

Uncovering Online Reading Comprehension Processes: Two Adolescents Reading Independently and Collaboratively on the Internet



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Overview of the Study

- This work used both case study and verbal protocol approaches to examine online reading comprehension as students address a researcher-posed question.
- Students were asked to conduct online research (for approximately 35 minutes), and think aloud about what they were doing and what they were thinking.
 - Each student completed an individual task
 - Students then worked together to complete a collaborative task

Why is this an important area to explore?

- In the context of preparing students for the demands of a 21st century knowledge society, there has been a shift on **personal understanding** [versus recall] and **co-construction of new knowledge** [versus transmission of information] (Assessment and Teaching of 21st Century Skills [ATC21S], 2008; IRA & NCTE, 2010; Wells, 2007)
- “Educational settings should enable learners of all ages to **construct knowledge together**, and thereby to enhance their **individual understanding** of the world and their **potential for action** in it” (Wells, 2007; see also Almasi, 2002)

Questions that Guided the Inquiry

- In what ways does shifting the reading context from offline to online change how students read for information?
- What strategies do adolescents employ as they read online to solve information problems?
- Do students use similar strategies when reading online independently and collaboratively?
- Is Afflerbach & Cho’s (2009) existing coding scheme for reading processes an adequate tool for analyzing all online reading?

Theoretical Assumptions

- **Constructivist theories of reading:** Readers are actively constructive as they **interact with and respond to information** in text while reading for a particular purpose (Pressley & Afflerbach, 1995, p. 83)
- **Online reading comprehension:** Some strategies for reading online and offline are common, some are more complex, and some are unique (Afflerbach & Cho, 2008; Coiro & Dobler, 2007; Coiro, 2007; Hartman, Morsink, & Zheng, 2010; Leu, Kinzer, Coiro, & Cammack, 2004)
- **Social interaction** contributes to individual development. Cultural artifacts (such as technology) play a key role in mediating social activity (Crafton & Burke, 1994; Serafini, 2000; Vygotsky, 1986)

Individual Task

Should land be set aside to preserve the leatherback sea turtle?

(Individual online reading with short retrospective interview)



The Participants

Seventh grade science students
Volunteered for the study

Abby



Starfish



Methods: Developing the Coding Scheme

Getting Started

- Pressley & Afflerbach's (1995) *Verbal protocols of reading*
- Pearson, Roehler, Dole, & Duffy (1992)
- Examine and compile a compendium of constructively responsive reading strategies in **offline reading contexts**

Refining the Coding Scheme

Going Further

Broadened with findings from recent studies that used think-aloud protocols to qualify nature of comprehension strategy use while reading across multiple texts in **online reading contexts**

- Afflerbach & Cho (2008): N=14 studies (multiple source) & 32 studies (hypertext & Internet) > revisit and update 1995 strategy list
- Afflerbach & Cho (2009): N=29 studies > new category "realizing and constructing potential texts to read"
- Coiro (2007): N=120 7th graders (quantitative) and N=12 (qualitative)
- Coiro & Dobler (2007): N = 11 seventh graders > PK, inferences, monitoring
- Schmar-Dobler (2003): N = 5 fifth graders > many parallels & navigation
- Zhang & Duke (2008): N = 12 adults (over 18 years old) > purposes & patterns

RQ1: Refining the Coding Scheme

Identifying & Learning Text Content	Identifying & Learning Text Content
<p>A. Before Reading Constructing a Goal/Planning Overviewing/Previewing</p> <p>B. During Reading Adjusting/Skimming Reading Aloud Paraphrasing Inferring/Predicting Connecting ideas within text Integrating Interpreting Determining word meaning Questioning/Conversing with author</p> <p>C. After Reading Rereading/Remembering Reflective processing Planning to use knowledge</p> <p>Monitoring understanding/Repairing Evaluating Evaluating source, topic, quality</p>	<p>A. Before Reading Planning searches to execute Searching/Locating (generating search; scrutinizing search results; predicting hyperlink utility)</p> <p>B. During Reading Connecting ideas across texts [Actions] Highlighting text; following with cursor; avoiding or skipping texts; sequencing texts</p> <p>C. After Reading (one text > another) Summarizing to remember across texts</p> <p>Monitoring/Repairing Monitoring reading pathways Changing reading pathways</p> <p>Evaluating Evaluating relevance of search results</p>
	<p>+</p> <p>Re-sequenced categories to follow online inquiry process</p>

11 Main Coding Categories (plus subcategories)

<p>Before Reading ⇒</p>	<p>1. Planning 2. Searching 3. Overviewing 4. Determining Important ideas</p>
<p>During Reading ⇒</p>	<p>5. Inferring 6. Integrating 7. Questioning 8. Monitoring 9. Evaluating 10. Repairing</p>
<p>After Reading ⇒</p>	<p>11. Reflective processing</p>

Methodology: Coding the Data

Time	# Sacs	Search Words	Website Visited	Student's Exact Words	Code	Liz's SubCode	Julie's SubCode	Jill's SubCode	Matched
12 sec	15			The only thing I know about sea turtles are that they are big and live in the ocean.	Planning	Planning	Activating Prior Knowledge		Y
28 sec	25		Navigates to school website, and then to Grolier.com listed in link on school website)	So Internet Explorer. I think Grolier is the best website that I like to search topics on... (clicking on website)...so I am going on Grolier		Planning	Planning the Search		Y
33 sec		2	Leatherback Sea Turtles	I am on Grolier right now and I am going to Grolier Multimedia Encyclopedia...and to search I will type in Leatherback Sea Turtles.	Searching	Searching	Generating Key Word Search		
55 sec	10		Grolier	There are a lot of them. There are 2500 items found Although the second one says leatherback turtles.	Searching	Searching	Scrutinizing Search Results		Y
1:07 sec	3				Searching	Searching	scrutinizing hyperlink utility		Y

Analyzing the Data

- Phase I: Review of screen capture data for general impressions
- Phase II: Transcription of all verbal responses and online reading actions
- Phase III: Coding
- Phase IV: Making sense
 - theory driven deductive coding structure
 - independently code
 - compare codes (and revise coding scheme)
 - examination of patterns
 - frequency counts of strategies used

Inter-Rater Reliability

Student	Total Codes	Category agreement	sub-process agreement
Abby	172	91%	82%
Starfish	175	94%	89%
Abby & Starfish	162	92%	83%

A Closer Look at Abby



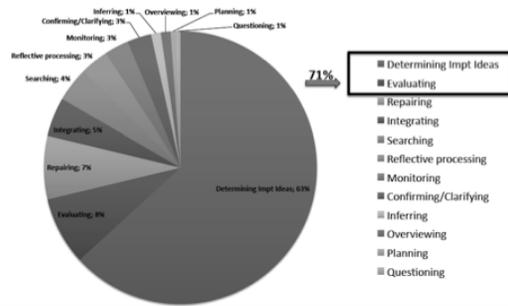
- Reading silently **"HABITAT"**: *The leatherback is the most pelagic of the sea turtles. Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the crawl to dry sand is not too far. The preferred beaches have proximity to deep water and generally rough seas.*
- 16:40: **...this is interesting** ...the habitat are sandy nesting beaches, with vegetation and their preferred beaches have deep waters and generally rough seas.
- 16:50 S - **It's just strange** because they just lay their eggs on the beaches and then just have time to go to the water.

Abby's Stance: "The Thoughtful Gatherer"

Findings: Abby's Frequency of Reading Strategy Use



ABBY: THE THOUGHTFUL GATHERER



A Closer Look at Starfish



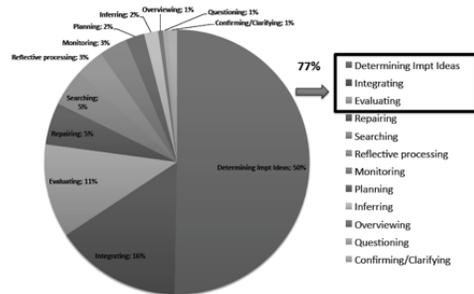
- 7:06 (website text) *Their lifespan is unknown but many leatherbacks meet an early end due to human activity. It is estimated that **only about one in a thousand leatherback hatchlings survive to adulthood**. Eggs are often taken by humans from nests to be consumed for subsistence or as aphrodisiacs. Many leatherbacks fall victim to fishing lines and nets, or are struck by boats. Leatherbacks also can die if they ingest floating plastic debris mistaken for their favorite food: jellyfish. Some individuals have been found to have almost 11 pounds (5 kilograms) of plastic in their stomachs.*
- S: 7:15 (reading aloud) Only about one in a thousand leatherback hatchlings survive to adulthood.
- S: 7:21 **That's kind of sad.**

Starfish's Stance: "The Aesthetic Summarizer"

Findings: Starfish's Frequency of Reading Strategy Use



STARFISH: THE AESTHETIC SUMMARIZER





Collaborative Task



What caused the downfall of the Mayan civilization?



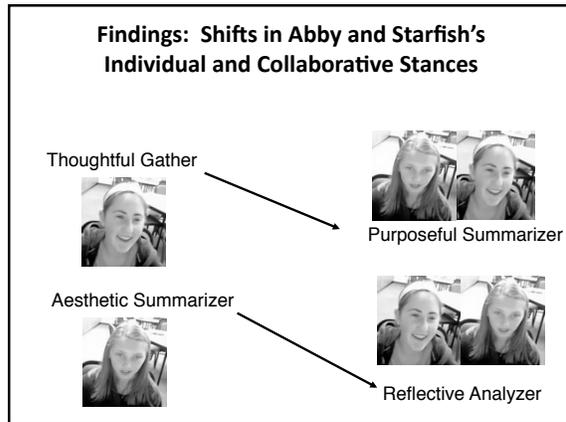

What will happen when Abby and Starfish work collaboratively?

In what ways might their patterns of strategy use remain the same or change?




Findings: Comparing Abby and Starfish's Individual and Collaborative Strategy Use

Strategy Coding Category	Individual Reading Sessions		Paired Reading Session		TOTAL (Paired)
	Abby (Individual)	Starfish (Individual)	Abby (Paired)	Starfish (Paired)	
Planning	1 (1%)	4 (2%)	2 (2%)	2 (2%)	4 (2%)
Searching	7 (4%)	8 (5%)	2 (2%)	2 (2%)	4 (2%)
Overviewing	1 (1%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)
Determining Impt. Ideas	110 (64%)	88 (50%)	19 (23%)	11 (14%)	30 (18%)
Inferring	1 (1%)	4 (2%)	3 (4%)	2 (2%)	5 (3%)
Integrating	8 (5%)	27 (16%)	26 (32%)	25 (31%)	51 (31%)
Questioning	1 (1%)	1 (1%)	3 (4%)	4 (5%)	7 (4%)
Evaluating	14 (8%)	20 (11%)	6 (7%)	2 (2%)	8 (5%)
Monitoring	5 (3%)	6 (3%)	6 (7%)	3 (4%)	9 (6%)
Repairing	13 (8%)	9 (5%)	3 (4%)	5 (6%)	8 (5%)
Reflective Processing	6 (3%)	6 (4%)	4 (5%)	12 (15%)	16 (10%)
Confirming/Clarifying	5 (3%)	2 (1%)	7 (9%)	13 (16%)	21 (13%)
TOTAL	172 (100%)	175 (100%)	82 (100%)	81 (100%)	163 (100%)



- ### Implications
- Opportunities to co-construct meaning may foster more efficient and productive comprehension when reading independently.
 - This is consistent with work that suggests **discussion and shared meaning-making** facilitates knowledge construction and deeper levels of understanding (Dillenbourg & Schneider, 1995; Mercer, 1995; Palincsar & Brown, 1987).

