

The Quantitative Literacy Demands of Nonfiction Texts Used in English Language Arts (ELA) Classrooms: A Pilot Study

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Introduction



Common Core State Standards (2009) proposed major shifts in ELA teaching:

Add more **“nonfiction text”** so that students are reading it 70% of the time by senior year.

(National Governors Association Center for Best Practices, & Council of Chief State School Officers, 2010).

But what is “Nonfiction Text?”

CCSS offers no definition: Instead, interchangeably uses:

- “Literary nonfiction”
- “Informational text”
- “Expository text”



Differ in structure, features, and cognitive demands but lead teachers to think they are the same.

Literary Nonfiction vs. Informational Text

Multiple Modes of Representation

Words
Symbols
Visuals

Rising before them stood a castle tree house—two stories high with an open turret and stairs that wound through a trap door that led to a tiny chamber at its highest point. The castle included a sky bridge, a tower prison, a tunnel, and a library—perfect for a girl with a bright imagination and a hunger for stories.

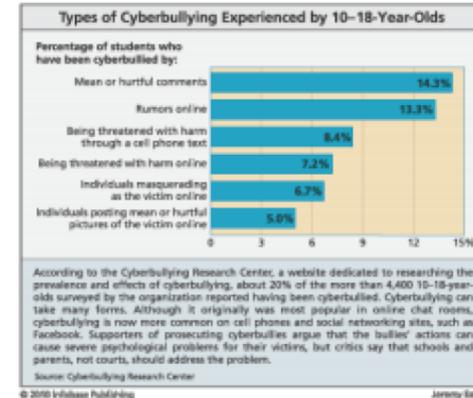
In the castle Avery could be anybody she wanted to be. On sunny days, she pretended to be queen and made Henry one of her loyal subjects. She painted watercolor castles and wrote poetry while sending Henry to collect blackberries or fetch water from the nearby stream for their snack. At night, when the sky was as black as ink, Avery would lie on the roof and imagine the stars were diamonds in her crown.

This castle held many secrets—among them, it supposedly sat atop an intricate system of tunnels—but whether any of them were true, Avery had no idea. Most importantly, it was the last place Avery saw her mother before she left and never came back.

Today it would be a hiding place.

Avery decided she and Henry would stay in the tree house until night fell, and then they would sneak home where Avery would explain everything to their father. He would be angry at first but would eventually soften. He might even loan her the money to buy a replacement dress since she had saved her brother's life.

Avery was just about to lead Henry into the arched doorway of the thick tree trunk when he yanked free of her grasp and raced into the open.



Cyberbullying Leads to Suicide, Prosecution

Over the past few years, several high-profile cases that have ended in tragedy have brought national attention to **cyberbullying**. In 2003, a 13-year-old Vermont teenager, Ryan Halligan, killed himself after he was taunted incessantly online and received numerous instant messages questioning his sexual orientation. Halligan's father became an **antibullying** activist, and the following year the Vermont state legislature passed an anti-cyberbullying law requiring schools to institute disciplinary policies addressing both on- and off-campus bullying.

In 2008, a **cyberbullying** case concerning a Missouri woman, 49-year-old Lori Drew, garnered national media attention. After Drew's daughter and a neighbor's daughter, Megan Meier, had a falling out, Drew and two other people set up a fake profile on MySpace under the name Josh Evans. "Josh" contacted 13-year-old Meier routinely, flirting with her, before eventually turning on her and saying that "the world would be a better place" without Meier in it. Shortly after receiving that message, Meier—who suffered from clinical depression—killed herself. Prosecutors charged Drew with one count of conspiracy and three violations of the Computer Fraud and Abuse Act, a 1986 **federal** law meant to prevent hacking. The prosecution argued that Drew had violated MySpace's terms of use, which stipulated that users provide truthful information when registering for a profile on the site. That violation of rules, prosecutors said, constituted "unauthorized access" to the site, a violation of the Computer Fraud and Abuse Act.

Some observers, however, balked at the charges. Experts noted that few Internet users regularly read the terms of use on all the websites they joined, and that sometimes it was beneficial for users of sites such as MySpace to present false information to protect their privacy. In September 2009, a California **federal** judge threw out Drew's misdemeanor convictions after ruling that laws criminalizing violations of websites' terms of service are too vague to be constitutional.

In 2008, Representative Linda Sanchez (D, California) introduced the Megan Meier **Cyberbullying** Prevention Act in the House. If the bill passes, any electronic communication meant "to coerce, intimidate, harass, or cause substantial emotional distress to a person" will become a felony under **federal** law. In September, the House Subcommittee on Crime, Terrorism and Homeland Security held a hearing on the bill, but many legislators voiced concerns that the bill

Why is this a problem?

1. The Teachers

- Have autonomy, might lack the knowledge and guidance to make informed decisions (Stotsky, 2012).
- Little is known about nonfiction texts taught



Types: Complexity, Demands

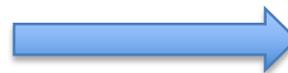
2. The Texts

- Are inherently mathematical, containing mathematical ideas and representations.
- Need to be read differently than verbal items even when embedded in a verbal context (Chapman & Lee, 1990).

Literacy depends on numeracy.

3. The Readers

- Need to move flexibly between registers, construct meaning, and transform it.
- ***Read embedded mathematical representations non-mathematically or not at all*** (Chapman & Lee, 1990).



Requires 'mathematical thinking' (Burton, 1982).

Purpose/Research Questions

The purpose of this study was to explore the nonfiction texts ELA teachers assign and the Quantitative Literacy demands that these texts pose on student readers.

Research Questions:

1.	2.
Which nonfiction texts are secondary ELA teachers assigning to their students?	What are the Quantitative Literacy demands of these texts?

Sample and Data Collection

- Sent emails to Connecticut high school ELA department heads asking them to invite their teachers to participate in the study.
- Collected nonfiction texts that participating teachers assign.
- ***Only the informational texts were analyzed.***

- All participating teachers use online nonfiction text collections.
- Cited 10 online resources.
- All participants use Newsela.com

Collected **41** texts:

16 = narrative nonfiction

25 = informational

Collected **35** Newsela texts

Total: 60 texts

Data Analysis

A manifest content analysis (Potter & Levine-Donnerstein, 1999) was conducted to determine the quantity of **numeracy events**, or “occasions in which a numeracy activity is integral to the nature of the participants’ interactions and their interpretive processes” (Street & Baker, 2006, p. 201).

Criteria:

1. Words, mathematical symbols, visuals (graphs, tables) or a combination thereof (O’Halloran, 2005)
2. Readers must apply numeracy skills/knowledge to make inferences
3. Inferences are essential to fully comprehend the text.

Data Analysis Examples

About 20% of more than 4,400 11–18-year-olds surveyed by the Cyberbullying Research Center in 2010 reported having been cyberbullied at some point in their lives.

- %
- $20/100$
- $1/5$
- Less than half
- Less than a quarter
- Is this a lot or a little in the context?

- 4,401 or any number greater
- $4,400/5 = 880$
- At least 880
- Is this a large sample size?

- Subtraction or range?
- How old are the respondents? 11, 12, 13, 14, 15, 16, 17, and 18.

Other examples

Publishers were quickly figuring out that young people and women made up the **majority of the film audiences.**

Nearly 70 percent of marriages, involving those **under 18** end in divorce. For those who marry **at 16 or younger**, which is permitted in **nearly 40 states**, **almost 80 percent** of their marriages will end in divorce, Hamilton says.

Findings

Articles Collected from Teachers

# Articles	# Numeracy Events	Average/Article
25	310	12.40

Articles Collected from Newsela.com

# Articles	# Numeracy Events	Average/Article
35	445	12.71

Implications/Conclusion

- Nonfiction texts taught in secondary ELA classrooms contain numeracy events.
- Successful comprehension depends on application of mathematical thinking
- Explicit teaching of numeracy in the context of nonfiction text reading.
- **CCSS provides little pedagogical guidance:**
 - Nonfiction text selection
 - Text complexity
 - Teaching nonfiction texts
- ELA teachers need to be aware of different nonfiction text types:
 - Differing text features
 - Differing cognitive demands
- This could inform professional development

26 informational text exemplars for ELA are all narrative nonfiction.

Next Steps

For the current study:

- ***Inter-rater reliability:*** Have at least two additional raters analyze the texts for numeracy events.
- ***Latent content analysis:*** Deductively code numeracy events to determine patterns in mode of representation and levels of complexity.

Related studies for the future:

- ***Explore teacher motivations for nonfiction text selection:*** Awareness of numeracy events and intentions of explicitly teaching them.
- ***Explore text simplification software:*** What happens to numeracy events when Newsela.com simplifies nonfiction texts containing them?