

# Disciplinary Literacy Research and Practice in the U.S. and in Nordic Countries

William G. Brozo

George Mason University, USA

Sari Sulkunen

University of Jyväskylä, Finland

European Conference on Literacy, Copenhagen, 5 August 2019

# Historical context for Disciplinary Literacy in the U.S.

- At least 100 years of applied research in the area of reading within subject areas
  - William S. Gray (1919) – generic reading skills would transfer to specific subject areas
- Solid knowledge base in content literacy has been established
- Content literacy strategies have become endemic to pedagogical practice and are specifically identified in district and state curricula
- Shift to disciplinary literacy has been challenging to the longstanding tradition of content literacy

# Disciplinary literacy research trends in the U.S.

- Defining literacy within disciplinary boundaries
- Role of digital tools
- Collaboration
- Teacher education
- Professional development
- Role of content area literacy

# Defining literacy within disciplinary boundaries

- Project READI - Reading, Evidence and Argumentation in Disciplinary Instruction
  - reading for understanding in authentic learning situations within a discipline
  - disciplines as communities of practice
  - researchers collaborate with teachers to design discipline-specific interventions in the subject areas
- Teams of diverse professionals conducted conceptual meta-analyses of literature, history, and science to determine types of knowledge critical to comprehending, constructing, and conveying evidence-based arguments from multiple sources of information within each of these three disciplines

## Source

Goldman et al. (2016). Disciplinary literacies and learning to read for understanding: A conceptual framework for disciplinary literacy. *Educational Psychologist*, 51(2), 219-246.

# Defining literacy within disciplinary boundaries



## Literary Reading

- Establish criteria for judging interpretive claims and arguments that address author generalizations, explaining how the text meets the criteria and justifies the claim.
- Justifications may be drawn from the text; from other texts, literary constructs or critical traditions; or from the reader's judgments from experience in the world.



## Science

- Justify explanations using science principles, frameworks and enduring understandings, cross-cutting concepts, and scientific evidence (Includes evaluating the quality of the evidence.)
- Critique explanations using science principles, frameworks and enduring understandings, cross-cutting concepts, and scientific evidence.



## History

- Construct claim-evidence relations, using textual evidence and explaining the relationship among the pieces of evidence and between the evidence and claims.
- Use interpretive frameworks developed by historians, such as societal structures, systems, and patterns across time and place, to analyze historical evidence and argument and to address historical questions.
- Evaluate historical interpretations for coherence, completeness, the quality of evidence and reasoning, and the historian's perspective.

# Role of digital tools

- Exploring disciplinary experts' use of digital tools for acquiring, analyzing, and disseminating knowledge
- Employing applications of digital tools with students for disciplinary learning

## Sources

Castek, J., & Beach, R. (2013). Using apps to support disciplinary literacy and science learning. *Journal of Adolescent & Adult Literacy*, 56(7), 554–564.

Goss, M., Castek, J., & Manderino, M. (2016). Disciplinary and digital literacies: Three synergies. *Journal of Adolescent & Adult Literacy*, 60(3), 335–340.

Phillips, N., Woodard, R., & Lund, V. (2017). Cultivating disciplinary futures in a school-based digital atelier. *Journal of Adolescent & Adult Literacy*, 60(4), 461–465.

Smith, B.E., & Shen, J. (2017). Scaffolding digital literacies for disciplinary learning: Adolescents collaboratively composing multimodal science fictions. *Journal of Adolescent & Adult Literacy*, 61(1), 85–90.

# Collaboration

- Exploring optimal approaches for exchanging knowledge
  - Between disciplinary experts and literacy professionals
  - Between subject-area teachers and disciplinary experts

## Sources

- Ippolito, J., Dobbs, C.L., Charner-Laird, M., & Lawrence, J.F. (2016). Delicate layers of learning: Achieving disciplinary literacy requires continuous, collaborative adjustment. *Journal of Staff Development, 37*(2), 34–38.
- Hinton, K., & Suh, Y. (April 2019). Foregrounding collaboration in disciplinary literacy form *JAAL, 2008-2017. Journal of Adolescent & Adult Literacy.*
- Wilder, P., & Herro, D. (2016). Lessons learned: Collaborative symbiosis and responsive disciplinary teaching. *Journal of Adolescent & Adult Literacy, 59*(5), 539–549.

# Teacher preparation

- Exploring university's role in fostering disciplinary literacy mindset and practices among pre-service teachers
- New teacher education candidates who are not familiar with content literacy may find disciplinary literacy approaches easier to adopt

## Sources

Pytash, K.E. (2012). Engaging preservice teachers in disciplinary literacy learning through writing. *Journal of Adolescent & Adult Literacy*, 55(6), 527–538.

Conley, M.W. (2012). Foregrounding the disciplines for teacher preparation in secondary literacy. *Journal of Adolescent & Adult Literacy*, 56(2), 141–150.



# Professional learning

- Exploring ways of supporting in-service teachers' transition to disciplinary literacy-based pedagogy
- Thought by some to meet less resistance than to content area reading since disciplinary literacy foregrounds teachers' domain knowledge and exploits literacy practices endemic to disciplinary inquiry

## Sources

Spitler, E. (2011). From resistance to advocacy for math literacy: One teacher's literacy identity transformation. *Journal of Adolescent & Adult Literacy*, 55(4), 306–315.

Fang, Z. (2014). Preparing content area teachers for disciplinary literacy instruction. *Journal of Adolescent & Adult Literacy*, 57(6), 444–448.

# Role of content area literacy

- Exploring whether and how content literacy strategies and disciplinary literacy practices articulate
  - Generic content literacy strategies **fade in importance** as students progress through the grades
  - Generic strategies actually **hinder effective reading, thinking, and problem solving** by drawing students' attention away from the required mental operations needed for specific disciplinary tasks
  - Content literacy strategies remain **critical to successful achievement** in the disciplines **for learning disabled and struggling readers**
  - Content literacy strategies are considered **useful “engineering tools”** situated within the work of engaging in disciplinary reading and writing practices
  - Generic literacy practices **can be adapted to further learning** within disciplinary domains

# Sources

- Brozo, W.G., Moorman, G., Meyer, C., & Stewart, T. (2013). Content area reading and disciplinary literacy: A case for the radical center. *Journal of Adolescent & Adult Literacy*, 56(5), 353–357.
- Dunkerly-Bean, J. & Bean, T.W. (2016). Missing the savoir for the connaissance: Disciplinary and content area literacy as regimes of truth. *Journal of Literacy Research*, 48(4), 448-475.
- Siebert, D.K., Draper, R.J., Barney, D., Broomhead, P., Grierson, S., Jensen, A.P., & Wimmer, J. (2016). Characteristics of literacy instruction that support reform in content area classrooms. *Journal of Adolescent & Adult Literacy*, 60(1), 25–33.
- Moje, E.B. (2015). Doing and teaching disciplinary literacy with adolescent learners: A social and cultural enterprise. *Harvard Educational Review*, 85(2), 254–278.
- Gilles, C., Wang, Y., & Johnson, D. (2016). Drawing on what readers do as readers: Discovering and embedding strategies across the disciplines. *Journal of Adolescent & Adult Literacy*, 59(6), 675–684.
- Faggella-Luby, M.N., Graner, P.S., Deschler, D.D., & Drew, S.V. (2012). Building a house on sand: Why disciplinary literacy is not sufficient to replace general strategies for adolescent learners who struggle. *Topics in Language Disorders*, 32(1), 69–84.
- Shanahan, C., Shanahan, T., & Misischia, C. (2011). Analysis of expert readers in three disciplines: History, mathematics, and chemistry. *Journal of Literacy Research*, 43(4), 393-429.



# Nordic traditions and developments

- In the Nordic countries both CAL and DL in education and research
  - Content-area literacy with a linguistic and literacy approach
  - More recent emphasis on disciplinary literacy in relation to disciplinary thinking and knowledge construction
    - Subject-specific didactics

# Nordic traditions and developments

- In Sweden, Norway, and Denmark several studies on subject area textbooks, their language & other textual characteristics, literacy practices and reading strategies needed
  - E.g. in science, literature, chemistry, mathematics, history (e.g. Brenholm, 2014; Bommarco 2006, Ekvall 2011, Kabel, 2009; Olofsson 2010)
  - Also struggling readers and L2-students in focus (Olvegård 2014, Reichenberg & Lundberg 2011)
  - Studies also on text-talk in upper secondary education (e.g. Halleson 2015, Tengberg 2011, Visén 2015)
  - Genre-pedagogy (Liberg 2009; 2016 theme issue in Sprogforum, the Danish Tidsskrift for sprog- og kulturpaedagogik; 2016, vol. 63)

# Nordic traditions and developments

- In Finland, several studies in several school subjects on different grades emphasizing the **integrated nature of content and language & literacy**
  - For primary school students, in the framework of **language awareness** in education (languaging) (e.g. Hähkiöniemi et al. 2015)
    - also about content-area reading (Merisuo-Strom & Aerila 2016)
  - For secondary school students, studies conducted in the framework of **disciplinary literacy** (e.g. Kouki & Virta 2015; Rantala & van den Berg 2013; Sulkunen & Saario 2019; Veijola & Mikkonen 2015; Yli-Paunula et al. 2015)
  - CLIL studies: content and language integrated learning (e.g. Nikula 2015)
  - Language learners and their challenges in subject area meaning construction (e.g. Saario 2012)

# Nordic traditions and developments

Disciplinary literacy present also in curricula for the basic education:

- Finnish history curriculum emphasizes "critical stance towards historical knowledge produced by various actors", "capability to read and analyze - - source materials and make supportable interpretations of their purpose and meaning"
- Swedish curriculum for basic education stresses the ability to "critically interpret and evaluate source materials in order to build historical knowledge"
- Danish curriculum for basic education includes subject-specific competence goals, e.g. in history students are expected to "formulate historical problems, search and select sources, analyze the sources, propose solutions and use disciplinary concepts and language in communicating their work" (freely translated by S.S.)

# Sources

- Bommarco, B. (2006). *Texter i dialog: en studie i gymnasieelevers litteraturläsning*. Malmö: Lärarutbildningen.
- Bremholm, J. (2014). *Veje og vildveje til læsning som ressource: Teksthændelser i naturfagsundervisning med og uden læseguide. Et interventionsstudie om "literacy" i naturfag i udkolingen*. Aarhus universitet.
- Danmarks læringsportal: Fælles Mål for faget historie. Available at: <https://www.emu.dk/grundskole/historie/faelles-mal>
- Ekvall, U. (2011). Enhetligt på den finska sidan men varierat på den svenska: om kemiböcker i svenska och finlandssvenska klassrum. I I. Eriksson (ed.), *Kemiundervisning, text och textbruk i finlandssvenska och svenska skolor: en komparativ tvärvetenskaplig studie*. Stockholms universitet.
- FNBE (2014). *National Curriculum for Basic Education*. Finnish National Board of Education.
- Halleson, Y. (2015). *Textsamtal som lässtöttande aktivitet. Fallstudier om textsamtals möjligheter och begränsningar i gymnasieskolans historieundervisning*. Stockholms universitet.
- Hähkiöniemi, M., Kauppinen, M. & Tarnanen, M. (2015). Luokanopettajaopiskelijoiden kielitietoisuus matematiikan päättelyketjujen tulkinassa. In M. Kauppinen et al. (eds) *Rajaton tulevaisuus. Kohti kokonaisvaltaista oppimista*, pp. 81–95.
- Kabel, K. (2009). Er matematisk samtale bare samtale? Læsning og elevers matematikfaglige sprog. *MONA - Matematik- og Naturfagsdidaktik – tidsskrift for undervisere, forskere og formidlere*, 2009 (4), 32–49.
- Kouki, E. & Virta, A. (2015). Lukiolaiset lähteillä – äidinkielen ja historian tekstitalojen kriittistä arviointia. In M. Kauppinen et al. (eds) *Rajaton tulevaisuus. Kohti kokonaisvaltaista oppimista*, pp. 11–25.
- Liberg, C. (2009). Genrepedagogik i ett didaktiskt perspektiv. I P. Juvonen (ed.), *Språk och lärande. Language and learning*, pp. 11–25. *Papers from the ASLA Symposium in Stockholm, 7-8 November, 2008*.
- Merisuo-Strom & Aerila (2016). Providing skills and support to primary school pupils in content-area reading. *International Journal for Cross-Disciplinary Subjects in Education*, 7 (3).
- Nikula, T. 2015. Hands-on tasks in CLIL science classrooms as sites for subject-specific language use and learning. *System*, 54, 14–27.
- Olofsson, S. 2010. *Nedslag i historien: att värdera och analysera källor*. Malmö: Gleerup.
- Olvegård, L. (2014). *Herravälde: är det bara killar eller? Andraspråksläsare möter lärobokstexter i historia för gymnasieskolan*. Göteborgs universitet.





# Sources

- Olvegård, L. (2014). Herravälde: är det bara killar eller? Andraspråksläsare möter lärobokstexter i historia för gymnasieskolan. Göteborgs universitet.
- Rantala, Jukka & van den Berg, Marko (2013). Lukiolaisten historian tekstitaidot arvioitavana. *Kasvatus*, 44 (4), 394–407.
- Reichenberg, M. (2005). Gymnasieelever samtalar kring facktexter: en studie av textsamtal med goda och svaga läsare. Göteborg: Acta Universitatis Gothoburgensis.
- Reichenberg, M., & Lundberg, I. (2011). Läsförståelse genom strukturerade text-samtal: för elever som behöver särskilt stöd. Stockholm: Natur & Kultur.
- Saario, J. (2012). Yhteiskuntaopin kieliympäristö ja käsitteet. Toisella kielellä opiskelevan haasteet ja tuen tarpeet. *Jyväskylä studies in humanities* 172.
- Skolverket (2011/16). Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011. Reviderad 2016.
- Sulkunen, S. & Saario, J. (2019). Tiedonmuodostus ja tekstityö: tapaustutkimus lukion historian opetuksen tekstikäytänteistä. *Finnish Educational Journal Kasvatus*, 50 (2), 149–163.
- Tengberg, M. (2011). Samtalets möjligheter: om litteratursamtal och litteratur-reception i skolan. Stockholm: Brutus Östling.
- Veijola, A. & Mikkonen, S. (2015). Miten mennestä tehtyä historiaa tulkitaan? Tutkiva oppiminen ja monilukutaito lukion historian opetuksessa. In M. Kauppinen et al. (eds) *Rajaton tulevaisuus. Kohti kokonaisvaltaista oppimista*, pp. 155–169.
- Veijola, A., Sulkunen, S. & Rautiainen, M. (2019). Historiallisen tiedon luonne ja historiantekstikäytänteet lukiolaisten kuvaamana. *Kasvatus & Aika*, 13(2), 53–67.
- Visén, P. (2015). Att samtala om texter: från träteknik och svetsteori till antikens myter. Stockholms universitet.
- Yli-Panula, E., Hiilovaara-Teijo, M. & Vauras, M. (2015). High schools students inquiry based collaborative learning in virtual marine science laboratory. In M. Kauppinen et al. (eds) *Rajaton tulevaisuus. Kohti kokonaisvaltaista oppimista*, pp. 135–153.



# Examples of disciplinary literacy teaching practices from the U.S. & Nordic contexts



# Inquiry-based history learning in a Finnish upper secondary school

- One school-week long project during which students worked in groups to answer to the question:
  - Who possibly tried to assassinate President of Finland, Urho Kekkonen, in summer 1957?
- Multiple text sources:
  - Research literature & Internet sources
  - Primary sources from archives, e.g. a page from the president's adjutants' weekly log; text by the president's daughter-in-law who, present at the time of the event, described it in an emotional tone
- Guidance in knowledge construction practices:
  - Students were instructed to read the texts and consider their relevance and reliability as evidence of the historical event
  - Students were challenged to ponder how authors' intentions might have influenced the texts and how to contextualize different kinds of sources

Brozo, W.G., Sulkunen, S., & Veijola, A. (2018). Participation as a pathway to content knowledge: Engaging all students in disciplinary literacy practices. *International Journal of Education and Social Science*, 5(7), 21-29.

Veijola, A., Sulkunen, S. & Rautiainen, M. (2019). Historiallisen tiedon luonne ja historiantekstikäytännöt lukiolaisten kuvaamana. *Kasvatus & Aika*, 13(2), 53–67.

# Examples of disciplinary literacy practices from the U.S. & Nordic contexts

- Across Disciplines
  - Disciplinary Expert in Residence Approach
    - Similar to artist and poet in residence
    - 1 day per week for a “grading period”
    - Schools “adopt” a professional mathematician, scientist, historian
    - Disciplinary expert works collaboratively with teachers of maths, science, history to ensure the actual material, social, and cognitive practices of disciplinary expertise are incorporated into the teachers’ instructional methods and textual practices
    - Provide small group PD in collaboration with literacy specialist

# Examples of disciplinary literacy practices from the U.S. & Nordic contexts

- Maths

Problem:

***Old McDonald is counting the number of chickens and pigs on his farm. Oddly, he decides to tally only the heads and legs of these animals. When he has finished, he has counted 30 heads and 70 legs. How many chickens and pigs does Old McDonald have?***

<p><b>Step 1: What is the problem asking you to do?</b></p> <p><i>I have to calculate the number of pigs and the number of chickens on the farm.</i></p>	
<p><b>Step 2: What is your plan for solving the problem?</b></p> <p><i>I am going to use the information in the problem to represent each of the animals mathematically and write an equation. I will represent the equation with words first, and then decide how to substitute numbers.</i></p>	
<p><b>Work Space</b></p> <p>1. <i>Chickens plus pigs equals the total number of animals on the farm.</i></p> <p>2. <i>Chickens + pigs = 30</i></p> <p>3. <i>Chickens + (30 - chickens) = 30</i>  <i>Chickens = c</i>  <i>Pigs = 30 - c</i></p> <p>4. <i>?</i></p>	<p><b>Explanation</b></p> <p>1. <i>I know this because the question asks me to determine how many chickens and pigs there are.</i></p> <p>2. <i>I know this because each animal only has one head and there are 30 heads</i></p> <p>3. <i>I know that I can only add and subtract variables that are the same, so I have to represent the quantity of one animal (in this case - pigs) in terms of the other animal (chickens). Since I know that there are only 30 animals total, I know that the number of pigs must equal 30 minus the number of chickens.</i></p> <p>4. <i>I became confused so I reread the problem. I found another number that is important - 70 legs. I know that chickens have 2 legs and pigs have 4 legs, so I am going to write an equation with that information</i></p>

# Examples of disciplinary literacy practices from the U.S. & Nordic contexts

5. $(2 \times \text{chickens}) + (4 \times \text{pigs}) = 70$	5. Now I have to substitute with how I decided to represent chickens and pigs in step 3 because I can't add unlike variables
6. $2c + 4(30 - c) = 70$	6. Now I can simplify the equation. Because "c" stands for the number of chickens, when I solve this equation, I should know how many chickens are in the store.
7. $2c + 120 - 4c = 70$	7. To further simplify, I have to combine like terms. I can use the additive property of equality and subtract 120 from both sides.
8. $2c + 120 - 120 - 4c = 70 - 120$ $2c - 4c = -50$ $-2c = -50$ $c = 25$	8. I simplified first by subtracting, then by dividing in order to isolate the variable. Because both 2 and 50 were negative, they resulted in a positive 25. Also, it wouldn't make much sense to have a negative number of chickens. Now that I know how many chickens there are, I can go back to my first equation and determine the number of pigs.
9. Chickens + pigs = 30 $25 + \text{pigs} = 30$ $\text{pigs} = 30 - 25$ $\text{pigs} = 5$	9. I substituted my result into the original equation and then solved the equation. My answer is that there were 25 chickens and 5 pigs.

## Disciplinary literacy goals:

- Use stated assumptions, definitions, and previously established results in constructing arguments
- Build a logical progression of statements to explore the truth of conjectures and to justify conclusions

# Examples of disciplinary literacy practices from the U.S. & Nordic contexts

## Maths

- Math writing that require students to explain reasoning and to justify results
- Writing approach developed by the teacher emerged logically from the algebraic processes under study
- Instead of relying on a generic content area writing strategy, the teacher created this unique, discipline-specific writing activity because it more closely fit the math content and processes as well as her goal to link students' communication skills to mathematical thinking

Communicate how you arrived at your conclusion using mathematical language. Make an argument for why this was the best way to solve the problem.

*I used the information given in the original problem to formulate an equation. I had to use some background knowledge about these two types of animals, specifically, I had to know how many legs each had. This was a faster way to solve the problem than drawing out the options or guess and check. If I were going to do it again, I might define the number of chickens based on the number of pigs because the math would be easier.*

Expand your thinking by considering at least one of the following: an observation, a pattern, a comparison to something we have previously discussed, a different strategy that could be used, or possible alternate solutions.

*I could have created a chart like the one below and tried to find the answer that way. I think it would have taken longer, but I would have still arrived at the answer.*

# pigs $\times 4 =$ # of pig legs	$0 \times 4 = 0$	$1 \times 4 = 4$	$2 \times 4 = 8$	$3 \times 4 = 12$	$4 \times 4 = 16$	$5 \times 4 = 20$
#Chickens $\times 2 =$ # chicken legs	$30 \times 2 = 60$	$29 \times 2 = 58$	$28 \times 2 = 56$	$27 \times 2 = 54$	$26 \times 2 = 52$	$25 \times 2 = 50$
Total legs	$0 + 60 = 60$	$4 + 58 = 62$	$8 + 56 = 64$	$12 + 54 = 66$	$16 + 52 = 68$	$20 + 50 = 70$

# Examples of disciplinary literacy practices from the U.S. & Nordic contexts

## Word Grid – generic content literacy strategy adapted for learning discipline-specific information in science

Source of food-borne illness	Infection	Intoxication	Aerobic	Anaerobic	Time symptoms begin	Most likely food source	Prevention
Clostridium perfringens	X	X		X	4-22 hours	Foods served at large buffet-type gatherings	Keep hot foods hot; refrigerate uneaten foods promptly
Staphylococcus aureus		X	X	X	1-7 hours	Moist meat dishes, starchy foods	Refrigerate uneaten foods immediately
Clostridium botulinum		X		X	12-24 hours	Improperly processed home-canned foods (especially low-acid types)	Boil home-canned foods; do not give infants raw honey



# Lingering Concerns & Future Directions

- Easier to theorize/conceptualize than operationalize disciplinary literacy curricula
- Research evidence in support of unique disciplinary literacy practices is slowly accruing
- More systematic investigations are needed to determine the impact of disciplinary literacy practices on student learning and engagement relative to content literacy or other approaches; and on teachers' skills and self-efficacy
- Healthy debate should continue that focuses on:
  - whether students should be disciplinary specialists or interdisciplinary generalists
  - If/how disciplinary literacy cultures can be realized in schools with teachers who are not disciplinary experts

# Thank You!

[wbrozo@gmu.edu](mailto:wbrozo@gmu.edu)  
@WilliamGBrozo

[sari.sulkunen@jyu.fi](mailto:sari.sulkunen@jyu.fi)  
@sari\_sulkunen