**Emerging Research Interests that Complicate Data Analysis:
How the Past Informs the Present**

Donna E. Alvermann, Ph.D.
Helene Halstead, Ed.S.
Marie Troutman Goodwin, M.A.
Lloyd P. Rieber, Ph.D.

The University of Georgia

Abstract

Increased interest in researching students' online literacy learning in the United States, particularly in the area of written argumentation, continues to attract external funding by both federal and private organizations. The authors of this article were fortunate to have received a grant from The Bill & Melinda Gates Foundation that required working with students in grades four through eight to develop an online learning tool that targeted three Common Core State Standards involved in written argumentation. Complications arose when the funding cycle did not align with the local school calendar. A series of events led to the researchers having to limit their data analysis to computer-generated records. This article describes how the researchers used two theoretical frames that differed not only in historical time but also in underlying assumptions to arrive at an analysis that satisfied the funding agency and their institution's human subjects review board.

By fourth grade, students in high-need schools lag considerably behind their peers from more economically advantaged backgrounds, and the gap widens as they move through middle school. This discrepancy is particularly visible in the area of persuasive writing that Common Core State Standards (CCSS) expect students to master (http://www.corestandards.org). No matter how controversial the CCSS are in some states, mastery of written argumentation has been a mainstay in U.S. schools for decades, and these standards show no signs of abating in a Web-based world that depends on media of one kind or another to transmit ideas and opinions for which little or no evidence sometimes exists.

Another mainstay in U.S. educational debates is the tension that has existed since the early 20th century over the locus of control when it comes to teaching students of all ages how to read and write in the core disciplines (science, mathematics, social studies, and the English language arts) (Alvermann & Moje, 2013). From the time of William S. Gray (1925) to the more recent Common Core State Standards, the call has been for every teacher, regardless of disciplinary training, to instruct students in reading and writing skills, such as written argumentation. Though seemingly logical, a majority of secondary teachers have historically viewed this call as an unfair demand on their time given their lack of expertise in literacy instruction (Dillon, O'Brien, Sato, & Kelly, 2011). In turn, this situation has led to a longstanding tension between literacy education and science education researchers (Holliday, Yore, & Alvermann, 1994). It is a tension we argued in our proposal to The Bill & Melinda Gates Foundation that we could address effectively by developing the online role-playing tool PersuadeMe.

PersuadeMe is based on the simple premise that all people have opinions on

issues that matter to them. Just as many adults are eager to share their opinions about whether or not they think climate change is a real phenomenon that human activity directly influences, fourth grade students will likely be just as happy to discuss at length which lunches served at their school are or are not their favorites. However, when students are sked to give reasons for theiropinions, the resulting conversations yield different sorts of responses. These conversations often reveal a disposition for one belief over another with claims based on evidence that usually contain bias in favor of those dispositions. Pushing someone to support their claims with evidence and responding to contradicting evidence is a challenge.

PersuadeMe is also based on the premise that people enjoy sharing their opinions with others. Doing so is an inherently social activity. Even if one holds an opinion in secret, the motivation not to share is likewise a social one. We might be afraid if our opinion is not shared by those we respect (or fear). Having the opportunity to share our opinions with others honestly in a safe anonymous environment, particularly one that rewards support and collaboration while promoting reflection and review of the opinions we hold and why, is what we believe makes PersuadeMe such a powerful learning environment.

<div align="center">**PersuadeMe**</div>

A PersuadeMe experience is organized around the idea of a tournament. Each tournament begins with the identification of a topic, followed by dividing the participating students into two groups: 1) idea innovators; and 2) idea investors. The idea innovators write persuasive arguments on the topic of the tournament. The idea investors read and critique the arguments as well as invest in arguments as a vote of confidence.

Each PersuadeMe Tournament involves a number of rounds, usually about three. Each round is divided into two parts.

The first part focuses on the innovators writing their arguments and rationales. At this point, they are not yet asked to provide specific evidence. This is done based on the belief that it enhances engagement by allowing the students to quickly "take a stand" on the issue stemming from their prior knowledge and feelings. The second part of the round is when the investors review the innovators' arguments and rationales. As investors read the arguments, they can vote to "invest in an argument" by giving it a positive vote—measured in as many idea dollars as they wish to spend—which increases the value of an argument within the role-playing community. Investors are also encouraged to offer suggestions to innovators whose arguments are not found to be persuasive in order to improve the argument. All arguments, critiques, and investments are completed anonymously; students do not know each other's identity or roles in a tournament. This practicehelps preserve fairness by reducing the chance of popularity bias among students. It also helps to limit a student's emotional exposure should a particular argument or evidence not be received well in any single round.

In round two, innovators are required to include evidence to support their positions and are given time and guidelines for doing so. They are also expected to update their arguments at the beginning of the round in light of the evidence they have found. It is therefore conceivable for an innovator to completely change his or her opinion as a tournament unfolds. Investors return to the argument to critique supporting details and vote with their idea dollars.

It's important to note that the results of a single round are not immediately published for the entire group to see. Instead, the idea innovators are provided their individual results in private along with any feedback that investors chose to give them. This gives all idea innovators the opportunity to revise and strengthen their arguments based on earlier feedback before the next round begins. At a time to be determined by the teacher, the next round begins at which point all of the results of the previous round are published to all participants. The idea investors proceed to invest in the idea innovators' persuasive arguments based on the revisions. In this way, previously weak arguments that are now strengthened have the opportunity to garner more support by the investors. After each round of a tournament, the "voting via investing" moves the most persuasive student arguments up in importance or value. Students who wrote weaker arguments in a preceding round begin each subsequent round with the advantage of sufficient feedback from both peers and teachers. PersuadeMe's game-like strategy ensures that winners are ultimately determined by the value of their arguments and supporting details (or evidence) at the end of a tournament.

The research basis for PersuadeMe comes from a long line of studies in late 20th century that focused on student cognition, motivation, and sociocultural learning. For example, research reviewed by Guthrie and Wigfield (2000) in support of their engagement model for literacy teaching and learning showed that cognitive tasks such as written argumentation are mediated by a student's motivation to complete those tasks. PersuadeMe is a learning tool that resembles a game, thereby engaging student motivation to participate. Likewise, Graham and Hebert's (2011) meta-analysis of the impact of writing and writing instruction on reading achievement, and Duschl and

Osborne's (2002) review of the literature on argumentation supports PersuadeMe's goal of engaging students in cognitive, social, and collaborative processes that are known to nurture and sustain motivation for mastering higher order thinking skills. Finally, Toulmin's approach to argumentation, on which PersuadeMe rests, has garnered research support for over a decade, especially in relation to its use in science classroom instruction (Erduran, Simon, & Osborne, 2004).

Theoretical Perspectives and Challenges

Two theoretical perspectives were used in the analysis of the PersuadeMe prototype and the internal data generated from a pilot study. One perspective was derived from Bourdieu's (1977) approach to studying humans as they socially interact. A second perspective, referred to as New Materialism (Bennett, 2009), focused primarily on non-human actants. Both of these theories were used under the IRB constraints that restricted analysis to the non-human prototype.

Perspectives

Bourdieu and Passeron's (1977) pivotal text *Reproduction in Education, Society and Culture* was published almost forty years ago. Despite its prominence in the field of sociology and the incorporation of technological tools, such as PersuadeMe, into educational settings, social theory has remained largely a canonical theory (Blommaert, 2015). Notwithstanding this limitation, we opted to use Bourdieu's social theory to assess potential instructional advantages for the tool PersuadeMe. Specifically, we were interested in how one's habitus—that is, one's socially reproduced attitudes and values at a given time and place (Sullivan, 2002)—would be reflected in playing the online game PersuadeMe.

By investigating the in-game, raw-data discourse and how it differs from in-class discourse, we hoped to better understand a player's allocation of virtual funds in successive rounds and tournaments. Because social theory indicates that a person's values are not only constructed within a single community, but also reconstructed in other communities in which that person engages, it was important to ensure that our data analysis focused on the in-game habitus of PersuadeMe rather than on the classroom per se.

From a New Materialism perspective, Jane Bennett's (2009) *Vibrant Matter* emphasizes the agency of non-human actants. In analyzing PersuadeMe from this perspective, the analysis examined the "enablements" of the prototype, meaning the activity that was elicited by the prototype. This analysis focuses on non-human actants, in keeping with the new materialist perspective and the IRB restrictions that applied to this research. Four non-human components of a PersuadeMe tournament were particularly salient: PersuadeMe itself, the computer assemblage, the prompt, and the suggestions. All of these actants are themselves assemblages of multiple moving parts. These assemblages consist of many components, both human and non-human. In order to illustrate what is meant by non-human actants, here are some of the salient components of each assemblage.

- PersuadeMe is the online prototype, consisting of its visual appearance, structure [including the boxes for entering arguments, rationale, and evidence], rounds of argumentation, and financial incentive.

- The computer assemblage is the computer, Internet connection, screen, mouse, and keyboard.

- The prompt is the question posed for debate, as well as issues and topics related to the question that may have resonated in a given argument.

- The suggestions are the comments and ideas that the prototype evoked as a means of improving the original argumentation presented.

Examining these assemblages individually and in conjunction provided the information we needed in order to determine what activity the prototype was able to elicit.

Challenges

Although different perspectives were used in the examination of PersuadeMe, the two analysts faced similar challenges. The primary challenge resulted from the researchers being restricted to analyzing a non-human prototype (PersuadeMe) as a result of receiving notification of funding from The Bill & Melinda Gates Foundation too late in the academic year to obtain their institutional review board's approval to collect data on the students who actually played the online game. While raw data collected by PersuadeMe's internally generated evaluation system provided information on the object's game-playing elements, it did not allow us to examine the players' social interactions while engaging with the various rounds of game-play.

The restriction to non-human actants did not pose a significant challenge to a new materialist analysis; indeed a new materialist perspective makes a similar requirement of the researcher. In this perspective, analysis must take into account the non-human components of the phenomenon under investigation (although it would not necessarily rule out any analysis of the human elements, as was the case here). The primary challenge in a new materialist analysis was the gaps in information regarding specific physical characteristics of the non-human actants. For instance, further data regarding

the look and feel of the prototype, as well as the way it was designed for use, would potentially provide an even richer analysis.

This restriction did, however, pose a challenge to the use of a social theory perspective. This framework examines exchanges of cultural, social and economic capital as a reflection of the human actants' habitus. The additional data from observing an authentic setting of the game in use would have allowed for an interpretation of the impetus for certain arguments, responses, and distribution of PersuadeMe funds.

Methodology

To adhere strictly to the two theoretical perspectives just named, we needed to analyze data on both human and non-human actants. Such an assemblage, while ideal, was impossible given the constraints of having insufficient time for a full human subjects review; thus, we limited our data collection methods and analysis to include only the non-human actants. This arrangement presented no difficulty in terms of data collection; we simply focused our attention on the evaluation aspects of the prototype. That is, we coded each response elicited by the online prototype for each of the three tournaments. Each tournament was designed for a different written argumentation topic (e.g., cell phones in schools, school dress uniforms, and video games). Restricted to studying a non-human actant, we relied on Jackson and Mazzei's (2012) rationale for plugging in a common data set across the two theoretical perspectives that informed our study.

Data Sources

The primary data source was the password-protected website that housed the evaluation functions of PersuadeMe. A secondary data source included the results from the rounds of tournament play.

Analytic Procedures

To conduct an analysis of PersuadeMe from a social theory perspective, it was

necessary to first determine which aspects of the tool-generated data reflected social,

economic, and cultural capital.   The next step was to determine how the exchanges of

those capitals reflected and constructed the in-game habitus. The New Materialist lens

defined its primary components of analysis differently. This perspective provided a more

direct examination of the non-human actants that comprised the tool itself, as discussed

previously.

Findings

	give an opinion?	opinion with evidnece?	I want to invest?	for the innovator:	help the innovator?		
2	Yes	Yes		1000	You could use the internet to help you.	It will help them make the idea better		
3	Yes	Yes		500	you can find information	Cell phones are helpful		
4	Yes	Yes		1000	I love it!	I hate it!		
5	Yes	Yes		500	Turn off i you do that I will give 200 it is fun	emtpty		
6	Yes	No	Empty		You bell be ebed to yos sed pansatsa	empty		
7	Yes	Yes		500	You can call your mom or dad if you weet your pants or something like that it is the circle of life	empty		
8	Yes	Yes		1000	empty	Cell phone helps you with math because if you don't have a calculator		
9	Yes	Yes		1000	to call your mom	It is making his idea better		
10	Yes	Yes		1000	If you need help with a reshearch. If mom/ dad calls you	Some people like his /her idea		
11	Yes	Yes	900(?)		Cell phones are great for school because if something bad happens you can tell your parents	Like if something bad happens you can tell your parents		
12								
13	Total 10 responses			1000-5 500-4				

Figure 1. Data collected from PersuadeMe shows the feedback provided by peers to one

student's argument. The figure demonstrates that this particular round of argumentation

enabled discussion and suggestions. Many of the suggestions provided reasons that cell phones are good in class, countering the original argument presented. The computer assemblage also enabled the addition of emphasis through exclamation marks in one suggestion.

The tool was designed to foster the engagement of students in cognitive, social, and collaborative processes. This engagement would, in turn, sustain motivation so that students can work toward a mastery of skills such as written argumentation. Both perspectives were able to provide analysis of the tool and how this engagement might occur.

From a social theory perspective, the tool PersuadeMe appeared to support collaboration in terms of co-constructed arguments motivated by pre-determined prompts. The substantial number of written exchanges between an innovator and an investor led us to assume that the tool was engaging. However, absent from the accumulated data were indicators that would have further strengthened our assumption concerning collaboration. For instance, we found neither an overwhelming acceptance of investors' suggestions, nor for that matter a tendency on the part of investors to offer much in the way of helpful critiques that potentially could have increased a range in distributions of economic capital. Based on the rarity with which investors' suggestions were taken into account by the innovators, one is left to wonder if the in-game habitus was at odds with the in-class habitus.

What can also be seen is that written exchanges in the form of collaboration may be based on a variety of reasons; we cannot determine from the data pool why players

ignored suggestions or even used specific language in their arguments. As mentioned

earlier, a social theory perspective examines *why* in relation to *what.*

In reference to Figure 1, line 7 shows that an investment was made in the amount

of $500.00. This is an exchange of economic capital, but we cannot be sure why the

exchange was made. If this investment was generated because "if you weet (sic) your

pants or something like that it is the circle of life" is a sound argument to the prompt

asking if students should have cell phones in school, then cultural capital was in use and

the values of the class may be reflected. If, however, the $500 was allocated in response

to potty humor, then a reflection of in-game habitus would be a reasonable assumption.

Because of this ambiguity and our inability to use interview data (per our human subjects

review board), we cannot say with certainty whether or not PersuadeMe enabled the

exchange of capitals.

We found that argumentation was frequently strongest in Round 1 and tapered off

in later rounds. Closer observations of PersuadeMe tournaments in future research when

restrictions on data analysis do not apply would yield a better understanding of the factors

that may have led to decreased use of argumentation skills in later rounds. It appears that

expecting PersuadeMe's virtual money to act as a financial incentive for Innovators to act

on Investors' suggestions did not serve our intended purpose—that of linking game play

to the real world. It is our hunch that PersuadeMe dollars were not valued in game play.

Currency in the real world can be used to procure material goods and services. Finally,

the PersuadeMe prototype developed through funding from The Bill & Melinda Gates

Foundation did not offer opportunities for spending the game-play money. Any future

research into the potential for PersuadeMe to motivate Innovators to act on Investors'

suggestions would do well to have a marketplace incentive in place at the start of a tournament.

Conclusions

By refusing (out of practicality) the Western mind's need to "divide between knowing *subjects* on the one hand, and *objects* of knowledge on the other" (Law, 2004, p. 132), we avoided disqualifying non-human data on the premise that such data had no agency in and of themselves. Nothing could be further from the "truth" when viewed within New Materialism. By not assuming that we could *know* our participants (even if the university's human subjects board had granted us the right to report on the human actants' activities in our study), we were free to focus solely on the non-human actant's (i.e., PersuadeMe's) internally generated data.

Data accumulated by that system and analyzed through a New Materialist lens showed that the non-human components (i.e., the prompt, the tool, and the suggestions) enabled arguments, responses, and financial reward. Thus, PersuadeMe did elicit activity in a game-like social learning environment designed to support students' persuasive writing skills and cognitive development.

From a social theory perspective, PersuadeMe was an effective tool in that it elicited argumentation, rationales, and evidence in most rounds of game play. It also provided a means by which opinions were formed that elicited different types of argumentation, ranging from seemingly rational arguments to those based on emotions and personal preferences.

References

Alvermann, D. E., & Moje, E. B. (2013). Adolescent literacy instruction and the discourse of "every teacher a teacher of reading." In D. E. Alvermann, N. J. Unrau, & R. B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th edition, pp. 1072-1103). Newark, DE: International Reading Association.

Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Durham, NC: Duke University Press.

Blommaert, J. (2015). *Pierre Bourdieu and language in society.* Tilburg, Netherlands: Tilburg University.

Bourdieu, P., & Passeron, J. C. (1977). *Reproduction in education, society and culture*. Beverly Hills, CA: Sage.

Dillon, D. R., O'Brien, D. G., Sato, M., & Kelly, C. M. (2011). Professional development and teacher education for reading instruction. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. P. Afflerbach (Eds.), *Handbook of reading research* (Vol. 4, pp. 629-660). New York, NY: Routledge.

Duschl, R.A., & Osborne, J. (2002). Supporting and promoting argumentation discourse in science education. *Studies in Science Education*, *38*(1)*,* 39-72.

Erduran, S., Simon, S., & Osborne, J. (2004). TAPping into argumentation: Developments in the application of Toulmin's argument pattern for studying science discourse. *Science Direct*, *88*(6), 915-933.

Graham, S., & Hebert, M. (2011). Writing to read: A meta-analysis of the impact of writing and writing instruction on reading. *Harvard Educational Review*, *81*(4), 710-744.

Gray, W.S. (1925). A modern program of reading instruction for the grades and for the high school. In G. M. Whipple (Ed.), *24th yearbook of the National Society for the Study of Education: Part 1*. Report of the National Committee on Reading (pp. 21-73). Bloomington, IL: Public School.

Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 403-422). New York, NY: Erlbaum.

Holliday, W. G., Yore, L. D., & Alvermann, D. E. (1994). The reading-science learning-writing connection: Breakthroughs, barriers, and promises. *Journal of Research in Science Teaching*, *31*(9), 877-893. doi:10.1002/tea.3660310905

Jackson, A. Y., & Mazzei, L. A. (2012). *Thinking with theory in qualitative research: Viewing data across multiple perspectives*. New York, NY: Routledge.

Latour, B. (1996). *Aramis or the love of technology*. Cambridge, MA: Harvard University Press.

Law, J. (2004). *After method: Mess in social science research*. New York, NY: Routledge.

Marsh, J. (2006). Popular culture in the literature curriculum: A Bourdieuan analysis. *Reading Research Quarterly*, *41*(2), 160-174.

Milner, A. (1993). *Cultural materialism.* Carlton, Victoria, AU: Melbourne University Press.

Sullivan, A. (2002). Bourdieu and education: How useful is Bourdieu's theory for researchers? *The Netherlands' Journal of Social Sciences*, *38*(2), 144-166.

Tzanakis, M. (2011). Bourdieu's social reproduction thesis and the role of cultural capital

    in educational attainment: A critical review of key empirical studies. *Educate*,

    11(1), 76-90.