

Title: Engaging all Students in Internet Research and Inquiry

Almost 45 % of the world's population is now online (Internet World Stats, 2014). Concerns remain about equality of opportunity in access to digital technologies depending on geographical location (Livingstone & Bulger, 2013), socioeconomic status (SES) (Hargittai & Hinnant, 2008; Leu, Forzani, Rhoads, Maykil, Kennedy & Timbrell, 2015), and diversity of needs (Dalton & Proctor, 2008; Dwyer, 2013a). Nevertheless, we are indeed the connected generation. For example, in the Internet Trends survey 87% of young people reported that the Smartphone “never leaves my side” (Meeker, 2015).

Many of our students are engaging successfully with digital technologies in their out-of-school daily lives (Alvermann, 2008). Many are masterful at creating live stories and connecting on social media like Instagram, Snapchat and Facebook. Some are skilled at creating, composing and remixing videos for YouTube. However, research suggests that the prowess attributed to young people as a tech-savvy homogeneous population is misguided and that many of our students are struggling to utilize the Internet and other digital technologies in complex online environments for academic purposes. In general, students rarely engage in Internet research in a planful manner and adopt a mainly consumerist and minimalist approach in seeking online information. In addition, they have few strategies to locate information online and seldom evaluate the reliability of the information they find. Moreover, many students lack the persistence and resilience to avoid the disorientation experienced by searchers (Bennett, Matton & Kervin, 2008; Ito et al., 2009; Leu, Kinzer, Coiro, Castek, & Henry, 2013; University College London CIBER Group, 2008; Williams & Rowlands, 2007). The danger with the ‘digital natives’ assumption is that it gives policy makers and educators a misguided impression of the digital capabilities of our students- a

‘they know more than we do’ notion. This suggests a free pass not to create the instructional contexts necessary to integrate technology into the curriculum in meaningful ways or to nurture the skills, strategies, dispositions and social practices that students need to use the Internet and other digital technologies as tools for literacy and learning.

Digital learning environments offer a myriad of possibilities and scaffolds to support all students through customizable multimodal supports which are flexible and responsive to readers’ and writers’ needs (Rose & Meyer, 2002). The International Literacy Association (IRA, 2009) urges educators to integrate digital technologies into the class curriculum to prepare students for learning in the 21st century. While some teachers are experiencing success at integrating technology into the curriculum in meaningful ways, many are not (Hutchinson & Reinking, 2011). Teachers are struggling to use digital technologies to transform and deepen learning; to challenge and engage students; to nurture student creativity; and to develop skills in communication, critical evaluation and collaboration. In large part, this is due to a ‘build it and they will come’ approach; a belief that educational improvement will follow merely by investing in technologies in schools without any real vision or clarity about the goals of so doing. Making technologies available is necessary, but is not sufficient for meaningful integration into curriculum to deepen learning. We need to view technology as a tool for literacy and learning. We need to build curriculum that reflects three elements- the content we are teaching, the pedagogies we are using, and the appropriate use of digital technologies (Mishra & Koehler, 2006).

In this article I will discuss ways to build instructional contexts that engage and scaffold our students to develop online reading comprehension and Internet inquiry and research skills. First, let’s consider the changes to reading when you move from printed page to screen.

The Online Reader as an Assembler, Fixer, Builder and Responder

Successful online and offline reading share a number of key skills, such as rapid decoding and word recognition to aid reading fluency; and specific strategies like, monitoring understanding, identifying and locating information, and evaluating text (Afflerbach & Cho, 2009; Presley & Afflerbach, 1995). However, reading online introduces new challenges for the reader and requires deeper levels of higher order processing skills, strategies, practices and dispositions to enable students to:

- **Explore:** to navigate and read on the web
- **Build:** to create and write for the web
- **Connect:** to participate and collaborate on the web

(See the Web Literacy Map (<https://teach.mozilla.org/teach-like-mozilla/web-literacy>) cited in Dalton (2015) for more details)

For the last decade, I have been working with teachers and students in classrooms to build online reading comprehension and Internet inquiry skills. Analysis of many hours of captured online screen reading and Internet inquiry activity and observations in these classrooms has led me to consider the online reader using the metaphors of Assembler, Fixer, Builder, and Responder (Dwyer, 2010; 2013b; drawing on Pearson, 2009).

The online reader as an *Assembler* creates unique pathways through a non-linear, dynamic, multimodal, opportunistic reading information space. Unlike the environment of the printed book, where text is bounded within the covers of the book, the online reader must assemble potential texts to be read while concurrently avoiding distractions like advertisements. In addition, the reader as *Assembler* must unpack the hidden content in hyperlinks using heightened inferencing skills (Coiro & Dobler, 2007).

As a *Fixer* the online reader must display dispositions like flexibility, habits of mind, self-regulation, persistence, and resilience to avoid the cognitive disorientation and overload often experienced in an online environment (Spiro, Coulson, Feltovich, & Anderson, 2004). As a *Fixer* the online reader is involved in strategic, active, metacognitive, decision making processes while making intertextual links (Hartman, 1995) across multiple websites and multiple modes of representation (including text, audio, visual, and video).

As a *Builder* the online reader needs to activate and fuse a broad range of prior knowledge sources with speed and efficiency in order to gather, sift, update, and synthesize information. These prior knowledge sources include knowledge of online information text structures (e.g. hyperlinks and menus), navigational skills (e.g. activating browser features and navigating across screens), domain and topic knowledge, and world knowledge, often referred to as common sense knowledge. Reading online introduces the possibility of rapidly updating prior knowledge with new knowledge on-the-hoof in the malleable moments of online research.

Finally, given that anyone can publish to an online forum, the online reader as a *Responder* must act as a gatekeeper, curator and editor of online information. This calls for heightened levels of critical thinking, critical evaluation, and media literacy skills. The online reader must assess the credibility, authority, reasonableness, believability, author agenda, and applicability of information in relation to their inquiry purpose.

Strategies for Teaching Online Reading Comprehension and Internet Inquiry Skills

How can we support students to develop online reading comprehension and the research and inquiry skills they need in a complex online environment? The sections which follow discuss some key principles and instructional contexts to scaffold Internet research and online

comprehension skills in the areas of creating authentic inquiry-based learning units; digging deeper with questioning skills; assessing online skills; scaffolding key stages within the Internet inquiry cycle; and encouraging peer-to-peer collaboration.

Create Authentic Online Inquiry Opportunities: Think Globally; Act Locally

In order to engage students in online inquiry and research you need to create authentic, inquiry-based, cross-disciplinary units centered on carefully designed and compelling real-world issues. For example, Ms. Reilly (all names are pseudonyms), a sixth-grade teacher in Ireland, and her students, considered global issues related to sustainability of natural resources such as water, air, food, or energy on the challenge-based learning website (<https://www.challengebasedlearning.org/challenges>). In class discussions, students reflected on local issues relating to water conservation and subsequently successfully investigated ways to reduce water consumption in the school. Placing students in the role of problem solver, through effecting change on a local level, can empower and engage students to build new understanding with real world issues and with real world audiences (Duke, Caughlin, Juzwik & Martin, 2012; Harrison, Dwyer & Castek, 2014).

Dig Deeper With Student Self-Generated Inquiry Questions

When students generate their own questions in an inquiry-based learning unit, their quest for information is more meaningful as it is derived from their current interest and inquisitiveness. However, given that it is teachers, rather than students, who routinely ask questions in class, asking students to generate their own questions can be challenging. Nurturing situational interest through field-trips, experiments, and expert visits can spark interest, deepen curiosity, and encourage students to adopt a questioning stance to formulate deeper levels of questions on the inquiry-based unit topic (Guthrie, 2004). Mr. Lane, a fifth-grade teacher, invited a professional bird guide into the classroom to discuss the importance of birds in the

ecosystem. Following the visit, the teacher modelled ‘I wonder’, ‘what if’ and ‘why’ questions to promote a metalanguage around different levels of thin (lower order) and thick (higher order) questions, drawing on well validated models like the Question Answer Relationship model (Raphael & Wonnacott, 1985). In small groups, students generated their own wonder questions, such as “Why do birds need feathers?”, “How does an owl’s wings help him to catch his prey?”, “Why is the corncrake endangered”? In class discussion, Amy noted that with a “thin question the answer is right in front of you. A thick question makes you wonder and talk lots and search more.” Student-led ‘thick’ (higher order) questions lead to authentic inquiry goals, influence the subsequent searching behavior of students and contribute to online inquiry that builds more conceptual knowledge (Dwyer, 2010).

Creating online shareboards where students can safely share ideas in real time both promotes social learning in classrooms and helps students to dig deeper to create meaningful questions to share with others. Digital tools to promote sharing include Noteapp (<https://noteapp.com/>) to create online post-its or more sophisticated share spaces such as DiiGo (<http://www.diigo.com/>); or Edmodo (<http://www.edmodo.com/home>).

Observe and Analyze: Assess Students’ Strengths and Needs

The Internet inquiry cycle includes key stages which are recursive rather than linear in nature (Dwyer, 2010). The stages are planning and focusing on the task goal, generating and revising search terms, investigating search results, locating information, critically evaluating information, and communicating information (See Figure 1).

-----Insert Figure 1 about here-----

Each stage involves a number of skills and strategies (See Figure 2, which includes suggested digital resources for each stage)

-----Insert Figure 2 about here-----

In order to support your students in an online environment you need to assess their current capabilities in relation to key Internet inquiry stages and skills. You may use informal formative assessment tools as students conduct Internet inquiry. For example, Ms. Ryan, a third-grade teacher in Ireland, uses structured Internet inquiry challenge tasks to observe and assess her students' inquiry skills. She introduced a unit on animals and environmental adaptation by presenting a challenge question: "How do owls hunt at night without bumping into trees?" Student pairs searched on the Internet for 15 minutes to find relevant information. Ms. Ryan observed and recorded the students' online activity with Screencast-o-matic (<http://www.screencast-o-matic.com>), a free screen capture software tool that records what is happening on screen in real-time.

Ms. Ryan combined her classroom observation with a more detailed analysis of students' online search activity to determine their current strengths and needs in conducting online inquiry within the Internet inquiry cycle. This provided a starting point for planning mini-lessons to support her students. In this case, Ms. Ryan learned that many of the students were successful at generating synonyms to revise search terms. However, they often chose to investigate the first search result displayed, adopting a 'snatch and grab' approach. She decided that students required mini-lessons on how to efficiently skim and scan the search results page. Additionally, students needed help to skillfully investigate both the origin of the information provided in the search result URL and the relevance of the information provided in the search result blurb. Ms. Ryan also used teacher-designed rubrics to encourage self-and peer-assessment of skills and strategies used during Internet inquiry.

Ongoing and periodic informal assessment practices at different stages of the Internet inquiry cycle allows you to monitor the planning, retrieving, processing, evaluation, and

communication skills and strategies used by your students as they conduct Internet inquiry. The results not only guide your instruction more effectively, but they also help students to monitor their own performance and recognize each other's areas of expertise.

Scaffold Key Stages of the Internet Inquiry Cycle

Analysis of online behavior provides information about where students are in their inquiry process, and what kinds of skills, strategies and dispositions they might need to develop at that phase. For example, students who are *starting out* may need help with generating vocabulary for key word searches, or strategies for skimming and scanning search results. Students who are *stepping up* may need to deepen their skills for how to navigate, locate, curate, and synthesize information presented in multiple modalities across multiple websites. Finally, students who are *moving on* may require assistance to develop the strategies to critically evaluate online information (see Dobler & Eagleton, 2015; Harrison et al., 2014; Leu, Forzani, & Kennedy, 2015 for specific strategies to support your students).

Encourage Peer-to-Peer Collaboration

Working collaboratively in groups on shared digital devices or platforms during Internet inquiry units permits exchanges of practices and 'aha' moments, and allows group members to expand their own individual understanding through discussing, examining, and contesting points of view. A classroom culture that encourages collaboration both shapes and influences how learners make sense of the world around them. However, structuring peer-to-peer collaboration can be challenging in the classroom. Collaboration during Internet inquiry can be supported through online reciprocal roles such as the Questioner, Navigator, and Summarizer (Dwyer, 2010; Harrison et al., 2014). Students take leadership roles within their groups to pose questions, focus navigational activity, take notes and synthesize information

(See Figure 3 for sample prompt cards). Working with peers allows students to use a comprehensible peer-to-peer language to cascade the expertise and transfer skills during online inquiry (Dalton, 2014/2015).

-----Figure 3 about here-----

Collaborative composing platforms such as Primary Pad (<http://primarypad.com>) or VoiceThread (<https://voicethread.com>) allow students to build participatory, affinity groups (Alvermann, 2009) and to communicate, share, design, and remix ideas during Internet inquiry. Collaboration can also be encouraged across time and space in global communities through literature response blogs (Dwyer & Larson, 2014) and exchange platforms such as Epals Global community, (<http://www.epals.com>), or iEarn (<https://collaborate.iearn.org/spaces>).

Final Thoughts: The Role of the Teacher

In this article I have drawn attention to instructional contexts and key principles to scaffold Internet research and inquiry with students. Working with the Internet and other digital technologies repositions the role of the teacher from the ‘most knowledgeable other’ in the classroom to a co-structor and co-learner with students. While this represents changes in “ways of thinking, ways of doing, ways of believing” (Young, 2008, p.352), working in this way with students promotes a mutual interdependence and respect between teacher and student. Do take time to ‘play’ with the digital tools mentioned in this article; to share ideas in professional learning communities and online discussion forums; and to discuss the possibilities with colleagues of how to build instructional contexts that integrate these digital technologies in meaningful ways into the curriculum to support and engage your students to develop literacy and learning with the Internet.

References

- Afflerbach, P.A. & Cho, B.Y. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. In S. Israel & G. Duffy (Eds.), *Handbook of reading comprehension research*. (pp. 69-90). Mahwah, NJ: Erlbaum.
- Alvermann, D. (2008). Commentary: Why bother theorizing adolescents' online literacies for classroom practice and research? *Journal of Adolescent & Adult Literacy*, 52, 8-19.
- Alvermann, D.E. (2009). Sociocultural construction of adolescent and young people's literacies. In L. Christenbury, R. Bomer, & P. Smagorinsky (Eds.), *Handbook of adolescent literacy research* (pp.14-28). New York: The Guildford Press.
- Bennett, S., Matton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. *British Journal of Educational Technology*, 39(5), 775-786.
- Coiro, J., & Dobler, E. (2007). Exploring the comprehension strategies used by sixth-grade skilled readers as they search for and locate information on the Internet. *Reading Research Quarterly*, 42, 214-257.
- Dalton, B. (2014/2015). Level up with multimodal composition in social studies. *The Reading Teacher*, 68(4), 296-302.
- Dalton, B. (2015). Charting our path with a web literacy map. *The Reading Teacher*, 68(8), 604-608.
- Dalton, B., & Proctor, C.P. (2008). The changing landscape of text and comprehension in the age of the new literacies. In J. Coiro, M. Knobel, C. Lankshear, & D.J. Leu (Eds.),

- Handbook of research on new literacies* (pp. 297-324). Mahwah, NJ: Lawrence Erlbaum Associates.
- Duke, N.K., Caughlan, S., Juzwik, M.M., & Martin, N.M. (2012). *Reading and writing genre with purpose in K-8 classrooms*. US: Heinemann Publishing.
- Dwyer, B. (2010). *Scaffolding Internet reading: A study of a disadvantaged school community in Ireland*. Unpublished doctoral dissertation: University of Nottingham, UK.
- Dwyer, B. (2013a). Struggling readers go online: Building an integrated, inquiry-based classroom curriculum linking literacy, science and the Internet. In E. Ortlieb, & E.H. Cheek, (Eds.), *School-based interventions for struggling readers, K-8 (Literacy research, practice and evaluation, volume 3)*. UK: Emerald Group Publishing Limited.
- Dwyer, B. (2013b). Developing online reading comprehension: Changes, challenges and consequences. In K. Hall, T. Cremin, B. Comber & L. Moll (Eds.), *International handbook of research in children's literacy, learning and culture*. UK: Wiley-Blackwell.
- Dwyer, B. & Larson, L. (2014). The writer in the reader: Building communities of response in digital environments. In K.E. Pytash & R.E. Ferdig (Eds.), *Exploring technology for writing and writing instruction*. USA: IGI Publications.
- Dobler, E. & Eagleton, M.B. (2015). *Reading the web: Strategies for Internet inquiry*. 2nd ed. New York: Guildford Press.
- Guthrie, J.T. (2004). Classroom contexts for engaged reading: An overview. In J.T. Guthrie, A. Wigfield, & K.C. Perencevich (Eds.), *Motivating reading comprehension. Concept-oriented reading instruction* (pp. 87-112). Mahwah, NJ: Lawrence Erlbaum Associates.

- Hargittai, E., & Hinnant, A. (2008). Digital inequality: Differences in young adults' use of the Internet. *Communication Research*, 35(5), 602-621.
- Hartman, D.K. (1995). Eight readers reading: The intertextual links of proficient readers reading multiple passages. *Reading Research Quarterly*, 30(3), 520-561.
- Harrison, C., Dwyer, B., & Castek, J. (2014). *Using technology to improve reading and learning*. Shell Publications: USA.
- Hutchinson, A., & Reinking, D. (2011). Teachers' perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly*, 46(4), 312-333.
- International Reading Association (IRA) (2009). *New literacies and 21st century technologies: A position statement*. Newark, DE: IRA. Retrieved from http://www.reading.org/Libraries/position-statements-and-resolutions/ps1067_NewLiteracies21stCentury.pdf
- Internet World Stats (2014). *World Internet usage and population statistics* Retrieved from <http://www.internetworldstats.com/stats.htm>
- Ito, M., Baumer, S., Bittanti, M., Boyd, D., Cody, R., Herr-Stephenson, B. , ... Tripp, L. (2009). *Hanging out, messing around, and geeking out: Kids living and learning with new media*. Cambridge, MA: MIT Press.
- Leu, D.J., Kinzer, C.K., Coiro, J., Castek, J., Henry, L.A. (2013). New literacies and the new literacies of online reading comprehension: A dual level theory. In D.E. Alvermann, N.J. Unrau and R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th Ed.). Newark, DE: International Reading Association.

- Leu, D.J., Forzani, E., Rhoads, C., Maykel, C., Kennedy, C. & Timbrell, N. (2015). The new literacies of online research and comprehension: Rethinking the reading achievement gap. *Reading Research Quarterly*, 50(1), 37–59. doi:[10.1002/rrq.85](https://doi.org/10.1002/rrq.85)
- Leu, D. J., Forzani , E., & Kennedy , C. (2015). Income inequality and the online reading gap: Teaching our way to success with online research and comprehension. *The Reading Teacher*, 68(6), 422- 427.
- Livingstone, S., & Bulger, M. (2013). *A global agenda for children's rights in the digital age*. UNICEF Office of Research: Florence, Italy.
- Meeker, M. (2015). Internet trends 2015-Code conference. Retrieved from <http://www.kpcb.com/internet-trends>
- Mishra, P., & Koehler, M.J. (2006). Technological Pedagogical Content Knowledge: A new framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Pearson, P.D. (2009). The roots of reading comprehension instruction. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 3-31). New York: Routledge.
- Pressley, M., & Afflerbach, P. (1995). *Verbal protocols for reading: The nature of constructively responsive reading*. Hillsdale, NJ: Erlbaum.
- Raphael, T.E., & Wonnacott, C.A. (1985). Heightening fourth-grade students' sensitivity to sources of information for answering comprehension questions. *Reading Research Quarterly*, 20(3), 282-296.
- Rose, D.H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

Spiro, R.J., Coulson, R.L., Feltovich, P.J., & Anderson, D.K. (2004). Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. In R.B. Ruddell & N.J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 640-654). Newark, DE: International Reading Association.

University College London CIBER group (2008). *Information behaviour of the researcher of the future*. London: University College London. Retrieved from <http://www.bl.uk/news/pdf/googlegen.pdf>

Williams, P., & Rowlands, I. (2007). *Information behaviour of the researcher of the future. The literature on young people and their information behavior. Work package 11. A British library JISC study*. Retrieved from <http://www.webarchive.org.uk/wayback/archive/20140614113317/http://www.jisc.ac.uk/media/documents/programmes/reppres/ggworkpackageii.pdf>

Young, P.A. (2008). Exploring culture in the design of new technologies of literacy. In J. Coiro, M. Knobel, C. Lankshear, & D.J. Leu (Eds.), *Handbook of research on new literacies* (pp. 325-358). Mahwah, NJ: Lawrence Erlbaum Associates.