grades are lacking in motivation to read and engage with texts.

Many factors have been shown to influence students' motivation to read. One is how interesting the text is to the reader, based on purpose for reading and personal engagement. If a book is personally significant and/or if a purpose for reading is established and accepted, it is likely to be rated as interesting (Schraw, Bruning, & Svoboda, 1995). For example, Ivey and Broaddus (2001) focused on what makes sixth-grade students want to read in reading and language classrooms. The students in their study sent a strong message about the need to read personally interesting materials and about having some control over what they read in school. This finding, coupled with the recommendation to make literacy experiences more relevant to students' interests and experiences in everyday life (Guthrie, Wigfield, & VonSecker, 2000) acknowledge the importance of exploring innovative ways to motivate students to read.

Narrative in education. Bruner (1990) argues that narrative is a form of thought that is innate in human beings. Perhaps this is why it is often used in education (Dettori & Paiva, 2009). Although there are "various narrative practices" (see Conle, 2003, p. 3), in this context we use the term narrative to mean "story," which Genette, Lewin, and Culler (1980, p. 25) defines as a "succession of events" that "tell what happened" and "who did what to whom and why" (Calfée & Drum 1986, p. 836). Put another way, narratives are a form of speech that do not describe the here-and-now but rather the there-and-then (Peterson, Jesso, & McCabe, 1999). When narratives are involved, a proficient reader attempts to explain *why* events in the text occur and *why* the author explicitly mentions particular information in the text (Graesser, McNamara, & Louwerse, 2003). Such explanations include motives of characters' actions, causes of events, and justifications of claims. In addition to the content, the vocabulary load of the text and its linguistic structure, discourse style, and genre also interact with the reader's knowledge (Sweet & Snow, 2003). Therefore, narratives presented in different formats, such as in video games, comic books, or traditional books, may well affect motivation and comprehension of the story.

As educational tools, narratives are effective because they are often believable, memorable, and entertaining (Neuhauser, 1993). Of course, the ability to read and comprehend written material is a "cross-curricular competence and an important prerequisite for success in school" (Artelt, Schiefele, & Schneider, 2001, p. 364). Such skills become increasingly important as students enter the middle school grades, where there is considerable emphasis on new vocabulary, connecting and summarizing ideas, and organizing and remembering information (Readence, Bean, & Baldwin, 2004). In science, for example, there have been many calls to leverage the explanatory power of narratives (Norris, Guilbert, Smith, Hakimelahi, & Phillips, 2005) in order to allow "nonscientists, who [do not] share the conventions of formal scientific monologue" (Smolin, 1998, p. 6) to communicate ideas and make ideas "coherent, memorable, and meaningful" (Millar & Osborne, 1998, p. 13).

In 1998, Milne identified four different types of science stories in science textbooks. These story types include heroic, discovery, declarative, and politically correct stories, all of which, Milne argues, promote a particular set of philosophical assumptions about science. Others have argued for the use of historical narrative as a means of providing a context to address science content in a humanistic and more authentic manner (for an overview see Metz, Klassen, McMillan, Clough, & Olson, 2007). In short, understanding narratives is important both in its own, "traditional" domain of stories and literature, and in content-area subjects.

Nontraditional Texts

Given the documented importance of providing interesting texts to young readers, a natural follow-up question is what area(s) of popular culture are students interested in that might provide some sort of reading experience? Multimodality of Internet technologies (Leander & Lewis, 2008), electronic books like the Amazon Kindle family, comic books, video games, and even mobile phones can be motivating ways to promote students' reading and writing (Black, 2006; Ito et al., 2009; Jenkins, 1992). Is there some way to harness adolescents' interest in video games to promote traditional literacy development? Drawing upon students' out-of-school interests to promote literacy development is supported by a number of researchers. For example, Alvermann and Hagood (2000) argue that using fandom of popular cultural texts, such as music, can get students interested in school literacies while providing teachers with insight into students' out-of-school lives. Chandler-Olcott and Mahar (2003) argue that acknowledging fan fiction or other text forms privileged by students, but often marginalized by teachers within formal learning communities, can increase student engagement and achievement in literacy.

Another possibility lies in comic books and graphic novels. Comic books are extremely popular because of their relationship to popular movies (Wax, 2002), the popularity of Japanese animation (Toku, 2001), and their increasing artistic and literary achievements (Gardner & Dillon, 2004). In a study of young readers of Archie comics, Norton (2003) concluded that the pleasure children derive from comics is associated with a sense of ownership of text, which in turn provides the confidence to engage "energetically and critically" (p. 145) with the comic book. The Comic Book Project, an arts-based literacy initiative for urban youth, used comic books to address specific literacy skills. Working with 733 children, the pilot program reported that participants processed a wealth of information related to the creation of comic books while including State learning standards (Bitz, 2004).

According to Schwarz (2002) the term graphic novel includes fiction as well as nonfiction text with pictures—"comics" in book format. These novels appeal to young people, are useful across the curriculum, and offer diverse alternatives to traditional texts as well as other mass media. Lavin (1998) suggests that reading graphic novels may require more complex cognitive skills than the reading of text alone. In this vein, Weiner, Weiner, and Royal (2010) suggest that graphic novels are multimodal texts that combine traditional text literacy with visual literacy, requiring multimodal literacy. Gardner and Dillon (2004) argue that just as with early readers, the correlation of pictures and text helps encourage the reluctant teen reader to engage with text in order to plumb the depths of a story.

Video games as texts. Adolescents play and enjoy video games—a national survey of school-age children found that they devote about seven hours per week to playing video games (Woodard & Gridina, 2000). Gentile, Lynch, Linder, and Walsh (2004) reported that eighth and ninth grade students averaged nine hours per week of video game play overall, with boys averaging thirteen hours per week and girls averaging five hours per week. Given the popularity of video games among adolescents, we might consider them as texts to promote traditional literacy practices in the way that comic books, graphic novels, and fan fiction have been used.

Although not present in all games, narrative is a critical element in most modern video games. According to Onder (2002) typical narrative devices in video games include backstory, cut

scenes, flashbacks, foreshadowing, cliffhangers, and red herrings. Advocates of narrative in game design argue that a strong narrative line creates more immersive and engaging game play (Adams, 2001). Schneider (2004) notes that some games offer a more complete narrative that provides a storyline and a justification for the actions taken during the game, thus making a more interactive, immersive and involving experience, while Frasca (2003) argues that a better understanding of the elements shared by games and stories, such as characters, settings, and events, is needed. Graesser and colleagues (2003, p. 84) emphasize multiple levels of dialogue in narrative, stating, "Not only are there explicit speech acts between characters in the plot, but there are implicit acts of communication between characters, implicit dialogues between the narrator and audience, and implicit dialogues between writer and reader." In short, video games (1) are extremely popular with adolescents, and (2) include strong narrative elements that are often critical to successful game play. The game chosen for use in this study includes both features.

RESEARCH DESIGN, PARTICIPANTS, AND PROCEDURE

This study was designed to examine the impact of narrative presentation format on the learning outcomes and motivation of 67 (27 female and 40 male, average age 11.6) public school students in New York City. They were randomly assigned to one of three groups: Game Group (GG, $n = 23$), Comic-book Group (CG, $n = 23$), and text-only Book Group (BG, $n = 21$).

Data were collected in two sessions on two consecutive days. In the first session, subjects were introduced to the study and asked to complete a comprehension assessment and a brief survey about their familiarity with and play habits regarding video games. Students' standardized reading test scores were also made available by the school. These assessments were used to examine equivalence across groups in terms of general reading proficiency and comprehension, and in experience with video games and the Nintendo DS.

In the second session, subjects (previously randomly assigned into groups) were separated into different rooms, introduced to the task, and given one of three versions of the narrative. A research assistant explained that the name of the book/comic/game was *Blood Edward Island Memories* and that they had 45 minutes to complete the first chapter of the story. Subjects were also told that they would be asked to answer questions about what happened in the story without being able to go back to the story. During the 45-minute period, after 10 and 20 minutes, subjects rated their interest and desire to continue the story on a 4-point Likert scale and then continued with the story. After 45 minutes, subjects were told to stop reading/playing, even if they had not finished, and were given the comprehension measures described below.

INSTRUMENTS AND MEASURES

The Narrative/Text

The narrative used in this study was from *Trace Memory* (released outside of North America as *Another Code: Two Memories*), a 2005 adventure video game developed by CiNG and published by Nintendo for the Nintendo DS. In an adventure game, the player assumes the role of a protagonist in an interactive story driven by exploration and puzzle solving instead of physical challenge

(Adams, 2006). The protagonist in *Trace Memory* is Ashley Mizuki Robbins, a 13-year-old girl, searching for her father on Blood Edward Island. Nintendo's website describes the storyline of *Trace Memory* as follows:

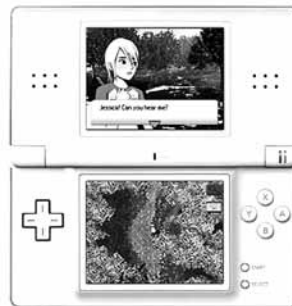
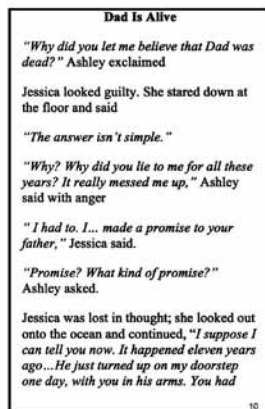
While researching human memory for the government's secret lab, scientists Richard and Sayoko Robbins suddenly disappear and are presumed dead. Ten years later, their daughter, Ashley, receives a letter from Richard, telling her that he is still alive and sequestered in a lab on Blood Edward Island. Ashley traces the letter to the island to find the truth behind her parents' mysterious disappearance. Once there, she discovers that her parents had been working on a memory-generating computer called Trace, but the connection between Trace and their disappearance remains unclear.

While searching for Richard, Ashley befriends a ghost named D, who is looking for answers of his own. Having lost all his memories and any recollection of his death, D is destined to remain in limbo and wander the island until he recovers them. Together, they set off to find the truth of their pasts. (from <http://www.nintendo.com/games/detail/909a0218-3a62-4d6f-a290-cb07ff26fa3c>, accessed 2/6/11)

Trace Memory was chosen for several reasons. The first was practical: It was unlikely that sixth grade students in 2010 had played an adventure game released in 2005. Second, the game is story-driven. It was described as a "touchable mystery novel" with "lengthy conversations" (StaffReviewer, 2005; Hruschak, 2006). Other reviewers claimed it was "well-written" with a "good amount of suspense" (Harris, 2005; Parish, 2005). Finally, the protagonist of the story is a 13-year-old, a similar age to the target audience of the study.

Using the narrative within the *Trace Memory* adventure game, comic-book and text-only versions of the story were created. The goal was to create identical versions of the story with the same title, cover art, text, and (in the comic-book version), graphics. To create the comic-book, over 800 screen shots of the game were captured from a computer monitor while running the game using Nintendo DS emulator software. These screen shots were used to extract dialogue sequences and graphics from the video game. The comic was then assembled using the comic publishing software *Comic Life* (plasq, 2010). The result was a full-color, 8.5 x 11, double-sided, 72-page spiral-bound comic book with a transparent plastic sleeve and a custom cover page that read "Blood Edward Island Memories." All images in the comic were taken directly from the DS adventure game and were presented in the same order as a player would see them in the game. In both the comic and book, all dialogue and scene descriptions were taken word-for-word from text displayed in the game. Figure 1 shows samples of the three versions.

The third version of the narrative was an all-text "book" version. To assemble this version, a word processor was used. The result was a 42-page novel titled *Blood Edward Island Memories*. As with the comic book, a spiral plastic binding that included a transparent plastic cover page was used. Because the original game version of the story includes graphics to convey some story-related information about the setting and time, appropriate scene descriptions were added. For example, where the game might show a setting sun to establish time of day, the book version would incorporate the phrase "at sunset" into the narrative.

Figure 1. Sample Comic Book Pages (Top), Book Page (Left), Nintendo DS “Pages” (Right)

Subjects in the GG played the first chapter of *Trace Memory* on Nintendo DS Lites. Each student was given a Nintendo DS, headphones, and the console's original stylus. They were given instructions on how to launch the game, which was preloaded. Subjects in the other two groups were given the comic book and book version, respectively, and asked to read the story.

Comprehension Measures

At the end of the second 45-minute period, all subjects were given a comprehension assessment designed by the authors to measure both literal understanding of the story as well as higher-order comprehension of the story. In total, there were eleven literal comprehension questions, such as "Who did Ashley meet at the cemetery?", and "Why did Ashley come to the island?" The eight higher-level questions were all short-answer, write-in questions, ranging from "How do you think the boat captain feels about the island?", to "Briefly, summarize the story in your own words." Subjects were encouraged to answer as many questions as possible. They were also told it was ok to guess if they didn't know the answer.

Motivation Measures

Two forms of motivation measures were used: a series of two during-intervention questions and a post-task survey. The two during-intervention motivation-related questions were asked of subjects at 10 and 20 minutes during the 45 minutes subjects played the game/read the narrative. At those times, research assistants recorded each students' responses on two, 4-point Likert scale questions: 1) How *interested* are you in this story?, and 2) How much do you want to *continue* this story? The 4-point Likert-scale ranged from 1 ("not at all") to 4 ("very much").

The post-intervention motivation measure included four questions, one each in the area of enjoyment ("How much did you like the game/book/comic?"), overall interest ("How interesting did you find the story?"), concentration ("How well did you concentrate on the game/book/comic?") and perception of task difficulty ("How hard was it for you to read the story in the game/comic/book?"). Each of these areas is linked to motivation (Ryan, Koestler & Deci, 1991). Responses were provided on a 5-point Likert-scale from 1 (not at all) to 5 (very much).

Measures Exploring Equivalence Between Groups

After subjects had been randomly assigned into the three groups, two measures examined equivalence across groups. First, as a pre-task measure of comprehension proficiency, subjects completed a paper-based comprehension measure used by the Teachers College Reading and Writing Project, *Abby Takes Her Shot* (Dyckman, 2001). Eleven students were absent for this measure, thus this comprehension measure was completed by 56 students. However, absent students were equally, and randomly, distributed across groups (4 in BG, 4 in CG, 3 in GG). There was no statistically significant difference ($F(2,53) = 0.696, p = 0.503$) between groups on this measure, thus implying group equivalence.

Second, by the time students in New York City schools are in the sixth grade, they have completed several standardized tests in the area of English Language Arts (ELA). For each student, the cumulative score on their past three standardized tests was obtained. Because not all had taken all three prior ELA tests, available scores for each student were averaged. There was no statistically significant difference in averaged standardized test scores across groups. We also examined possible differences in video game experience (e.g., number of hours spent playing video games, familiarity with video adventure games, owning gaming consoles). There was no statistically significant difference in any of these categories, and the 47 students who stated that they owned and used the Nintendo DS or DSi were equally distributed across groups (17 in GG, 15 in CG, 15 in BG). Cross-group equivalence is thus implied in these areas as well.

FINDINGS

Table 1 shows the mean and standard deviation statistics for all measures.

Motivation Findings

The first research question investigated the impact of presentation and format of a narrative on motivation/interest. Responses to a 4-point Likert scale question asking "How *interesting* is this story?" were not statistically significant after 10 minutes ($F(2, 64) = 1.660, p = .197$). However, a

Table 1. Means and Standard Deviations for the Measures Used in Each Condition

MEASURE	CONDITION					
	Book Group		Comic Group		Game Group	
	(BG; <i>n</i> = 21)		(CG; <i>n</i> = 23)		(GG; <i>n</i> = 23)	
	Mean	SD	Mean	SD	Mean	SD
Interest						
after 10 minutes	3.62	0.50	3.14	0.99	3.10	0.89
after 20 minutes*	3.90	0.31	3.09	1.19	3.43	0.60
Desire to Continue						
after 10 minutes	3.67	0.73	2.95	1.13	3.14	0.79
after 20 minutes*	3.95	0.22	3.09	1.19	3.52	0.81
Likeability	4.57	0.98	4.30	0.97	3.78	1.04
Overall Interest at end of task	4.43	0.98	4.43	0.90	3.78	1.16
Concentration	4.45	0.76	4.26	0.76	3.61	1.23
Task Difficulty	2.62	0.87	2.00	1.13	2.78	1.04
Literal Comprehension	9.43	1.57	9.70	1.40	8.13	1.91
Inferential Comprehension						
accuracy	6.76	1.26	6.48	1.85	6.70	1.22
number of details	2.06	0.55	1.99	0.86	1.94	0.44
word count	16.16	11.90	13.85	8.58	10.69	4.87

* Students who finished before 20 minutes were not asked to complete this measure. Thus, for the 20-minute assessments BG = 20, CG = 22, GG = 21.

statistically significant overall difference was found after 20 minutes ($F(2, 60) = 6.891, p = 0.002, \eta^2 = .19$). Post hoc comparisons using the Tukey Honestly Significant Difference (HSD) test indicated that the mean score for the BG was significantly different than the CG ($p < 0.001$) but there was no difference between the BG and the GG. A comparison between the GG and the CG did not reveal a significant difference after 20 minutes.

Within-group comparisons were also made for subjects' reported story interest, to determine whether a given group's score changed significantly from 10 to 20 minutes. None of the groups showed a significant increase in their interest ratings from 10 to 20 minutes.

The second during-intervention motivational measure recorded desire to continue, assessed on a 4-point Likert scale question, "How much do you want to *continue* this story?" An overall comparison of desire to continue was statistically significant after 10 minutes ($F(2, 64) = 3.529, p = .035, \eta^2 = .10$), and also after 20 minutes ($F(2, 60) = 5.276, p = .008, \eta^2 = .15$). Post hoc comparisons using the Tukey HSD test indicated that the mean score for the BG was statistically significant when compared to the CG ($p < 0.05$) for desire to continue, after 10 minutes, and also after 20 minutes ($p < 0.01$). There was no statistically significant difference in the desire to continue between the

GG and the CG after 10 or 20 minutes, although the GG group's desire to continue was slightly higher in both instances.

Within-group comparisons were also made for subjects' desire to continue the story. Although the reported desire to continue increased slightly for each group as the task went on, the change was not statistically significant within any group.

After subjects experienced (read or played) the narrative for 45 minutes, data were collected asking how much they liked the story (henceforth "likeability") and about their interest, concentration, and perception of task difficulty through questions using a five-point Likert scale from 1 (not at all) to 5 (very much). A mean score comparison found a significant difference across groups in reported likeability at the end of the intervention ($F(2, 64) = 3.579, p = 0.034, \eta^2 = 0.1$). Post hoc comparisons using the Tukey HSD test showed that the BG vs. GG mean score comparison was statistically significant ($p < 0.05$), implying that the book group liked the story more than the video game group.

A mean score comparison of all three groups' story interest ratings at the end of the 45 minute task approached statistical significance ($F(2, 64) = 3.054, p = .054, \eta^2 = .08$), with the GG reporting the lowest rating in how much subjects liked the story.

A mean score comparison of the three groups found a significant difference between reported concentration on the task ($F(2, 64) = 4.266, p = .018, \eta^2 = .11$). Tukey HSD post hoc comparisons of the three groups indicated that the mean score for the BG was statistically significant when compared to the GG ($p < 0.05$) but not the CG, implying the lowest concentration scores on the task for game group.

A mean score comparison of all three groups' rating of task difficulty found a statistically significant difference ($F(2, 64) = 3.729, p = .029, \eta^2 = .10$). A post hoc analysis using Tukey HSD revealed that participants in the CG reported the lowest task difficulty, which was significantly different from the GG ($p < 0.05$), but not the BG.

Comprehension Findings

The second research question investigated the impact of the presentation format of a narrative on middle school students' comprehension of the story. Two types of comprehension questions were analyzed: literal and higher-order questions. In total there were eleven, one-point multiple choice literal questions, and eight higher-order questions. A one-way between subjects ANOVA conducted to compare the total correct responses on the eleven multiple-choice questions found a statistically significant effect of presentation format on literal comprehension score at the $p < .05$ level for the three groups [$F(2,64) = 5.93, p = .004, \eta^2 = .15$]. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the GG was statistically significantly different from the CG ($p < 0.05$) and the BG ($p < 0.05$). However, the CG condition did not differ significantly from the BG.

To analyze the higher-order questions, three different aspects were coded for each answer to the eight, open-ended, questions: accuracy, level of detail, and word count. For example, consider the following questions and responses: *Q*: How would you describe the relationship between Jessica and Ashley? *R1*: It was complicated. At first Ashley liked her because she thought Jessica was helping her, but then Ashley didn't like her because Jessica lied. *R2*: It was complicated. At first Ashley liked her, but then she didn't like her.

Accuracy was coded in a binary fashion; each answer was either correct or incorrect. Both responses in the above example are correct in their inferences about the relationship and would receive one point for accuracy. However, a simple accuracy score masks additional important information. Level of detail was scored by giving one point for an accurate and relevant descriptor, or an appropriate reason. In the aforementioned example, details are underlined and each would receive one point. Details were thought to be a potential differentiating feature between the three groups, as each condition provided different information with regard to how details could enhance inferences. For example, in the comic and video game conditions, graphics of body position, posture, and hand movements could help indicate how the two characters were interacting and felt about each other. This would not be true in the text condition, where all such information would have to be inferred from the text itself.

The word count measure was also used within the inferential comprehension analysis, as the provision of more details would be confirmed by a higher number of words used. Thus, in the above example, scores would be as follows: *R1*: accuracy = 1, details = 2, word count = 24; *R2*: accuracy = 1, details = 0, word count = 14. While both responses are accurate and exhibit inferential understanding of the relationship in question, *R1* provides more depth and sophistication, as shown in its number of details and words. Two graduate students independently scored the responses to each question for accuracy and details. Both raters had to agree, in terms of a response's accuracy score and its detail score, for inter-rater agreement to be coded as matching. Comparing their scores across both aspects for each response yielded a 92% inter-rater reliability rating; disagreements were resolved by a third reader.

A one-way between subjects ANOVA was conducted on each of the three score types: accuracy, number of details, and word count. There was no statistically significant difference found in any of these areas across the three groups (accuracy [$F(2, 64) = .224, p = .800$]; number of details [$F(2, 64) = .193, p = .825$]; word count [$F(2, 64) = 2.144, p = .126$]).

DISCUSSION

Two research questions were explored in this study. The first concerned the format of a narrative and how a respective format impacts middle school students' motivation to read a provided narrative, as indicated by students' perceptions of a story's interest level, their desire to continue reading, and how much they liked the story. The second question explored the impact of narrative format on the comprehension of a story. To address these questions, 67 middle school students were presented with a narrative in one of three formats: a video game, a comic book, or a book.

Results from this study reveal that narrative format may indeed impact middle school students' motivation to read, although perhaps somewhat counterintuitively. We felt initially that a narrative presented in a video game format might be the most interesting, be perceived as the most liked story, and would elicit the highest ratings in terms of desire to continue playing/reading given the documented interest children in this age range tend to show toward video game play. However, the results presented here indicate otherwise and argue for more research in this area.

For example, although there was no difference in reported perception of story interest between the three groups after 10 minutes, at the 20-minute mark statistically significant differences emerged. Subjects in the book group ranked the story as more interesting than the comic group, although there was no difference between the book and game groups. Results regarding interest at the end of the 45-minute period approached statistical significance ($p = 0.054$), with the book group reporting the most interest and the game group reporting the least. Statistically significant results indicate that the book group liked the story more than the game group, and that desire to continue with the activity was higher in the book group than the game group after both 10 and 20 minutes; there was no difference in desire to continue the story between the game and comic groups.

A similar pattern was seen in literal comprehension scores. The book group significantly outperformed the game group and the comic group; there was no statistically significant difference between the game and comic groups. There were no statistically significant differences in the three measures (accuracy, number of details, and word count) associated with the inferential comprehension questions.

These findings are somewhat puzzling, given the evidence suggesting middle schools students' interest in video games. Logical follow-up questions include, Why would the book group show the highest desire to continue the task? Why, with the support of graphics in the game and comic groups, would literal comprehension scores favor the book group, and why would the task demands that require an overt purpose for reading in the game not result in a gain over the other groups?

Perhaps the subjects' prior experience with the various narrative formats was a mitigating factor. For example, it is possible that narratives in book form are most familiar and thus the narrative within a video game is not the central focus during game play, even when the narrative is integrated into the game and is a central part of game play. We note that the game group reported that they concentrated less on the task than did the other two groups. Perhaps the game group concentrated on game play rather than on the narrative. This, of course, has important implications for those attempting to use games as instructional vehicles—one might not assume that the motivational value or interest in out-of-school endeavors will be automatically beneficial when used for in-school tasks. Co-opting students' leisure activities for instructional purposes may not always result in optimal outcomes (e.g., see Kinzer, 2010; Ito et al., 2009).

Additional explanations for our findings might include our subjects' expectations for the game itself. While the game we chose was popular, it is possible that the students had more experience with, and liked, faster-paced games such as action/fighting and racing genres. If this was the case, the relatively slow, plot-driven adventure game might have been disappointing or unfamiliar to the subjects. *Trace Memory* has a lengthy introduction with dialogue between characters. Perhaps, to some subjects, *Trace Memory* may not have felt like a game. While it is an adventure game on the Nintendo DS, *Trace Memory* is similar to a graphic novel, though with puzzles/challenges interspersed within its dialogue.

We note that the game group reported higher task difficulty scores than the other two groups. Perhaps their interest and likeability ratings were influenced by how difficult they found the task. Perhaps there is a tension between the narrative and the interactivity of the game. As Costikyan (2000, p. 45) notes, "There is a direct, immediate conflict between the demands of a story and the demands of a game. Divergence from a story's path is likely to make for a less satisfying story;

restricting a player's freedom of action is likely to make for a less satisfying game." Juul (2001) similarly argues that games and stories do not translate to each other as do some of the more traditional media, such as movies and books.

With regard to the comprehension results, a possible explanation is that the puzzles interspersed throughout the game, rather than focusing the player on the narrative to gain clues to apply to the puzzles, distracted students. In addition, the need to navigate Ashley through the in-game world required some concentration on the part of the player. Perhaps students processed fewer story details due to the additional tasks involved in playing the game: holding the console, selecting and pressing the appropriate buttons, navigating Ashley through the in-game worlds, and so on. From a cognitive perspective, these additional tasks might cause a form of dual-task interference (Pashler, 1994) that ultimately impacts subjects' ability to process the narrative fully. This explanation seems consistent with the finding that subjects in the game group reported the highest level of task difficulty.

Taken together, the results of this study point to a need for well-designed research that examines the roles and effects of narratives in video games. This study used one genre of video game—an adventure game. The effects on motivation and comprehension in other video game genres may well be different. It remains necessary to explore the role of narrative understanding in game play, and the ways that game-based narratives might serve as vehicles for learning. This is not to say that learning cannot or does not occur in and through games. However, all games are not the same, and coming to understand optimal narrative environments for specific learning tasks within games is still woefully unexplored. We urge others to take up the challenge and closely examine the interrelationships between game play, game design, educational goals, game mechanics, and learning mechanics, especially as these might inform the teaching and learning of literacy and the exploration of literacy practices both in and out of school settings.

ENDNOTE

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