emphasizing the difference between the exploration and the collection stages. By scheduling several visits to the school library for each class, you can support teachers in revising assignments to accommodate these two stages. Organize faculty book groups to read together about Guided Inquiry Design and reflect on how it could work in your school. Consider the inhibitors as well as the enablers to implementing inquiry learning (see Kuhlthau 2004, 149–52). Set up a three-year plan for shifting toward inquiry learning and outlining the different stages. Each faculty member should work individually and in groups to accommodate the students’ needs.
FEATURES

8 Making the Shift
From Traditional Research Assignments to Guiding Inquiry Learning
Leslie K. Maniotes and Carol C. Kuhlthau

18 Elements of Information Inquiry, Evolution of Models, and Measured Reflection
Daniel Callison and Katie Baker

26 Seeking—and Finding—Authentic Inquiry Models for Our Evolving Information Landscape
Trudi E. Jacobson and Emer O’Keeffe

34 Designing Inquiry for Upper Elementary Students
Lessons Learned from Driver’s Ed
Suzy Rabbat

38 Approaching the Inquiry Process from a Cultural Perspective
Ho’onui i ka ‘ike—A Learning Process Imbued in the Hawaiian Culture
Na‘alani Naluai

42 Rocks in the River
The Challenge of Piloting the Inquiry Process in Today’s Learning Environment
Sandy Graham, Patrice Lambusta, and Barbara Letteri-Walker

46 Recipe for an Infographic
Debbie Abilock and Connie Williams

56 Community Collaboration for Inquiry Success
Cherry Fuller, Gayla Byerly, Donna Kearley, and Lilly Ramin

60 Real-Life Research: Project Runway Makeover Model
Paige Jaeger and Olga M. Nesi

64 Opportunity Knocks!
Inquiry, the New National Social Studies and Science Standards, and You
Mary Boyd Ratzer

ONLINE EXCLUSIVES

OE1 Inquiry Learning and Reading Comprehension Strategy Instruction: Processes That Go Hand in Hand
Judi Moreillon

OE2 A Case for Browsing
An Empowering Research Strategy for Elementary Learners
Barbara Montgomery

OE3 Through the Eyes of Librarians
Helping Ourselves and Others “See” What We Do
Na‘alani Naluai

Visit <www.ala.org/aasl/kq> to read these online exclusives.
“When teachers embark on student-centered inquiry-based research projects, assignments become learning adventures…”

Real-Life Research: Project Runway Makeover Model — pg. 60

COLUMNS

72 Technology Quest Column
Socrative 2.0
Judy Deichman

74 L4L Column
Just Wondering: The Beginning of Inquiry
Catherine E. Marriott

78 CBC Column
The Roles of Inquiry and Research in Hatching the Glorious Goddesses
Shirin Yim Bridges, with Janie Havemeyer and Gretchen Maurer

DEPARTMENTS

4 President’s Column
Planning + Mission = A Focused Association
Terri Grief

6 Guest Editor Column
An Exploration of the Inquiry Process
Mary Keeling

80 Index to Advertisers
What an exciting time to be the leader of AASL! During the last year, the board has worked diligently to develop a new three-year strategic plan. This task may not seem exciting to many of you who have attended strategic planning meetings and then never saw the plan in action, but AASL’s new plan will help guide our organization’s direction for years to come. Harrison Coever and Mary Byers, authors of *The Road to Relevance: 5 Strategies for Competitive Associations*, contend that strategic planning is strategic thinking. Strategic thinking asks questions that focus the discussion. These questions guide planners through the process of first articulating the purpose of the association and then identifying what leaders of the association hope to accomplish, followed by devising ways to accomplish those things. The process ends with determining how to measure if those things are getting done (2013, 52). These strategies are exactly what happened over the last year. What makes this effort so interesting is that this plan is going to guide the association for every decision. WOW! Every decision we make for the next three years will be supported by and will support this plan. A little background…

We began the process by hiring a consultant to work with us. The consultant surveyed members on why they joined AASL and what they saw as the trends that will impact school librarians in the future; he also gathered data from AASL staff. He then put the board to work. The board, committee chairs, and other leaders of the association met face to face in Philadelphia at the 2014 ALA Midwinter Meeting. Out of much discussion, a plan bubbled up. We also decided that our mission statement needed updating. The executive committee, made up of the past president, president, president-elect, division councilor, treasurer, and the member-at-large, along with the executive director and deputy executive director, met in May to work through the report from the consultant. At the same time, a working group began honing the mission statement. A draft strategic plan was in place for the ALA Annual Conference in Las Vegas. Discussion of the mission statement continued on ALA Connect.

In Las Vegas the board received the draft document and voted to accept the strategic plan. After much discussion, the new mission statement was also adopted.

**The Strategic Plan in a Nutshell**

Three critical issues were identified. They are association relevance, membership development, and association governance and leadership.

The first issue relates to the external world and defines a desire for AASL to become a stronger voice for school librarians and the profession. Two goals will guide us in this area. Goal one challenges us to determine the impact of education and technology trends and then to respond as the advocate for the profession. We plan to identify three key external stakeholder groups and partner with them. The second goal is to be a stronger voice for school librarians, a goal that includes setting

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**Planning + Mission = A Focused Association**

*Terri Grief, 2014–2015 AASL President | terri.grief@mccracken.kyschools.us*
The new mission statement is: “The American Association of School Librarians empowers leaders to transform teaching and learning.” The discussion was intense as we thought carefully about every word.

The learning standards and program guidelines for the profession.

The other issues are internal to the association. We know that the strength of our association is our members. The state associations are critical to the success of the national association. If we strengthen our relationship with the state affiliates, everyone will benefit. My presidential initiative is to help develop leaders at the state level—leaders who will then be ready to serve at the national level. Our organization is a living organism that is nourished by members. By enhancing the strength of leadership at the state level, our professional community will become an even more influential group.

The last issue involves taking a hard look at our governance structure. We value the time our volunteers give to the association. Again, we can’t accomplish anything without our members and their participation. With this reality in mind, we want to focus on the governance structure and streamline what we do. Albert Einstein is widely quoted as having said that the definition of insanity is doing the same thing over and over again and expecting different results. I really don’t think we’ve done anything insane over the last sixty-five years of our existence, but we do need to change the way we are structured. As a result, the committee structure might change. A task force is being created to analyze our committees, task forces, and working groups. To really tap into the vast knowledge and expertise of our members, a new volunteer form was developed to allow folks to jump in and out of issue-related activities. It’s available at <www.ala.org/aasl/getinvolved>.

As we make decisions on the direction of the association, we will choose not to do some tasks. This approach is a relatively new phenomenon in associations. Every one of us has fabulous ideas, but we realized that we can’t do it all well. We want to deliberately focus our volunteer and staff energies on accomplishing great things.

**New Mission Statement**

The revision of AASL’s mission statement came naturally as the group worked through creating the strategic plan. The new mission statement is: “The American Association of School Librarians empowers leaders to transform teaching and learning.” The discussion was intense as we thought carefully about every word.

We talked about the word “leaders” and discussed who we were targeting. The conclusion was to let the word “leader” speak for itself. School librarians are leaders in their schools, but we also were thinking of school administrators, legislators, and other stakeholders who are instrumental in the success of our students.

We loved the word “transform” because it so perfectly captures what happens in our school libraries every day. You will see the tagline “Transforming Learning” used extensively in the future.

Adding the word “teaching” was important to reinforce our role as teachers. I hope that you will embrace the new mission statement.

**Terri Grief** is president of the American Association of School Librarians. She is one of the school librarians at McCracken County High School in Paducah, Kentucky. In 2013 she received the Barby Hardy Lifetime Achievement Award from the Kentucky Association of School Librarians. She also authored the chapter “Big Games at Reidland High School” in Teen Games Rule! A Librarian’s Guide to Platforms and Programs (Libraries Unlimited 2014).

**We loved the word “transform” because it so perfectly captures what happens in our school libraries every day.**

**Work Cited:**

With the publication of Standards for the 21st-Century Learner, AASL declared its commitment to the instructional role of school librarians, a role grounded in a constructivist instructional philosophy. This model focuses on students as they use an “inquiry-based process” to “inquire, think critically, and gain knowledge”; “draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge”; and “share knowledge and participate ethically and productively as members of our democratic society” (AASL 2007, 4, 5, 6).

Although school librarians have taught information process skills for years, how does aligning our instruction with an “inquiry-based process” change our work? How does an inquiry-based process differ from information literacy? To what extent are school librarians changing their professional practice to incorporate this model in their own school library programs?

We asked this issue’s authors to address these questions:

- How is using an inquiry process different from helping students with traditional research assignments?
- To what extent do school librarians embrace and teach with an inquiry-based process? What are some inquiry process models?
- How does an inquiry process fit into implementation of the Common Core State Standards and other state standards?

How Is Using an Inquiry Process Different?
Carol Kuhlthau and Leslie Maniotes discuss how Kuhlthau’s research has led to a deeper understanding of student behavior, thinking, and feelings at different stages of a research assignment. The authors define the characteristics of inquiry and show how the Guided Inquiry Design model can be used to design learning experiences.

Daniel Callison and Katie Baker define elements of information inquiry and describe and compare in three major inquiry models the learning tasks embedded in these elements. They note that the increased emphasis on inquiry results from the application of constructivist theory and changes in the teaching role of the school librarian.

Trudi Jacobson and Emer O’Keeffe introduce two learning models used in academic libraries and consider their application in high school instruction. Metaliteracy emphasizes students’ information creation, collaboration, and metacognition. Threshold concepts are a discipline’s core concepts. Both models are integral to the Association of College and Research Libraries’ draft Framework for Information Literacy for Higher Education.

In an online exclusive, Judi Moreillon discusses the alignment of reading strategies and tasks in the inquiry process. She demonstrates how the school librarian can “build a bridge” to the classroom by using a shared vocabulary and intentionally aligning library instructional goals and practices with those of principals and teachers.
To What Extent Do School Librarians Embrace and Teach with an Inquiry-Based Process?

Using a Driver’s Ed analogy, Suzy Rabbat shares practical and relevant strategies to provide students with multiple opportunities for practice so learners can gain the skills to move from “the parking lot to the highway.”

Nalani Naluai shares how librarians in Hawaii’s Kamehameha Schools developed an inquiry process model infused with Hawaiian values and traditions to empower their students to learn about the world while continuing the traditions and learning styles of their ancestors.

Sandy Graham, Patrice Lambusta, and Barbara Letteri-Walker tell how school librarians came to the painful realization that their district’s inquiry process model was possibly flawed and why they revised it. These authors also describe how changes to the model resulted in improvements in student learning at elementary, middle, and high school levels.

School librarians may not recognize browsing as a search strategy, but browsing shares characteristics with the “Explore” component of inquiry. In an online exclusive Barbara Montgomery defines browsing, summarizes research on the practice, and explores its benefits and shortcomings.

Debbie Abilock and Connie Williams use the frame of an infographic assignment to provide rich examples of negotiating assignments with teachers, supporting students as they develop questions, and providing structures like matrices to scaffold students’ synthesis and product design.

Cherry Fuller, Gayla Byerly, Donna Kearley, and Lilly Ramin describe a grant-funded project undertaken by public, school, and university librarians. The librarians’ development of a K–20 information literacy curriculum has been an authentic inquiry with all the confusion and uncertainty our students experience.

How Does an Inquiry Process Fit into the Common Core?

Many see the Common Core State Standards (CCSS) as a catalyst for implementing inquiry, and most authors in this issue reference CCSS. Paige Jaeger and Olga Nesi discuss the difference between teacher-driven information tasks and true inquiry, provide steps to transform assignments, and illustrate the redesign of a fact-based information assignment into an inquiry project that requires students to do something with what they have learned.

Mary Boyd Ratzer declares that “school librarians who invest in inquiry have…expertise to bring to national standards reform.” She explores the College, Career, and Civic Life (C3) Framework for Social Studies State Standards and the Next Generation Science Standards and shows how both sets of standards align with AASL learning standards and the CCSS and require a school librarian to be actively involved in inquiry tasks.

Summing Up the Change in Practice

In an online exclusive, Nalani Naluai describes how school librarians at Hawaii’s Kamehameha Schools customized Charlotte Danielson’s framework for school librarians.

Traditional research assignments typically focus on teaching students the mysteries of location and access and strategies for note-making and citation to avoid plagiarism. Questions may be predefined by the teacher or school librarian, with expectations of a limited range of correct student responses. Inquiry, on the other hand, engages students in framing their own questions and provides structures to help them make sense of information, synthesize ideas, and communicate their findings to a real audience. Designing for inquiry requires a shift in practice—hard work that motivates students to dig deeper into the learning experience. I hope that this issue inspires readers to dig deep into their own practice, ask questions about the learning they inspire, and embrace an inquiry–based process to help students think, create, share, and grow.

Mary Keeling is the supervisor of library services at Newport News Public Schools in Virginia. In 2003, she became a National Board Certified Teacher in Library Media. Her article “Mission Statements—Rhetoric, Reality, or Roadmap to Success?” was published in the Sept/Oct 2013 issue of Knowledge Quest. She also wrote “The AASL Planning Guide: A District Approach to Powerful Professional Development” for the Mar/Apr 2013 issue of Library Media Connection. She is an AASL member and is serving on the AASL/ACRL Interdivisional Committee on Information Literacy and is chair of the AASL Supervisors Section. She has presented numerous eAcademy courses.

Work Cited:

The Shift
From Traditional Research Assignments to Guiding Inquiry Learning

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What Is the Traditional K–12 Research Assignment and Why Won’t It Go Away?

It’s Tuesday afternoon, and a teacher walks into the school library at 3:10 p.m. just as the busses are leaving. The teacher tells the school librarian that she would like to have her class come to the library tomorrow to do research on invasive species. She is making a list of plants; each student will pick one to research. Students will need to find five sources and take notes for a six-page research paper. Because the teacher can’t spare any more classroom time, one school library visit will be learners’ sole chance to get the information they need for the project. The teacher has to move on to the next unit by Friday.

Does this scenario sound familiar to you? This is an example of an educator suffering from Traditional Research Syndrome (TRS). We’re kidding, but think about it. So many K–12 teachers still hold the traditional research mindset, and this is their go-to assignment to get research into their units and courses. In Ban Those Bird Units David Loertscher, Carol Koechlin, and Sandi Zwaan offer a remedy for these traditional assignments; unfortunately, too few teachers have read the book!

The traditional research assignment is a common approach for teachers unaware of an inquiry process. In the traditional assignment, on the very first day that the work is assigned, students are given a topic or asked to choose a topic from a prepared list. They are given the parameters of the assignment, the number of sources required, the number of pages, and when it is due. At this point, they visit the school library, are briefed on how to find and cite sources, and given some time to start collecting information. After this visit they are expected to complete the assignment on their own.

Why is this still teachers’ expectation? In typical schools of education teachers do not learn in their teacher education courses about the research process—not in any content area or at any level, undergraduate, postgraduate, or advanced degrees. So, naturally, teachers are simply relying on their own experience in school to direct their approach to research. Relying on “the way it was always done” continues to maintain the gap between what we know about how students learn through research and assignment design. Although teachers have good intentions, they don’t realize that their traditional research approach is actually not supporting student learning. We know that the traditional assignment design actually runs counter to students’ experiences as described in the Information Search Process (Kuhlthau 2004).

Studies Opened a New Way of Looking at Research Assignments

Back in the 1980s my (Carol’s) studies were born out of a true need to improve students’ experience in learning through research. At the time, I was a school librarian in a high school and sought a better way to interact with students to...
support their learning in research assignments. At that time, the information age was looming in the future, and I wanted to find out why traditional research assignments weren’t more successful or effective learning experiences for students. The outcomes were often shallow with students reporting facts without giving much thought to the meaning and, sometimes, copying directly from the texts. However, I knew that research had the potential to be a powerful learning experience given the right conditions.

What I discovered, as I examined how students went through a traditional research assignment, was the process we now call the Information Search Process (ISP) shown in figure 1 (Kuhlthau 1985, 1989). The original study looked through the lens of the students during research. The process marked the thoughts, feelings, and actions of students in six stages and how these thoughts, feelings, and actions interplay across time within the context of a traditional research assignment.

One important finding was the difference between two stages of learning in the research process, exploration and collection. After students have some essential questions or big ideas, learners enter an exploration stage in which they need to browse broadly on the general topic and to dip into a few sources to explore in preparation for forming a focused question to pursue. Once they have formulated a focus for their research, they are ready to enter the collection stage and to gather information that specifically addresses their focused questions. An authentic research question or thesis statement comes toward the middle of the research process after exploration and before collection, rather than at the beginning.

These same studies also showed what can go wrong with research assignments. Without exploring and formulating a focus that identifies a clear question to pursue, students get mired in the collection stage of research and end up merely reporting on disconnected facts. As one student lamented, “I don’t think I ever acquired a focus… I thought I could just smush it all together. It didn’t work out” (Kuhlthau 2004). Traditional assignments don’t allow for the complex, constructive process of learning through two important phases of research: exploring and collecting. Typical assignments limit students’ ability to learn from a variety of sources and often result in a simple copying exercise.

Why Is the ISP Important Now?
We are now living in the information age. Although no one could have predicted back in the 1980s that thirty years later we would all be walking around with little computers...
Standards Call for Research at All Ages

Current standards, including the Common Core State Standards (CCSS), recognize that research has become part of everyday life and a basic skill for all students. The Common Core State Standards require research at all ages. According to the CCSS Initiative:

“To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today’s curriculum. In like fashion, research and media skills and understandings are embedded throughout the Standards rather than in separate sections” (2014).

AASL’s Standards for the 21st-Century Learner (2007) introduce inquiry in the information age as a way of learning that encompasses research. Research is embedded in inquiry. (For full discussion see Kuhlthau 2013.) Inquiry takes us out of the traditional research assignment mindset and forces us to think more broadly about learning.

Research Is Embedded in Inquiry Learning

We need to recognize the relationship between research and inquiry. Research is embedded in inquiry learning. Through inquiry, students discover real questions about academic topics; these questions blossom into research. In this context, inquiry supports students in building deep understandings within the content of the curriculum. The extensive research that comes out of inquiry allows students to create products worth sharing.

The ISP describes the stages that students experience in the process of learning from a variety of sources of information. The ISP indicates where students need guidance and what kind of guidance would be helpful. Based on the ISP findings, we developed a design framework to support teachers and school librarians to guide student learning through research within the inquiry context. We call this framework Guided Inquiry Design (Kuhlthau, Maniotes, and Caspari 2007, 2012).

Framework for Designing Inquiry Learning

Guided Inquiry Design (GID) is a framework for designing inquiry learning experienced in eight phases: Open, Immerse, Explore, Identify, Gather, Create, Share, and Evaluate. First, students’ curiosity is opened to a broad topic (Open) with an essential question on curricular content. Next, the whole class builds background knowledge about the general topic by visiting a museum or immersing in some other enlightening experience, such as reading a book together or viewing a film (Immerse). Once each student has found some personally interesting ideas to investigate, learners are ready to begin the exploratory phase of research. They begin to explore these ideas by browsing broadly, dipping into a few sources, and reflecting on what they find (Explore). After taking

An authentic research question or thesis statement comes toward the middle of the research process after exploration and before collection, rather than at the beginning.
some time to read and reflect they stop to formulate a focused question that is interesting and important in the context of the essential question (Identify). After they have identified a research question they are ready to gather information that specifically addresses the focus they are pursuing (Gather).

Explore, Identify, and Gather are the phases of research that support students in creating something new that they can present and share with others (Create and Share). In the last phase of the inquiry process, to consider where they may go next, students reflect on their own learning, both on the process of how they learned and on the depth of understanding of content they have gained (Evaluate). That is the full cycle of inquiry, and it requires expert guidance along the way.

Inquiry takes time, reflection, and persistence—it can’t be rushed to get to the next unit (Maniotes 2013). Through inquiry, students engage in research around interesting ideas and important questions within an area of study in the curriculum. When that learning is guided, students are supported and not overwhelmed. Through inquiry students engage in discovery, ask real questions about academic topics, and are interested to learn more and to share with others.

Guided Inquiry Scenario
What would the traditional research assignment on invasive species look like if it were designed using guided inquiry? The following example shows how research is embedded within the Guided Inquiry Design process.

**Open:** The teacher and school librarian form a learning team to collaborate on the design of the inquiry unit. To heighten students’ curiosity about big ideas and essential questions, the inquiry is opened with an image of local invasive species, such as Kudzu vines taking over a building. As the image is displayed, the coteachers pique students’ interest by asking what is happening here and guide them to wonder about the implications.

**Immerse:** Next, the learning team immerses the class in the topic to build their background knowledge by visiting a location to observe the impact where an invasive species has taken over. The educators invite a local expert to talk about particular invasive species in the area, inviting students to consider the local plants and animals that are replaced by invasives and to think about the impact on a larger scale. Students are guided to note interesting ideas about local ecology, invasive species, and impact—ideas that they want to know more about.

**Explore:** Then each student uses resources in the school library and digital collections to explore the ideas that most interest that person. Learners are guided to dip in and reflect broadly and accumulate ideas, questions, and connections to the topic. Only now is each student ready to identify a specific question to research and learn more about.

**Identify:** The learning team gives students time to pause and ponder and review their learning to come up with the questions that will drive their research. Some examples of students’ research questions are:

- How does a particular invasive plant affect the surrounding area?
- How is a particular animal affected by an invasive plant species?
- How can an invasive plant affect local birds?
- How are insects affected by the invasion?
- What potential damage might a particular native plant incur from an invasive plant?
- Is there a benefit to planting natives?
- Are there ways to stop invasives?
These questions are authentic and are born out of students’ real interest in the topic.

**Gather:** Next, time is set aside to gather information on their questions as students begin to think about what might be important information to share with others. The students in this inquiry are surprised to discover that many of their family members and neighbors do not know about invasive species and local plants. Together students decide that to make people aware of the benefits of local plants and animals and the dangers of invasive species, a public information campaign will help spread the ideas learned.

**Through inquiry students engage in discovery, ask real questions about academic topics, and are interested to learn more and to share with others.**
Create and Share: Students create a multimedia public information campaign to showcase what they have learned about local invasive species. They share their multimedia presentation at a community night and invite the expert from the Immerse phase. For access to a synthesis of the information that students have discovered, the multimedia presentation lives online at a website about local and invasive species.

Evaluate: In the final phase of the project, the learning team evaluates each student’s learning of content and process. The students reflect on what supported their learning and what was challenging. They think about the ways they overcame challenges and how they learned through inquiry—strategies that they can apply to their next research and inquiry project.

The process described above requires a shift from making research assignments to designing learning experiences. The next section describes six attributes of inquiry to keep in mind during the design of learning experiences that rely on inquiry.

Six Important Attributes of Inquiry

How is inquiry learning different from traditional research assignments? Traditional research assignments go against the grain of the learning process that we know from Kuhlthau’s extensive research. Guided Inquiry Design readjusts the learning sequence to align instruction and guidance to support deep learning. So we can say that inquiry is a way to learn and that research is an essential part of this process. Inquiry has six integral attributes that shift the learning in K–12 schools:

- Inquiry promotes and supports academic research at all ages.
- Inquiry is learning-centered not product-driven.
- Inquiry recognizes and supports the emotional aspect of learning.
- Inquiry is carefully and intentionally designed.
- Inquiry is driven by students’ high level of questioning.
- Inquiry goes beyond low-level fact finding to deep understanding.

Inquiry promotes and supports academic research at all ages. AASL standards call for an inquiry approach to learning in K–12 schools, and CCSS requires research for all ages throughout the curriculum. An inquiry approach to learning promotes authentic, original research. Research is embedded in the inquiry process as illustrated in the figure 3 chart of Guided Inquiry Design.

Inquiry is learning-centered not product-driven. Many traditional research assignments have the goal of developing a product rather than a learning outcome. Unfortunately, some of the most elaborate and impressive products have little evidence of student learning. However well intentioned, these assignments are drawn from a traditional research mindset. Grant Wiggins and Jay McTighe’s Understanding by Design (1998) clearly showed that effective learning begins with a clear learning goal not a culminating activity. A transferable goal of inquiry is for students to learn how to learn through an inquiry process. As students engage in inquiry and reflect on their own learning through inquiry, they come to recognize the process as their own way of learning. Another goal is for students to learn and practice literacy, social, and information literacy skills and content knowledge in an authentic context.

Inquiry recognizes and supports the emotional aspect of learning. Empirical studies from the library and information science field describe the emotions as well as the thoughts and actions students experience in constructing deep learning from a variety of sources of information (Kuhlthau 2004). Without adequate guidance, students commonly experience anxiety and frustration when they expect to be in the collection stage of research and find themselves in the exploration stage. Guidance in handling the uncertainty of the exploration stage is particularly helpful for learning in the research process. Inquiry provides the emotional satisfaction of building personal knowledge and sharing learning. Studies found that students’ interest increased when they built personal knowledge and that they experienced emotional satisfaction in sharing their learning with others in the class.
Inquiry is carefully and intentionally designed. All educators would benefit from reading widely in the inquiry literature, particularly the work of school library experts: Barbara Stripling (2010), Jean Donham (2010, 2014), Violet H. Harada and Joan M. Yoshina (2004), and others, such as the authors of chapters in *Inquiry and the Common Core* (2014), edited by Vi Harada and Sharon Coatney. Different perspectives on inquiry help us build a broad view, deepen our understanding, and add to our inquiry repertoire. These experts’ ways of looking at inquiry are complementary and help to expand what we know about inquiry learning. Our own work in *Guided Inquiry* lays out the foundation for guiding inquiry based on the research of the ISP (Kuhlthau, Maniotes, and Caspari 2007). The GID framework (Kuhlthau, Maniotes, and Caspari 2012) will help you intentionally design a complete program of inquiry that incorporates research for K–12 students.

Inquiry is driven by students’ high level of questioning. At the opening of the inquiry process an essential question stimulates curiosity in a broad topic that leads toward a learning target. Jeffrey D. Wilhelm has defined essential questions as those “that probe for deeper meaning and set the stage for further questioning” (2014, 38). Through the inquiry process students ask many questions as they immerse in background knowledge, explore interesting ideas, and identify their own research questions to pursue for deep learning.

Inquiry goes beyond low-level fact finding to deep understanding. Many traditional research assignments are fact finding and reporting activities. Reports are sometimes useful, but these assignments are not inquiry-based. It is important to see the difference between a report of facts and research for understanding. In a study of school librarians in New Jersey, Ross Todd (2012) found over 90 percent of library instruction was teaching access and evaluating sources; under 60 percent of library instruction focused on skills that lead to deep understanding, such as forming one’s question and integrating information into one’s own knowledge.

Jean Donham in her study of college readiness in Iowa found three troubling themes emerge from her analysis. Lacking in undergraduates’ readiness for college research were: “information literacy, especially initiating inquiry; academic writing, especially citing evidence in support of a thesis; learner dispositions, especially curiosity, open-mindedness, self reliance, and perseverance” (2014). The shift from traditional research assignments to guiding inquiry is essential for moving students beyond simple fact finding to deep learning.

Without adequate guidance, students commonly experience anxiety and frustration when they expect to be in the collection stage of research and find themselves in the exploration stage.
School Librarians’ Expertise and Knowledge of the Research Process

School librarians have special expertise in the inquiry process and how research fits into that process; this expertise makes them indispensable partners on the learning team. Since teachers are not taught about the research process in their teacher education courses, it is up to school librarians to share their knowledge of the process. This special expertise can be a major contribution to students’ learning in school and establishes the school librarian’s value in design and collaboration in inquiry learning.

School librarians know the inquiry process like language arts teachers know the writing process and science teachers know the scientific method. A middle school librarian explains that by internalizing the ISP she is able to apply it in her work with teachers and students. “I always have the process in the back of my mind. When I work with students I think about where they are in the process. Are they before formulation and need guidance to explore interesting ideas or after formulation and have identified a focused question and are ready to collect and gather specific information? It makes all the difference on how I guide them” (LaDawna Harrington, Woodbridge Middle School). She also describes the process to students at the beginning of a project so they know what to expect. School librarians and teachers that know this process and hold it in their minds can instinctively encourage and support teachers in their shift from traditional research assigners to designers of inquiry learning experiences for students.

The inquiry process is the knowledge of the library field situated in the body of school library research. Using this knowledge school librarians are able to collaborate with teachers at a high level to impact learning, learning design, and the learning environment of the whole school. School librarians can be leaders in inquiry learning because they know the research process and are able to help teachers design better learning experiences for students, experiences that support their learning through research.

Curing Traditional Research Syndrome (TRS)

What could shift the traditional research assignment mindset in your school? What conversations might you have to shift teachers toward an inquiry learning approach? Start by reading and discussing the inquiry literature. Talk about the Information Search Process studies with your teachers, particularly emphasizing the difference between the exploration and the collection stages. By scheduling several visits to the school library for each class, you can support teachers’ revising assignments to accommodate these two stages. Organize faculty book groups to read together about Guided Inquiry Design and reflect on how it could work in your school. Consider the inhibitors as well as the enablers to implementing inquiry learning (see Kuhlthau 2004, 149–52). Set up a three-year plan for shifting toward inquiry learning.

All across the country educators are working to shift toward inquiry. It may seem as if other people have this transformation down pat and are way ahead of you. Don’t be discouraged! We have found that the shift takes time, commitment, and thoughtful planning. Be one of the innovators and join in curing TRS in your school.
Leslie K. Maniotes is a teacher effectiveness coach and educational leader in the Denver Public Schools. A National Board Certified Teacher with more than a decade of classroom experience and more than twenty-five years in education, she has served as a curriculum and professional development designer and facilitator as well as a K–12 literacy specialist in rural and urban Title One schools. In her spare time Leslie is a national consultant on the Guided Inquiry Design approach and leads teams through professional development to support implementation and grow capacity for inquiry in schools and districts. Her published works include Guided Inquiry: Learning in the 21st Century (Libraries Unlimited 2007) and Guided Inquiry Design: A Framework for Inquiry in Your School (Libraries Unlimited 2012) along with numerous articles.

Carol C. Kuhlthau is professor emerita of Library and Information Science at Rutgers University, where she directed the graduate program in school librarianship, rated number one in the country by U.S. News & World Report. She is founding director of the Center for International Scholarship in School Libraries at Rutgers University, where she serves as senior advisor. Her published works include Libraries Unlimited’s Seeking Meaning: A Process Approach to Library and Information Services, 2nd ed. (2004), Guided Inquiry: Learning in the 21st Century (2007), and Guided Inquiry Design: A Framework for Learning in Your School (2012). She is internationally recognized for her ground-breaking research on the information search process and the ISP model of thoughts, feelings, and actions in six stages of information seeking and use.

Works Cited and Recommended:


In 2003 Paula Montgomery, founding editor of *School Library Media Activities Monthly* and former branch chief of school media services for the Maryland State Department of Education, published a guide to teaching information inquiry (Callison 2003). Her staff also illustrated the elements of information inquiry as a recursive cycle with interaction among the elements occurring each time the inquirer encounters new information. This cycle is centered on a need or task, no matter how small or large, or how complex or simple (see figure 1). This cycle recurs with each information interaction, whether a portion of a project or culmination of the greater inquiry experience.

In 2003, I (Daniel) defined five elements as a consistent core found in the many models for information searching and use emerging at the time from a variety of academic educators and researchers, as well as from leading school library professionals. These five elements have remained central while there has been evolution in several of the leading information literacy instructional models (Callison and Preddy 2006). Application of constructivist educational theory, as well as refinement of school library instructional practice, resulted in an evolution toward inquiry. While these advancements have moved toward a more student-centered teaching approach, the core information inquiry elements continue to provide the framework for inquiry-based learning.

**Five Elements of Information Inquiry**

**Questioning.** This element rests on natural curiosity held by most humans from birth. Who? What? Where? When? How? But most of all, Why? This element, as it interacts with the other four, becomes a more refined skill set. The result is the ability to ask more focused, relevant, and insightful questions.

Questions trigger the interactions that can eventually lead to greater understanding of an environment, a situation, a problem, an issue, or actions of a person or group. Today, these questions are raised in an environment dominated by a flood of information, often unorganized, misleading, and overpowering. Understanding, gaining meaning, and arriving at a solution are the indicators of successful end-products of the inquiry process. Conclusions are also the basis for beginning another set of questions.
Information inquiry is based on a continuous questioning cycle, the essence of lifelong learning.

**Exploration.** Closely tied to questioning, exploration is the action taken to seek answers to the questions. In many cases, no specific questions are on the agenda, but the drive to satisfy curiosity moves the learner to search for information: reading, viewing, listening. As the information inquiry elements interact and the abilities of the explorer mature, exploration becomes the action to gain information related to specific questions. Exploration becomes a systematic search for and examination of resources and information to meet a need or task that is meaningful and holds purpose for the learner.

Over time and through many cycles of these elements, information needs and tasks become more focused. As a result, exploration involves a more discriminating process to seek and select information. Mature abilities gained through practice and experience result in more efficient use of time to search, examine, and reflect.

**Assimilation.** This element involves the actions to absorb and fit information with that which is already known, believed, or assumed by the learner. In some cases, assimilation means reinforcing or confirming what is known. In other cases, assimilation involves an altering of what has been accepted as knowledge by the individual learner or group of learners.

Inquiry turns learning into more than a gathering of data. Assimilation through inquiry leads to consideration of a wider range of perceptions and options. As the inquirer matures, assimilation involves linking a host of diverse information to that previously known and applying that information to meet different future situations. Assimilation involves accumulation of knowledge, alteration of accepted knowledge, and constant consideration of alternatives.

**Inference.** This element involves the actions or processes for deriving a conclusion from facts and premises. Inference may involve personal choice and actions taken based on conclusions that seem most relevant and meaningful for the situation. On a personal basis, inference is usually an internal message to the self and not one that is conveyed in a formal manner to others.

In other cases, inference may involve a wider communication of conclusions. The inference is either shared among members of a group working on the same tasks in a cooperative effort, or the inference is presented to those who might need the recommendation for action or need to evaluate the learner’s ability to address a problem and communicate a solution.

Information within the inference element is most useful when it becomes evidence. Evidence is necessary to support a claim, notion, plan for change, or hypothesis. Evidence may be necessary to justify the status quo or accepted norm. Evidence is always necessary to justify change. A new expectation for the Common Core State Standards Initiative is that students learn not only how to find satisfactory evidence, but also determine what is the best evidence possible.

**Reflection.** This element raises the question that brings the interactions of the other elements to a complete cycle. “Have I been successful in answering my question?”

Further, other questions that involve assessment of the information inquiry process extend from reflection. Were the resources used the best possible? What new questions have resulted, and how should they be explored? Is what has been accepted as new knowledge meaningful to me, to others? Has this knowledge been understood to the extent that the communication process is complete? What evaluation of the application of this cycle in information literacy do others have to offer?

As the learner matures in his or her ability, reflection will be used more and more within each element as well as an overall action. Individual reflections to assess exploration, assimilation, and inference are formative. Reflection that is summative in nature allows the learner and teacher to consider decisions connected across the entire project.

The learner who masters self-reflection becomes more likely to be not only a true independent learner but also one who can help others master the information inquiry interactions. Teachers who master both formative and summative assessment processes will provide more clarity in their guidance and feedback in judgment of learning actions. The teacher as a model of

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**Figure 1. Recursive inquiry cycle. (Callison 2003)**

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**TABLE 1. PATHWAYS TO KNOWLEDGE** (Follett Software Company; Pappas and Tepe 2002)

<table>
<thead>
<tr>
<th>Five Elements or Components of Information Inquiry</th>
<th>Appreciation and Enjoyment</th>
<th>Sensing, viewing, listening, reading, curiosity, enjoyment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raising the Information Need</td>
<td>Brainstorm, formulate initial questions, build background, identify key words, relate to prior knowledge, explore general sources.</td>
<td></td>
</tr>
<tr>
<td>Pre-Search, Establish a focus</td>
<td>Develop an overview</td>
<td>Define questions, cluster, outline, webbing, listing, and narrowing and broadening</td>
</tr>
<tr>
<td>Explore relationships</td>
<td></td>
<td>Provides searchers with strategies to narrow their focus and develop specific questions or define information need</td>
</tr>
<tr>
<td>Identify information providers</td>
<td></td>
<td>Makes a connection between their topic and prior knowledge</td>
</tr>
<tr>
<td>Select information resources and tools</td>
<td></td>
<td>Home and computer resources, museums, zoos, historical sites, libraries, etc.</td>
</tr>
<tr>
<td>Seek relevant information</td>
<td></td>
<td>Indexes, people, Internet, media, reference resources, etc.</td>
</tr>
<tr>
<td>Assimilation Accepting, Incorporating, Rejecting</td>
<td>Interpret information</td>
<td>Assessing usefulness of information and reflecting to develop personal meaning</td>
</tr>
<tr>
<td>Communication, Construct and present new knowledge</td>
<td></td>
<td>Compare and contrast, integrate concepts, determine patterns and themes, infer meaning, analyze, synthesize, classify, filter, organize, and classify</td>
</tr>
<tr>
<td>Apply information</td>
<td></td>
<td>Choose appropriate communication format, solve a problem, answer a question, and respect intellectual property</td>
</tr>
<tr>
<td>Share new knowledge</td>
<td></td>
<td>Compose, design, edit, revise, use most effective medium such as video, report, mural, portfolio, and animation</td>
</tr>
<tr>
<td>Reflection Adjustment for Additional Questioning</td>
<td>Evaluate</td>
<td>End product, effective communication, redefining new questions, use of resources, meeting personal information needs</td>
</tr>
<tr>
<td>Evaluation Think about process and product</td>
<td></td>
<td>Evaluation is ongoing in their nonlinear information process and should occur throughout each stage. Through this continuous evaluation and revision process that searchers develop the ability to become independent searchers.</td>
</tr>
</tbody>
</table>

reflective behavior will serve as a mentor who learns from mistakes as well as successes.

**Comparing and Contrasting Inquiry Elements**

Completely independent from my (Daniel’s) definitions and based on extensive professional experience of their own, several leading school library educators have established information literacy instruction models that have moved to an inquiry approach. Each will be examined below. While each model has a unique and copyrighted graphic that can be located through the citations provided, the elements of each model have been organized under a standard frame (see table 1) to allow for comparison to information inquiry as well as identification of contrasting elements that bring new dimensions to the inquiry process.

The model developed for Follett Software by Marjorie Pappas and Anne Tepe (2002) moves beyond the basic information inquiry framework in many respects and brings quality literature to the center of the learning objectives, along with the student’s needs. Below are some of the actions Pappas and Tepe recommend for students and teachers:

- Foster appreciation and enjoyment of literature and the desire to learn; these are foundational to establishing meaningful inquiry.
- Activate all senses for information intake.
- Do extensive brainstorming that will trigger potential topics for exploration; extend this brainstorming by identifying keywords and reading general resources to determine interests.
- Cluster questions to bring efficiency to the process.
- Encourage students to exercise methods that bring efficient use of time through skimming and scanning.
- Look for matching patterns and themes within answers to question clusters; identifying these patterns and themes enhances prior knowledge and current interests.
- Experiment with a wide variety of communication formats to determine the most effective mode for students’ abilities to present and the audience to comprehend.
- Evaluate not only the product but also the process to raise new questions, assess the extent to
which use of resources meets information needs, and recognize the degree of movement toward becoming an independent thinker.

Beyond the REACTS Model Barbara Stripling developed in collaboration with Judy Pitts (1988), Stripling has moved more recently to a process designed to meet inquiry learning projects across the curriculum and at various grade levels (see table 2). Her model is designed as a conversation-planning instrument to be used collaboratively with teachers (Stripling and Harada 2012). Several of her strategies move beyond the information inquiry core to create a greater library-centered and learner-centered experience for students. Among the student learning behaviors she encourages for students—in addition to engaging in the standard information inquiry cycle—are those listed below:

- Find a connection from your experience and ideas to that of others, especially your peers.
- Feel free to wonder about questions that may lead to resources, ideas, and information you have not considered before.
- Establish a focus and framework that will meet academic intellectual demands of the assignment.

### TABLE 2. INQUIRY PROCESS (Stripling 2003)

<table>
<thead>
<tr>
<th>FIVE ELEMENTS OF INFORMATION INQUIRY</th>
<th>STAGES</th>
<th>INQUIRY SKILLS AND STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Questioning</strong> Raising the Information Need</td>
<td>Connect</td>
<td>Connect to own experience Connect to ideas of others Connect to previous knowledge and verify its accuracy Gain background and context Establish preliminary contact with idea through observation or experience</td>
</tr>
<tr>
<td><strong>Exploring</strong> Reading, Viewing, Listening</td>
<td>Wonder</td>
<td>Develop wonder questions that will lead to new understandings about key ideas Frame questions using prior knowledge, focus and framework of instructional unit, and different levels of thinking Develop questions to lead to active investigation and decision making Make predictions or hypotheses based on prior knowledge, background information, and preliminary observations</td>
</tr>
<tr>
<td></td>
<td>Investigate</td>
<td>Plan investigation and develop search strategies to find relevant, high-quality information Identify, evaluate, and use multiple sources of information Find and evaluate information to answer questions Take notes using a variety of formats Use information and information technology responsibly, efficiently, and ethically Think about the information to formulate new questions and hypotheses: identify gaps and conflicting information, consider alternatives explanations and predictions, and consider new questions to extend the investigation into a new area</td>
</tr>
<tr>
<td><strong>Assimilation</strong> Accepting, Incorporating, Rejecting</td>
<td>Construct</td>
<td>Organize information to detect relationships among ideas Draw inferences justified by the evidence Think about the information to test predictions and hypotheses: compare evidence to hypotheses, compare patterns in data with what is already known, use evidence Recognize author’s point of view and consider alternate perspectives Construct clear and appropriate conclusions based on evidence, explanations, interpretations, and connections Connect new understandings to previous knowledge</td>
</tr>
<tr>
<td><strong>Inference</strong> Application for Solution and Meaning</td>
<td>Express</td>
<td>Apply understandings to new context – create a product to demonstrate new understanding Select format based on needs of topic and audience Communicate clearly both main and supporting points in product Use the writing process to develop product (pre-write, write, revise, edit) Evaluate and revise own product based on self-assessment and feedback from others Express new ideas or take action to share learning with others</td>
</tr>
<tr>
<td><strong>Reflection</strong> Adjustment for Additional Questioning</td>
<td>Reflect</td>
<td>Set high and clear standards for own work Reflect with others Use criteria to assess own process and product throughout the learning; make revisions when necessary Reflect on own learning to be clear about the change in understanding (change in mental model) Adapt own standards and process based on personal reflection and feedback from others Ask new questions, set new goals for learning</td>
</tr>
</tbody>
</table>

Note: Application of the Information Inquiry Elements to Stripling and Pitts’ REACTS model can be found in The Blue Book on Information Age Inquiry, Instruction and Literacy by Daniel Collison and Leslie Preddy, Libraries Unlimited, 2006, Table B.6., page 590.
• Initiate a plan to find not just relevant information, but high-quality, credible information.

• Identify information gaps and conflicting information, and plan to deal with such issues.

• Look for patterns in data and patterns in conclusions from others.

• Transform information gained to new contexts to determine new meaning based on the strength of the evidence.

• Study the expectations of the audience and tailor your presentation to address those demands.

• Apply self-assessment as much as possible but learn to reflect with others.

• Set new learning goals as part of the total reflection on the experience and make those new goals foundational to future inquiry.

• Understand that maturation in inquiry is the process of building toward new, meaningful mental models.

The most influential model for information literacy instruction has been that created by Carol Collier Kuhlthau: the Information Search Process (Kuhlthau 2003). Her work has extended across public schools and higher education and has been tested in a variety of demanding workplace environments. Her shift to greater emphasis on inquiry strategies is in keeping with her consistent application of constructivist learning theory and assumption that students have the ability to build on their experiences (see table 3). Through the development of Guided Inquiry Design (Kuhlthau, Maniotes, and Caspari 2012), even greater emphasis has been placed on the student as the centerpiece of the learning process. Strategies are designed to guide the student to a meaningful focus for inquiry. Without such, everything else is futile. Examples of ways educators can foster student engagement are listed below:

• Make sure tasks involved in teaching inquiry are complex enough to merit trained, collaborative teaching teams.

• Immerse the students in thinking about what they already know and what would be worth learning; guide the students but support individual effort when of value.

• Encourage students to scan and explore a wide variety of sources, including broad subjects and works at various reading levels.

• Guide students to concentrate question development on issues of importance.

• Expect learners to maintain a record of the research experience and reflect on it regularly.

• Model actions such as visualizing and charting patterns to show growth in understanding and emersion of new knowledge.

• Advocate going broad, beyond the norm, in early exploration, but deep in quality and credibility when a focus has been established.

• Recognize that simple fact finding does not merit the students’ or the teacher’s time but reaching for new knowledge does.

• Encourage learners to make presentations as interesting for the audience as they are for the inquirers, as knowledge does not become rich and worthwhile until shared.

• Convince learners that self-assessment drives true reflection and recording reflection establishes the foundation needed to mature as an effective inquirer.

**Measured Reflections**

While the evolution toward inquiry of the information literacy models described here has been dramatic over the past decade, many aspects of reflection remain only slightly considered and some not at all. In 2005 Ross Todd and colleagues at Rutgers University reported that high school students engaged in guided inquiry learning reported several aspects of change in student academic behavior:

• Student’s initial knowledge underwent a significant conceptual change.

• Students learned topical content in deep ways, shown in complex and coherent knowledge structures.

• Students became more skillful and confident as information seekers.

• Students became increasingly engaged, interested, and reflective during their learning process and saw information seeking as a constructive process of building both deep knowledge and deep understanding.

• Students gained practical skills in independent information seeking, moving from fact finding to information analysis and synthesis.

• Students showed increasing awareness of the varied quality of information, as well as of information as problematic and often contradictory.

While Todd’s work has uncovered new evaluation measures that should be investigated and practiced more, we know very little about the process and value of student reflection, and we know even less about the array of behaviors that could become tangible measures of high performance. Areas that lie before us for further and deeper examination are:

• How do students identify conflicting information, document its differences, and resolve use of that information that seems most credible? How can they document value of primary and secondary sources?
### TABLE 3. GUIDED INQUIRY DESIGN (Kuhlthau, et al. 2012.)

<table>
<thead>
<tr>
<th>FIVE ELEMENTS OR COMPONENTS OF INFORMATION INQUIRY</th>
<th>PHASES</th>
<th>INQUIRY COMMUNITY TASKS</th>
<th>LEARNING TEAM TASKS</th>
<th>STUDENT TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questioning</td>
<td>Open</td>
<td>Invitation to inquiry</td>
<td>Decide on the learning goals, create powerful opener that invites learners in, establish an inquiry stance, introduce general topic to engage the inquiry community</td>
<td>Spark conversations about ideas and themes, pose questions and problems, and highlight concepts related to the subject</td>
</tr>
<tr>
<td>Raising the Information Need</td>
<td>Immerse</td>
<td>Build background knowledge</td>
<td>Design engaging ways for students to immerse in the overall content ideas</td>
<td>Think about what they already know and what seems particularly interesting, curious, surprising, or troubling</td>
</tr>
<tr>
<td>Exploring</td>
<td>Explore</td>
<td>Exploring interesting ideas</td>
<td>Guide students to browse and scan a variety of sources and encourage them to keep an open mind as they explore and reflect on new information</td>
<td>Survey (dip into) a wide range of sources, read when they find something interesting, reflect on questions that begin to shape their inquiry</td>
</tr>
<tr>
<td>Reading, Viewing, Listening</td>
<td>Identify</td>
<td>Pause and ponder</td>
<td>Introduce strategies that enable each student to sort through information and ideas to clearly articulate a meaningful inquiry question that will frame the rest of the inquiry</td>
<td>Construct an inquiry question from the interesting ideas, pressing problems, and emerging themes they have explored</td>
</tr>
<tr>
<td>Assimilation</td>
<td>Gather</td>
<td>Gather important information</td>
<td>Guide students in structured approach for managing their search: locating, evaluating, and using information that leads to deep learning</td>
<td>“Go broad” to find a range of sources that are useful for understanding their inquiry question</td>
</tr>
<tr>
<td>Accepting, Incorporating, Rejecting</td>
<td>Go broad</td>
<td>Go broad</td>
<td>“Go deep” and choose a core of the most useful sources to read closely as they find connections and construct personal understanding</td>
<td></td>
</tr>
<tr>
<td>Inference</td>
<td>Go deep</td>
<td>Go beyond facts to make meaning</td>
<td>Guide students to go beyond simple fact finding and reporting and to summarize, interpret, and extend meaning of what they have learned and create a meaningful, interesting, clearly articulated, well-documented presentation that tells the story of what they have learned in the inquiry process</td>
<td>Reflect on all they have learned about their inquiry question, construct their own understandings, and decide what type of presentation will best represent their engaging ideas, controversies, and theories generated through the inquiry for a particular audience</td>
</tr>
<tr>
<td>Application for Solution and Meaning</td>
<td>Create</td>
<td>Reflect on learning</td>
<td>Guide students to go beyond simple fact finding and reporting and to summarize, interpret, and extend meaning of what they have learned and create a meaningful, interesting, clearly articulated, well-documented presentation that tells the story of what they have learned in the inquiry process</td>
<td>Reflect on all they have learned about their inquiry question, construct their own understandings, and decide what type of presentation will best represent their engaging ideas, controversies, and theories generated through the inquiry for a particular audience</td>
</tr>
<tr>
<td>Reflection</td>
<td>Share</td>
<td>Learn from each other</td>
<td>Organize share sessions to provide the best conditions for students to learn substantial content from each other</td>
<td>Share the products they have developed to communicate what they have learned in an interesting, informative way</td>
</tr>
<tr>
<td>Adjustment for Additional Questioning</td>
<td>Evaluate</td>
<td>Evaluate achievement of learning goals</td>
<td>Guide students in reflection for self-assessment of their content learning and progress through the inquiry process; evaluate students’ achievement of the learning goals</td>
<td>Reflect on their content learning and learning throughout the inquiry process</td>
</tr>
</tbody>
</table>

**Note:** Application of the Information Inquiry Elements to Kuhlthau’s Information Search Process can be found in The Blue Book on Information Age Inquiry, Instruction and Literacy by Daniel Callison and Leslie Preddy, Libraries Unlimited, 2006, Table B.3., page 587.

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How can they document and reflect on dealing with bias? (Fitzgerald 1999)

- How do students deal with encountering new information that could dramatically shift the focus of inquiry and push it beyond the timeframe usually determined by an assigned structure for the project? Some have suggested that existing inquiry learning models do not include advice for educators or students dealing with such situations (Erdelez, Basic, and Levitov 2011). How can students reflect on their experiences and document reasons for advancing in the inquiry process through a cognitive apprenticeship provided by a qualified school librarian or other teacher acting as a research mentor? (Tilley 2006)

- What methods of gathering original data are best suited for various student ability levels and how can they be taught within an inquiry context? Can students document how they can improve in the application of those methods in future inquiry? (Callison and Preddy 2006)
• How do students illustrate their original data through graphics they produce, such as tables and charts? Do these become more precise with each new inquiry experience and does the student mature in his or her use of technology to construct such illustrations? (Lamb and Callison 2012)

• In what manner can students document their reflections on best and worst resources examined so that they may demonstrate more effective and efficient search strategies as they mature in the inquiry process? How can they best test the credibility and usefulness of evidence? (Callison 2015)

A portfolio of student products in inquiry learning should be compiled to show how the student has grown intellectually and matured in the information inquiry process. (Callison 1993). The Common Core States Standard Initiative and the American Association of School Librarians’ standards crosswalk provide progressive frameworks for this assessment process over the duration of the student’s academic career.

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Tables designed by Katie Baker, computer technology teacher and technology integration specialist, Sycamore School, Indianapolis, Indiana.

Working Cited:


Authentic Inquiry Models for Our Evolving Information Landscape

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Introduction

Information literacy instruction continuously adapts to changes in the information environment, whether those changes are small and focused on a regularly used tool or much broader in scope. School librarians in all settings are adept at adjusting to modifications, whether they result from new or evolving resources or the differing needs of the teachers and faculty members the librarians work with.

What is harder to conceive of and implement are more radical, overarching shifts. These transformations go far beyond introducing new and revised tools or even teaching increasingly sophisticated ways to interact with information. We will address two such shifts in this article: metaliteracy and threshold concepts. Both assert new lenses for defining information literacy and guiding student learning.

What Is Metaliteracy?
The changes in our information landscape have been dramatic since 1989 when ALA’s Presidential Committee on Information Literacy: Final Report called for a restructured learning environment that would “actively engage students in the process of:

- knowing when they have a need for information
- identifying information needed to address a given problem or issue
- finding needed information and evaluating the information
- organizing the information
- using the information effectively to address the problem or issue at hand.”

While this rallying call still applies, a range of new roles and responsibilities for learners have been made possible by Web 2.0 tools, social media, and the opportunities they have brought to learning. These opportunities include the ease not only of accessing information but also of creating it and doing so in new collaborative spaces. This enriched, but often overwhelming, environment is better navigated by learners who are willing to reflect critically about their interactions with and in it. The concept of “metaliteracy” was developed in connection with these new roles, responsibilities, and opportunities.

In Metaliteracy: Reinventing Information Literacy to Empower Learners, Thomas P. Mackey and I (Trudi) describe the scope of metaliteracy thusly, “The metaliterate individual has the capability to adapt to changing technologies and learning environments, while combining and understanding relationships among related literacies. This requires a high level of critical thinking and analysis about how we develop our self-conception of information literacy as metacognitive learners in open and social media environments” (2014, 2).

Proponents of metaliteracy conceive of information literacy as an overarching literacy, transcending any particular literacy—digital, visual, and media, for example—and identify key components necessary to critically engage with information. Individuals must see themselves as creators of information, as well as consumers. Participation and collaboration in the production
of information has been made possible with the rise of social media. And metaliterate learners are metacognitive; they think about their thinking as they engage in information-related activities.

Our students are, for the most part, heavily engaged in using social media. But they do not connect that activity to the world of information. When they are asked if they create information beyond that required for school assignments, they often say, "No," and are surprised when their activities on Facebook, Pinterest, or Tumblr are considered information generating.

Metaliteracy in Practice: The College Level

The Metaliteracy Learning Collaborative (MLC), made up of current and former State University of New York librarians (including both authors), faculty members, and instructional designers, has been working to enrich the original conception of metaliteracy. The collaborative has developed learning goals and objectives that have similarities with longer standing definitions of information literacy, but which amplify collaborative, participatory, and metacognitive elements (see <http://metaliteracy.org/learning-objectives>). The four learning goals articulated by the MLC are:

1. Evaluate content critically, including dynamic, online content that changes and evolves, such as article preprints, blogs, and wikis;

2. Understand personal privacy, information ethics, and intellectual property issues in changing technology environments;

3. Share information and collaborate in a variety of participatory environments;

4. Demonstrate ability to connect learning and research strategies with lifelong learning processes and personal, academic, and professional goals.

The supporting objectives delve more deeply into the behavioral, cognitive, metacognitive, and affective components of these larger goals. For example, one of the learning objectives for goal 3 is:

- Produce original content appropriate to specific needs in multiple media formats; transfer knowledge gained to new formats in unpredictable and evolving environments.

While flagged as a behavioral objective, it also presupposes that the learner has the agility to translate knowledge from one format or type of expressive technology to another (cognitive), has reflected on the need for the new expression and whether it will enhance what he or she has already done (also cognitive), and is able to make the translation to an environment possibly being encountered for the very first time (affective). The learner would also be reflecting on the hurdles and successes of this process and recognizing what components will be helpful the next time the learner engages in the process (metacognitive) and might also be reflecting on the collaborative process if the goal was reached working with others.

While I (Trudi) am unable to speak for all my peers, when teaching information literacy I see the need for an increasing emphasis on elements encompassed by metaliteracy. A connectivist metaliteracy MOOC was offered in fall 2013 (and is still available at <http://metaliteracy.cdlprojects.com>), and two conferences in the summer of 2014 included "metaliteracy" in their titles.

In my one-credit Information Literacy course, I challenge students’ metaliteracy abilities in two ways: one is team-based, and the second is an individual effort. The team-based project is to create a website that serves as a resource guide for the team’s topic (though without teaching them how to develop a website, as this is meant as a confidence-building activity). Before starting the project, I ask students if they are information producers (beyond course assignments), and very few say, "Yes." A discussion about Facebook or other social media sites frees them from this limiting view of information creation, but they still often have qualms about the assigned project: creating an online research guide on their team’s topic. Working with teammates helps; together, they are generally able to figure out how to accomplish whatever they would like to do.

A second assignment, done individually, causes more angst. Here’s the assignment:

Use a Web-based social media tool such as Glogster, Voki, GoAnimate, Timetoast, or another tool of your choice to enhance the information your team has found on its topic…. Be creative yet informative in creating a new information source. Present something new, fill in gaps, comment, analyze. Do not rehash.
Proponents of metaliteracy conceive of information literacy as an overarching literacy, transcending any particular literacy—digital, visual, and media, for example—and identify key components necessary to critically engage with information.

In this case, students are working alone and must decide what they have to say, an activity that feels alien. I can almost hear students asking themselves: Who am I to participate in the conversation on this topic? And how do I use these tools? The assignment really is challenging. However, when I ask them at the end of the course to reflect on how they feel upon completing this assignment, they express a sense of empowerment—even wonder—that they did it.

Threshold Concepts, Metaliteracy, and the New ACRL Information Literacy Framework

The information environment was very different in 1999 when the ACRL (Association of College and Research Libraries) Information Literacy Competency Standards for Higher Education were drafted. These standards, implemented early the next year, were meant for a world in which information access was more predictable than it is now. Publication was primarily by established publishers; students mostly consumed rather than created information, and the constantly changing social media environment didn’t exist as it does today. At the time, a skills-based approach relying primarily on the cognitive domain made sense. However, as the sources of information have grown exponentially, learners take on a variety of roles, and a skills-based approach falls short of today’s students’ needs. ACRL’s proposed draft Framework for Information Literacy for Higher Education addresses new roles, new types of information, and multiple domains: metacognitive, affective, and behavioral, as well as cognitive.

Threshold concepts, those concepts critical for understanding a particular discipline, provide a foundation for the framework. Jan H. F. Meyer and Ray Land have posited five characteristics of threshold concepts: transformative, troublesome, irreversible, integrative, and bounded. They have stated, “as students acquire threshold concepts, and extend their use of language in relation to these concepts, there occurs also a shift in the learner’s subjectivity, a repositioning of the self” (2005, 374).

The ACRL framework is built on six frames, each of which includes a threshold concept, a brief and a more expansive description of the concept, knowledge practices, and dispositions. The shift from a set of standards to a conceptual model is dramatic but is designed to help students master key ideas that allow them to situate themselves more effectively in the information ecosystem.

Included in the framework is a new (draft) definition of information

1 While at the time of this writing (August 2014) the new framework has not yet been submitted for approval by the ACRL Board, it is in a second draft <http://acrl.ala.org/ilstandards/wp-content/uploads/2014/02/Framework-for-IL-for-HE-Draft-2.pdf>.

2 The ACRL Task Force responsible for this framework has drawn upon an ongoing Delphi study that has identified several threshold concepts in information literacy but has molded the framework with its own ideas and emphases for the threshold concepts. The Delphi study is being conducted by L. Townsend, A. Hofer, S. Lu, and K. Brunetti. See also: Lori Townsend, Amy Hofer, and Korey Brunetti. 2011, “Threshold Concepts and Information Literacy,” Portal: Libraries and the Academy 11 (3): 853–69.
Metaliteracy learning objectives speak to this ever-changing information environment, providing a model for creating learners who are adaptable and self-aware, as well as effective information users and producers.

- **Understand the responsibility that comes with entering the conversation through participatory channels.**

**Implications for High School Library Practice**

As the Metaliteracy and Threshold Concepts models of information literacy continue to gain ground in higher education—particularly should they be adopted by ACRL—those of us in the K–12 world might ask what, if any, impact these models will have on our library practice. Since the school-based author’s experience is limited to the high school setting, I (Emer) will speak to that.

One of the teams participating in the Metaliteracy Learning Collaborative mentioned above included secondary librarians. This team was curious to see what the new metaliteracy learning objectives might mean for high school students. With three of metaliteracy’s key elements in mind—information creation, collaboration, and metacognition—we examined the metaliteracy learning objectives vis-à-vis the Common Core State Standards and New York State’s Information Fluency Continuum (IFC) and found many correlations. This correlation can be seen, for example, in metaliteracy Learning Goal 3 and its supporting objectives.

**Goal 3: Share information and collaborate in a variety of participatory environments**

- Compare the unique attributes of different information formats (e.g., scholarly article, blog, wiki, online community), and have the ability to use effectively and
to cite information for the development of original content.

7. Produce original content appropriate to specific needs in multiple media formats; transfer knowledge gained to new formats...

School librarians already put into practice, many similar goals in the Common Core State Standards:

CCSS.ELA-Literacy.RI.11-12.7: Integrate and evaluate multiple sources of information presented in different media or formats...

CCSS.ELA-Literacy.W.11-12.4: Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.W11-12.6: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

In my library classroom, I (Emer) address different learning needs, abilities, and interests by helping students access a variety of resources (print, audio, visual), as well as supplementary titles (fiction and nonfiction). Since adoption of the CCSS with their emphasis on research, writing, and expression, I am much more involved in research as a process than I was in the past. Therefore, I include targeted heuristics for guidance (IFC worksheets, for example). Almost all library instruction is constructed around research questions (as opposed to one-shot bibliographic instruction common at college), so I can support the process all along the way.

With regard to collaboration, much classroom work remains individual work. Even when students work in teams, it’s not always a truly collaborative effort—more like “divide and conquer”—although this approach is changing as more teachers use tools like Google Docs, Tumblr, and blogs. Our students know how to collaborate and how to create information in an online environment; they have no trouble navigating the Web 2.0 world or moving on to the next new thing. But a disconnect remains, as Trudi notes above; they don’t seem to recognize that these are transferrable skills between media, as well as setting (social to academic).

Metacognition, the third major emphasis of metaliteracy, is illustrated in Goal 4 and associated objectives:

Goal 4: Demonstrate ability to connect learning and research strategies with lifelong learning processes...

4. Use self-reflection to assess one’s own learning and knowledge of the learning process

5. Demonstrate the ability to think critically in context and to transfer critical thinking to new learning

I have used IFC assessments with students, and even if learners haven’t met all the above-mentioned goals and objectives, it is always interesting to see students stop and actually think about what they are doing and why, and how they might be able to use what they have learned in a new assignment.

As school librarians our ultimate goal is to help students become college and career ready. Through collaboration with subject area teachers, we seek to create authentic learning experiences by using the best resources available and going deep into inquiry. We integrate technology where possible, using a variety of resources and suggesting presentation tools. Time permitting, we ask students to self-assess. But putting it all together can be tricky.

In spite of the imperative from all quarters to use technology and Web tools to create, share, and collaborate, teachers are often just not able to do so—and not necessarily because they are less digitally “literate” than their students or because teachers don’t know how to make the shift. (There’s no lack of literature and...
Teaching to threshold concepts will help our students move beyond disconnected skills that become dated as resources and applications change and toward a genuine understanding of information and its generation, as well as their own roles in the process.

Still, once students get it—that reading is the key to everything else—they can really move forward, regardless of format, modality, and platform, and truly become college and career ready.

ACRL’s proposed draft Framework for Information Literacy for Higher Education, as discussed above, will resonate with school librarians, especially those in high schools. The Metaliteracy and Threshold Concepts models of information literacy both play vital roles. Teaching to threshold concepts will help our students move beyond disconnected skills that become dated as resources and applications change and toward a genuine understanding of information and its generation, as well as their own roles in the process.

What might be surprising to school librarians is the part AASL’s Standards for the 21st-Century Learner played in the development of the ACRL framework. The AASL standards contain language school librarians are intimately familiar with. Before the advent of Common Core, we used AASL’s inquiry-based research standards to direct instruction and best practices, encouraging students to “inquire, think critically, and gain knowledge … apply knowledge to new situations, and create new knowledge” (2007, 4, 5) and share that knowledge ethically in a participatory world. Each standard came with a set of skills, dispositions, and self-assessment strategies. By including these standards in its new framework, ACRL recognizes the importance of the continuum of learning from K–12 to post-secondary education.
Conclusion

In the end, the most important attribute to have today is the ability to learn. This capacity is as important for educators as it is for our students. The world is changing so quickly, we don’t know what will be available next year, never mind in ten! Being reflective, adaptable, self-empowered learners will only enhance one’s ability to succeed in this exciting but, perhaps, daunting future. If we are to prepare our students to become this type of learner, using models that stress authentic inquiry by engaged individuals will make a critical difference.

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Emer O’Keeffe is the school librarian at Schalmont High School in Schenectady, New York. She served with Trudi Jacobson as project manager on the 2012–2013 SUNY IIT Metaliteracy grant. Prior to becoming a school librarian, Emer worked for many years in the fields of history and publishing.

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DESIGNING INQUIRY FOR UPPER ELEMENTARY STUDENTS: LESSONS LEARNED FROM DRIVER’S ED

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One of the most memorable achievements of adolescence is the independence gained from obtaining a driver’s license. Students are highly motivated to study the rules of the road, hone their skills behind the wheel, and meet all the state requirements to reach their goal. They are invested in the process because they value the outcome. The Driver’s Education instructional course is well designed to include multiple opportunities for practice over time, with a gradual release of responsibility. What can we learn from this experience? How can we foster a similar level of engagement as we prepare students to navigate the information highway? The Common Core English Language Arts Standards provide a roadmap for designing inquiry for upper elementary students that calls for relevance, rigor, and relationships—the current 3R’s in education.

Relevance
A fifth-grade student was asked what he thought of the Civil War research project his class was recently assigned. Heaving a sigh, he replied, “I don’t see the point in doing all this work. My teacher asked us to find the answer to her question—and she already knows the answer!”

Finding Value in the Outcome: Who should own the learning?
How do we make inquiry meaningful for students? Consider these options:

- Cultivate a culture of wonder. Give your students a blank journal where they can record their thoughts and questions about topics they are thinking about or studying. Keep this wonder journal easily accessible anytime questions or wonders surface. Encourage learners to jot down all their questions. What doesn’t make sense to you? What are you curious about? Where are the holes in your understanding?
- Create a wonder wall, like a graffiti wall, in your school library. Don’t have open wall space? Use an online tool like Padlet that allows students to post questions and refine them throughout their inquiry journey. Give students the opportunity to generate questions about topics they want to explore. Encourage them to refine their questions as they build background knowledge about the topic under investigation.
- Model good questioning techniques. As students begin to study a topic, such as Plymouth Colony, generate some of your own wonderings aloud. Explain the difference between open and closed questions.

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- Closed questions can usually be answered with a quick Google search. For example, "How many people traveled on the Mayflower?"
- Open questions require careful reading and synthesizing of information. An open question begs to be argued. "How might the story of the colonists’ first Thanksgiving change without the support from Chief Massasoit and Squanto?"

Don’t provide all the questions, letting your students take a back seat. Give students time to wonder. Let them have a voice in choosing the destination for their inquiry journeys.

**Rigor**

It is early Sunday morning. Our student driver navigates her car in an empty parking lot to practice some basic skills. Start and stop, maneuver the turns, and parallel park, all with the support and coaching of her instructor. This is a great beginning, but at some point, she’ll have to take the car out in traffic.

*Instructing with Your Foot on the Passenger Brake: The teacher is in control!*

As primary students engage in research, teachers and school librarians often design learners’ tasks like that empty parking lot—a safe place to practice skills. Teachers assign the topic, e.g., Native Americans. They also determine what the students should learn, e.g., clothing, diet, shelter, etc. Finally, librarians provide the resources that contain the needed information, usually from nonfiction books written about each tribe. Students fill in the blanks on their note-taking worksheets, and the task is complete. Unfortunately, too many upper elementary teachers continue this practice, void of opportunities for students to apply higher-level thinking skills that require analyzing, evaluating, and synthesizing information to build understanding. Students are never challenged to leave the empty parking lot.

Real inquiry is rigorous. It is messy. It can be vague and ambiguous, nudging students toward alternate routes, prodding them to reflect on the information gathered, urging them to make connections and draw conclusions. Real inquiry fosters perseverance, flexible thinking, and metacognition. How do we move students from the parking lot to the highway? What kinds of experiences will help them build capacity to become discriminating users and producers of ideas and information?

The Common Core Writing Anchor Standard 7 calls for “short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation” (Common Core State Standards Initiative 2014). A close look at this anchor standard reveals two important components to consider in designing research tasks:

1. The task is driven by a question.
2. Students are expected to demonstrate understanding of the topic as a result of their research.

*Merging into Traffic: It may be a white-knuckle ride; however, if you never give them the wheel, they won’t learn how to drive.*

Take another look at the Native American assignment in light of the two components mentioned above. Add the research question, "What adaptations would your tribe need to make if they were moved to a different region?" The original research assignment can be viewed as a “pre-search” activity, helping students build the needed background information about the lifestyle of their targeted tribe. However, to answer the research question, students will also need to investigate the new region to learn about the resources, climate, and other conditions that exist there.
Reflecting on their tribe’s current lifestyle and what they understand about the new location, students must draw conclusions and make inferences using information from the sources to support their claim. Here is an excerpt from Jack’s research findings:

Members of the Arapahoe Tribe from the Great Plains are nomads. They follow the buffalo herd because they rely on buffalo for food, housing materials, and other things. They would need to change their diet if they moved to the Southeast because they would not find buffalo in Florida. They would also have to develop farming skills...

As a result of his research, Jack demonstrated his understanding of the broader concept that where you live effects how you live.

Logging Practice Hours: Building Research Skills

Writing Anchor Standard 7 refers to sustained and short research. Short research can be an effective vehicle for teaching information literacy skills and providing multiple opportunities to practice these skills over time. Often, these projects can be completed in two or three class sessions. This timeframe is ideal for school librarians operating on a fixed schedule—students’ interest often wanes if the research task is stretched over many weeks. The emphasis here is on the research process, not on the creation of an end product. Pare down the process by focusing on one or two skills. Consider the following short research task to practice website evaluation:

1. Start with a research question like, “Should kids be allowed to play Minecraft in school?”
2. Provide students with three websites. Ask them to examine all three in light of the research question.
3. In addition to gathering information from the sources to answer the question, have learners identify the two websites that best met their information need.
4. Don’t stop there. Ask students to explain their rationale for determining which website to eliminate. What did they find out about the author? Was the text too technical? Did the information in this source address the research question? Asking students to explain their choices fosters metacognition. This task encourages them to think about their thinking.

If you find that students have difficulty deciding what to include in their notes, create a short research project that will engage them in close reading of complex text:

1. Begin by crafting a research question that will require students to compare and contrast or analyze information. Since the goal is to provide practice in extracting relevant information from a source, preselect the resources so students can focus on the targeted skill. Select two articles that are short, yet rich with information to address the research question. Vary the resources to include primary source documents, maps, charts, or illustrations.
2. During the initial lesson, discuss the research question and preview the first resource together. Where possible, incorporate questions from their wonder journals or wonder wall.
3. Model the skills of close reading and note taking. As you read aloud, use an LCD projector to display the text so students can follow along. Let students hear your thought process as you work with informational text. Reread passages to clarify your understanding. Question the text that seems unclear. Separate the information that’s nice to know from the facts you need to know to answer the research question.
4. Show students that you vary your strategies for organizing your notes based on the task. Use a T-chart to weigh pros and cons of an issue or a concept map to show the relationship between parts of a topic to the whole, etc.
5. Pause to reflect on the information after reading small sections at a time. Let students watch as you record your thoughts, connections, and questions in a graphic organizer or in the margin of your notebook. The process of reflective note taking helps students digest the information in small bites, making it easier to synthesize their understanding of the topic under investigation.

6. Let your students get behind the wheel to comb through the second resource independently. Since you selected these resources you’ll know in advance what information learners should glean from them.

7. As students synthesize the information, give them the opportunity to collaborate on their findings and discuss the conclusions they’ve drawn. Although students’ responses to the question may vary, the emphasis should be on their evidence from the resources to support their claim.

In a similar way, students need tools and strategies to reflect on their progress throughout the inquiry journey. Here are two suggestions for building relationships as you promote self-assessment and peer feedback:

- Teachers and school librarians can collaborate to develop and implement formative assessment tools such as checklists, rating scales, and learning logs. Vi Harada and Joan Yoshina’s Assessing for Learning: Librarians and Teachers as Partners discusses numerous tools and strategies to involve students in assessing their own learning.

- Encourage students to test drive their ideas with a critical friend, someone who listens carefully, asks clarifying questions, and provides feedback to help achieve success. Students often see the teacher or school librarian as the go-to person when they hit a speed bump as they struggle to locate resources, make sense of conflicting information, or design an effective way to communicate their new understandings. With coaching and modeling, students can support each other by taking on the role of a critical friend. Here are some behaviors to cultivate in a critical friend:
  - Listen carefully.
  - Use questions rather than statements, e.g., “Have you thought about trying this database or using these search terms?”
  - Make suggestions that are realistic.
  - Provide rationale for your suggestions.
  - Be positive.

Assessing Along the Way: Check your mirrors!

As soon as our new driver slides behind the wheel, he is expected to adjust the rearview and sideview mirrors. These tools provide constant feedback on how he is progressing through traffic. They also guide him in maneuvering around obstacles on the road.

Relationships

Whether students are engaged in a short or sustained research, be sure to slow them down at the intersection of Information Gathering and Synthesis to reflect on their progress and garner feedback from others.

Assessing Along the Way: Check your mirrors!

As soon as our new driver slides behind the wheel, he is expected to adjust the rearview and sideview mirrors. These tools provide constant feedback on how he is progressing through traffic. They also guide him in maneuvering around obstacles on the road.

Suzy Rabbat is a school library consultant in the Chicago area. She created the concept for Cherry Lake’s Information Explorers series and authored several books in the series. She was a contributing author for Inquiry and the Common Core: Librarians and Teachers Designing Teaching for Learning (Libraries Unlimited 2014), and Navigating the Information Tsunami: Engaging Research Projects that Meet the Common Core State Standards, K–5 (Cherry Lake 2013).

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Recommended Resources:


Approaching the Inquiry Process from a Cultural Perspective

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Hoʻonui i ka ʻike — A Learning Process Imbued in the Hawaiian Culture

Figure 1. Princess Bernice Pauahi Bishop (1831–1884), benefactor of Kamehameha Schools.

Figure 2. King Kamehameha I, honored through the name of the schools.
Kamehameha Schools is a private educational institution supported by the endowment of Princess Bernice Pauahi Bishop (1831–1884) (see figure 1), the last direct descendant of King Kamehameha I. In her last will and testament, the princess directed the five trustees of her estate to erect a school for Hawaiian children (Bishop 1883). Her wish was to improve the capability and well being of her people through education and provide an environment where each would have an opportunity to practice and perpetuate Hawaiian values and traditions. Pauahi’s desire was fulfilled three years after her death. In 1887 Kamehameha Schools (KS) was founded and named after her great-grandfather King Kamehameha I (see figure 2).

In 2008 the librarians of Kamehameha Schools began their own inquiry into how they might infuse Hawaiian values and traditions into their curriculum. Having already used Mike Eisenberg and Bob Berkowitz’s Information and Technology Skills for Students, the school librarians at Kamehameha decided to model their work after the Big6 (Eisenberg and Berkowitz 2013).

An initial meeting of a core group of the school’s K–12 librarians set two goals. The first was to inspire their Hawaiian students to carry on the traditions and learning styles of their ancestors who were exceptional craftsmen and tradesmen. They had learned their specialties through inquiry and created a culture of people who were hardworking, skilled, and, as Hawaiian historian and scholar Samuel Manaikalani Kamakau wrote in his book, Ruling Chiefs of Hawai‘i, “possessed of much learning” (1992, 237).

The second objective was to infuse the library’s curriculum with Kamehameha Schools’ Working Exit Outcomes (WEO) (see figure 3). The WEO is a framework for learning that incorporates Hawaiian cultural understanding and 21st-century skills. The framework outlines outcome expectations of the knowledge all students of Kamehameha Schools K–12 should acquire before graduation.

The word “inquiry” means to seek or request truth, information, or knowledge. And this was to be Kamehameha’s quest. As a young boy the future ruler’s “classroom” consisted of all that surrounded him: the stars in the heavens above, the land on which he walked, and the vast ocean that encircled his island home. Knowing Kamehameha would someday become king, Nae‘ole, Kamehameha’s first kumu (coo-moo), or teacher, guided his pupil’s inquiry using the environment as his classroom resource. Kamehameha was taught to prepare himself to be a leader: to be observant, to listen, to study, to think, and to perpetuate this knowledge for future generations. In this way his real-life experiences were made purposeful and relevant.

KS librarians want their students to be able to do the same, to use inquiry to learn about the world around them while incorporating the fundamental skills of information literacy. These school librarians want to inspire their students to follow the learning styles of their early Hawaiian forebears and believe students’ ability to do so is innate and very much within each student’s capacity to achieve.
The information literacy process, as outlined in Eisenberg and Berkowitz’s Big6, is: 1) task definition, 2) information-seeking strategies, 3) location and access, 4) use of information, 5) synthesis, and 6) evaluation. Keeping Eisenberg and Berkowitz’s research process in mind, KS librarians made a list of Hawaiian terms that corresponded to each stage of this research process but were more reflective of Hawaiian cultural concepts and values. Helping students to connect to their ethnic roots, these steps ask each student to: 1) prepare, 2) listen and obey, 3) observe and notice, 4) study and comprehend, 5) showcase, and 6) perpetuate. A Hawaiian/English dictionary was used to translate the terms to Hawaiian. Finding a direct English translation for any foreign word is difficult, and Hawaiian is no exception. To address this issue, KS librarians instead translated the actions to be accomplished at each stage of the inquiry process. For example, task definition most closely correlated with to prepare, which in Hawaiian is ho’omakaukau. (The prefix ho‘o, when added to a base word, means to do something.)

Their school librarians’ list of Hawaiian terms represented the actions connected to early Hawaiian ways of learning. How did they know this? These actions are translated in the Hawaiian Dictionary by Mary Kawena Puku‘i and Samuel H. Elbert, both considered to be authoritative scholars in the Hawaiian language. A poster of the Ho‘onui i ka ‘ike process (see figure 4) outlines the Hawaiian terms and their English translations, each term followed by examples of three actions grounded in traditional Hawaiian thought.

- Ho‘omakaukau (prepare)
  - My mind, body and spirit are ready.
  - My materials are ready.
  - My attitude is positive.

- Ho‘olohe (listen and obey)
  - I respect and pay attention to the teacher (kumu).
  - I value the ideas of the kumu and my peers.
  - I know my assignment(s) and what I need to do.

- Ho‘ona‘ana (observe, notice)
  - I seek to understand.
  - I carefully observe and review.
  - I look for reliable sources.

- Ho‘oma‘ama‘a (practice)
  - I apply and practice what I learn from my kumu.
  - I create inquiry questions to guide my research.
  - I read and take notes.

- Ho‘opa‘a (study and comprehend)
  - I organize ideas to convey a clear message.
  - I rewrite in my own words.
  - I ask questions to clarify.

- Ho‘opuka (showcase)
  - I synthesize and create.
  - I evaluate, revise my work, and give credit.
  - I am tested (ho‘ike) and share my new knowledge.

These school librarians want to inspire their students to follow the learning styles of their early Hawaiian forebears and believe students’ ability to do so is innate and very much within each student’s capacity to achieve.
Ho’omau (perpetuate)
I persevere.
I hold fast to the knowledge (‘ike).
I pass on and live the ‘ike.

KS librarians also wanted to infuse the school library curriculum with Kamehameha Schools’ Working Exit Outcomes (WEO), specifically the section that focused on Ke Ao ‘Imi Na‘auao—Knowledge and Wisdom. Each of the four categories of Ke Ao ‘Imi Na‘auao begin with a Hawaiian aphorism, taken from ‘Olelo No‘eau: Hawaiian Proverbs and Poetical Sayings (1983), a collection of native Hawaiian proverbs and sayings Mary Kawena Puku‘i (1895–1986) began gathering when she was fifteen years old. They are evidence of traditional Hawaiian beliefs that have been orally handed down through the generations and that capture the wisdom and knowledge of Hawaiian kupuna (elders) in their own words.

The following proverbs were selected from Puku‘i’s book to support the Ho‘onui i ka ‘ike document:

Nānā i ke kumu—Look to the source.
Utilize various sources to foster inquiry and seek knowledge.
(Examples of sources would be kupuna, kumu, loea, mo‘olelo, wahi pana, mo‘omeheu).

Ua lehulehu a manomano ka ‘ikena a ka Hawai‘i—Great and numerous is the knowledge of the Hawaiians. We create, share and apply knowledge in purposeful and relevant ways.

These ‘Olelo guided KS librarians’ own inquiry process on traditional Hawaiian learning. Other resources included Resource Units in Hawaiian Culture, in which Donald D. Kilolani Mitchell stated, “[Hawaiian] Education was direct and effective” (1992, 249).

The slogan of the schools is I mua Kamehameha, which means to go forward, Kamehameha. The librarians of Kamehameha Schools agree and believe within each of their Hawaiian students lies the ability to be, as expressed in the following, ‘Olelo no‘eau:

Ua lehulehu a manomano ka ‘ikena a ka Hawai‘i—Great and numerous is the knowledge of the Hawaiians. We create, share and apply knowledge in purposeful and relevant ways.

I mua, Kamehameha!

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School librarians in Newport News, Virginia, are meeting the challenges of integrating an Inquiry Process Model into instruction. This journey to inquiry was first described in the 2009 Knowledge Quest article “A District’s Journey to Inquiry” by Mary Keeling (Supervisor, Library Media Services, Newport News Public Schools).

In 2009 Keeling noted that Newport News school librarians—after having the opportunity to integrate a district-developed NNPS Inquiry Process Model (see figure 1) into district curriculum—were reflecting on how this integration had worked and were seeking to revise and adapt curriculum units to better match the NNPS Inquiry Process Model. However, in 2012 a focus group of school librarians working to create assessment rubrics had an “ah-ha” moment. It wasn’t the curriculum units we needed to revise, but the structure and language of the NNPS Inquiry Process Model we were using.

In our original model we began our process by asking students to develop questions to start their inquiry journey. As we taught this model we realized that students often did not have enough background knowledge to generate questions. This realization was the first rock we encountered; many of us individually modified the model in our practices to give students opportunities to search for information on a topic before they began to generate questions.

We tried to work our way around a second rock when a team of school librarians was asked to develop rubrics to assess students’ understanding of inquiry skills (see figure 2). We had already developed a scope and sequence document (Keeling 2009). Our next step was to use AASL’s Standards for the 21st-Century Learner and New York City’s Empire State Information Fluency Continuum: Benchmark Skills for Grades K–12 to determine what successful acquisition of skills in each stage of our inquiry process would look like across grade levels (what students would know and could do). The development of rubrics stagnated at specific stages of the model. These were the same stages that had been revealed through observation and reflection as weak when we used this model in our school library instruction. Students struggled with developing questions, planning their search, and synthesizing information.

We had invested quite a bit of time and research into creating the NNPS Inquiry Process Model that would unify library instruction in our district. Therefore, it was painful to come to the realization that our model might be flawed.

Also during this time district librarians began a professional development training on inquiry with the guidance of Dr. Leslie Maniotes. The 2012 publication Guided Inquiry Design: A Framework for Inquiry in Your School, coauthored by Dr. Maniotes, propelled us to revisit the stages of our inquiry. The book study (with personal visits from Dr. Maniotes)—along with the lack of progress in our rubric development and our observations and reflections on student behavior as learners used the original NNPS Inquiry Process Model—resulted in a revised model (see figure 3). This model is closely aligned with Guided Inquiry but reflects what we discovered about how our students learn in our practice.

We made three significant changes in the NNPS Inquiry Process Model.
The first was structural, moving from a recursive to linear design. Second, we combined the steps of “Organize” and “Synthesize” into one step: “Understand.” This term reflected what we wanted to happen in this stage and was a word that students and teachers understood at a more intuitive level than “Synthesize.” After a year of working with the revised model we think the third change was the most significant: starting with an “Explore” step rather than asking students to generate questions. “Explore” incorporates hooking students, immersing them in information designed to connect them to the topic, and helping them begin to formulate their inquiry questions.

Following are the stories of three of the district’s school librarians’ collaborative experiences with the new NNPS Inquiry Process Model at the elementary, middle, and high school levels.

The incorporation of the inquiry process at the elementary school level allows students to begin to take ownership of their learning. Although every step of the Inquiry Process is important, the “Explore” stage is what hooked our students. This step takes precious time, but it is the step that sets the tone for the project. We have learned that this is the stage that really piques the students’ interest in the work they are being asked to do and

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**Figure 2. Sample rubric for evaluating sources, and finding, collecting, understanding, and interpreting information while using it ethically and legally.**

<table>
<thead>
<tr>
<th>COLLECT AND CREDIT</th>
<th>EXPERT</th>
<th>PROFICIENT</th>
<th>APPRENTICE</th>
<th>NOVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLLECT AND CREDIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locate and access efficiently and effectively</td>
<td>In addition, chooses the best or most appropriate resources from a variety of resources from libraries and the web, depending on the purpose (or need)</td>
<td>With guidance, uses search systems (Google, Bing, OPAC) and strategies (basic, advanced, Boolean) to locate information sources</td>
<td>Knows the distinguishing characteristics of a variety of resources available from libraries and the web</td>
<td>Uses text features in nonfiction books, print references sources, and digital text (E-books and online databases) to predict and categorize information</td>
</tr>
<tr>
<td>COLLECT AND CREDIT</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Evaluate information sources critically</td>
<td>In addition, can explain the reason for selection.</td>
<td>Independently, evaluates and selects print sources based on authority, content and point of view.</td>
<td>With guidance evaluates print and web sources with some consideration of authority, content and point of view.</td>
<td>Selects and evaluates information from preselected sources, print or web.</td>
</tr>
<tr>
<td>COLLECT AND CREDIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extract, take notes, and make sense of information</td>
<td>Demonstrates effect of point of view on issues/topics</td>
<td>Recognizes how one’s own point of view influences interpretation of information</td>
<td>With guidance, questions the information found and uses note-taking strategies, (such as graphic, organizers, etc.) to paraphrase or bullet information found in sources.</td>
<td>Begins to paraphrase information in bulleted or short notes and determines whether information is what they need.</td>
</tr>
<tr>
<td>COLLECT AND CREDIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use information ethically and legally</td>
<td>Gives credit for quotes, ideas, images, or other works by using proper citation</td>
<td>Can explain the concept of plagiarism and its consequences. Understands Intellectual property and that sources that need to be cited.</td>
<td>Does not distinguish between one’s own ideas and the ideas of others when communicating what has been learned</td>
<td></td>
</tr>
</tbody>
</table>

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**Figure 3. Newport News Public School’s revised Inquiry Process Model.**
This year the explore step was structured the same way for each grade level. No matter the age group, we pulled all of our nonfiction books about a topic out on the tables, and students moved around, snatching and scanning those books that caught their interest (see figure 4).

First-grade students researched animals. Each student was given a chart on which they would write the names of three animals. One choice had to be an animal that was new to them; the two other choices could be animals that were familiar. Students felt in control of their learning because they were given the opportunity to look at all of the animal books and make choices. They also had to explain what they wanted to learn about each animal (the beginning of the questioning stage).

Our fourth-grade students explored historical people and the character traits that made them successful. After a lesson on character traits, using the classroom teacher as a model, students moved around the school library, exploring the biographies piled on the tables. They had to narrow their research choices to three people and on a graphic organizer identify the important character traits of those people. This exploration stage exposed students to a variety of people they might not have known about. It allowed them to make their own choices for research based on the personal connections they made as they browsed the book collection. As the project progressed, students narrowed their choice to one person and then had to persuade their peers to vote for inclusion of that person’s portrayal in the Communication stage: a set of tableaux vivants that the students viewed as a living “wax museum.”

The school librarian in the middle school is fortunate because of the focus on interdisciplinary teaming at her school; teachers already view the school librarian as an instructional partner. At Passage Middle School educators, including the school librarian, often plan units that incorporate two or more academic content areas. In July 2012 a team of educators from our school attended the CISSL (Center for International Scholarship in School Libraries) Summer Institute at Rutgers University. While there, we designed an inquiry unit that focused on collaboration and authentic research of STEM career goals. Among the presenters were two of the authors of Guided Inquiry Design: Dr. Carol Kuhlthau and Dr. Leslie Maniotes. They inspired us and gave us much food for thought.

Because ours is an urban school with a 65 percent free and reduced lunch population and 18 percent special education population, we knew we would have to do a lot of scaffolding to build background knowledge in forensic science. The “Explore” stage was extremely important to this unit. We opened our unit with “Forensics Day,” which was a day devoted to interdisciplinary lessons designed to immerse students in a range of forensic activities. Each content teacher taught a lesson that connected his or her subject to a forensic topic. The math teachers worked with proportions using skeleton bones. In the science classes students learned about the science relating to DNA evidence at crime scenes. Our foreign language teachers taught the history of fingerprinting, and English teachers worked on solving a mystery using a commercial mystery kit.

Based on their new knowledge and experiences, students selected three of ten possible forensic careers that they wanted to know more about. That evening the teachers sorted students by interest and companionability into specialty teams. These inquiry circles then explored a variety of materials on the forensic career of choice. Students used inquiry logs to “Dip In” (Kuhlthau, Maniotes, and Caspari 2012) and read about their careers. These logs were used to determine what resources would be useful in learners’ research.

Because of its success, this unit became the model for all future inquiry units in this middle school.

Facilitating Guided Inquiry Projects at the high school level is challenging due to the tight curriculum-pacing schedule established by our district in response to standardized testing. It’s difficult to collapse original research into a ninety-minute class period and provide the “considerable guidance and intervention that students need throughout the process to construct personal understanding” (Kuhlthau, Maniotes, and Caspari 2012). Our revised 2012 Inquiry Model has led to more opportunities to evaluate how students work when they are in the “Explore” and “Gather” steps (the two stages of the NNPS Inquiry Process Model that are most often facilitated in our school library).
Two successful projects have evolved as a result of our faculty members’ interest in collaborating to design inquiry lessons. One is an English Renaissance project with the twelfth grade. Students were placed into groups, and each student in the group was given a different social, cultural, or political topic to explore. As the “Explore” stage came to an end, student groups were given time to share their findings within their groups and establish how individual topics fit together to epitomize an aspect of the time period. Next, students were given a selection of Renaissance poems to study. From this group of poems, learners selected two or three whose themes best reflected the topics explored. Over the next several weeks students continued to expand on what they learned during the “Explore” stage; they further analyzed the poems within the context of Renaissance society and created a group thesis. They also agreed upon the format they would use to present their work in each stage, and provide valuable feedback and guidance during the process, when student misunderstandings are much easier to interpret and correct.

While instruction in critical evaluation of sources and appropriate citation of sources remains the bulwark of our high school library work, we believe that as students move up to us from elementary and middle school with an understanding of the NNPS Inquiry Process Model, we will be able to encourage more complex and real life-connected inquiry in our high school students.

Conclusion

We know that students are excited to do research when given choices, but we have since learned that the “Explore” step in our NNPS Inquiry Process Model ensures a deeper understanding of what they learn. Through collaboration with other students and immersion into rich resources, students build background knowledge needed to connect what they already know with new knowledge gained through inquiry.

We will continue to navigate our way around the rocks in the river of inquiry as we make this journey with our students, but we feel confident that our NNPS Inquiry Process Model provides our students with a strong foundation in inquiry skills and fosters a desire for lifelong learning.

Works Cited:


Sandy Graham is a library media specialist at Menchville High School Newport News Public Schools in Newport News, Virginia. She is a co-sponsor of The Lion’s Roar, the student newspaper at Menchville High School. She is an AASL member.

Patrice Lambusta is a school librarian at Passage Middle School in Newport News, Virginia. She was named the 2014 Librarian of the Year for York Region, Virginia. She is currently co-authoring the book Guided Inquiry Design in Action: Middle School with Leslie Maniotes and Ledauna Harrington. She is an AASL member.

Barbara Letteri-Walker is a retired elementary librarian living in Newport News, Virginia. She was named the Kiln Creek Elementary Teacher of the Year for 2010–2011.
Recipe for an Infographic

“A creative process may begin with a flash of a new idea or with a hunch. It may just start as noodling around with a problem, getting some fresh ideas along the way. It’s a process, not a single event, and genuine creative processes involve critical thinking as well as imaginative insights and fresh ideas.”

—Sir Ken Robinson (2009)
America’s Test Kitchen, located just outside of Boston, strives to develop absolutely the best recipes for popular dishes. Staff members test each recipe “30, 40, sometimes as many as 70 times, until we arrive at the combination of ingredients, technique, temperature, cooking time, and equipment that yields the best, most-foolproof recipe” (America’s Test Kitchen 2014). Inspired by their patience and precision, we decided to develop a teaching recipe that would consistently engage students in open-minded inquiry. In accordance with Common Core State Standards CCSS.ELA-Literacy.CCRA.R.7 and CCSS.ELA-Literacy.CCRA.R.8, students would select and weigh textual, visual, and quantitative evidence and reason dispassionately in order to arrive at a unique synthesis imaginatively presented in an infographic. We have begun the process: testing many ideas, observing lessons in action, and viewing student products. As systematic “bakers,” we expect to test, adapt, review, and learn from our failures. We invite you into our infographic kitchen to help us create an instructional sequence that consistently yields high-quality learning for students.

Infographics, Not Posters

Infographics can be engaging alternative products of research because the multimodal format invites students to make sense of complex information by applying multiple literacies. An infographic is a claim expressed through visual metaphor, conveying the creator’s fresh understanding of relationships, expressed through a judicious selection and arrangement of visuals, evidence, and text acquired during inquiry research within a discipline.

However, as we looked into classrooms, searched the Web, and spoke with classroom teachers, we learned that most infographic assignments resulted in what we would label as posters. Essentially, these products were the equivalent of David Loertscher’s “bird reports”—representations of loosely related facts and numbers, sometimes verified and paraphrased, displayed visually. We hypothesized that the student engagement enthusiastically reported by teachers came primarily from using novel technology, not from inquiry learning. If we were to devote time to teaching infographics, the product must be more than an attractive visual collage of statistics and facts; it should demonstrate understanding (per CCSS.ELA-Literacy.CCRA.W.7).

Inquiry, Not Advertising

For guidance we looked first to applications outside school settings. We observed that many popular infographics were advertisements that, subtly or not so subtly, cherry-picked evidence to persuade a target audience of a predetermined conclusion. The designer was not hired to investigate an issue, nor was the purpose of the infographic to invite an audience to think through alternative solutions to a problem. Rather, these real-world infographics employed selectively shaped evidence to support one-sided reasoning. The audience “buys” (a product, idea, or belief) based on a delightful design—an aesthetic response that doesn’t consider alternative viewpoints or question the premises.

We contend that students are doing too many of these persuasive infographics; schools cannot simply become training grounds for advertising and marketing agencies. We believe that assigning persuasive infographics encourages the equivalent of the “backwards” paper in which students first arrive at an a priori conclusion and then write the paper, and, finally, search for sources to support their claims and pad their bibliographies. Indeed, if there was one inquiry disposition we especially wanted to develop in our students, it was an open mind. The key lay in instructional design.

Argument, Not Persuasion

The shift in our thinking from persuasion to argument enables us to describe our ideal infographic assignment as an opportunity for students to open-mindedly explore a complex problem (per CCSS.ELA-Literacy.RH.11–12.7) using disciplinary and new literacies. We imagine a process in which students develop a research question within a domain, investigate a variety of claims and evidence wherever they lead, play with connections and assess contradictions, and wonder about the possible significance of their findings (per CCSS.ELA-Literacy.CCRA.W.8).

Not only will students experience a discovery process and acquire disciplinary knowledge, but they will also analyze different options, construct a logical argument, reason through examples and analogies using multiple literacies, and learn that complex problems have qualified solutions from which new questions naturally arise. Well worth the effort, the result is an “ah–ha!” for both the creator and the audience.

One way to reframe this teaching challenge is to think about a specific purpose, genre, and product—in much the same way as the president’s advisors develop their daily briefing.
for him each morning. They offer their expert judgment by synthesizing complex issues and representing the strength of various positions honestly to provide the president with a complete brief so that he can make an informed decision.

Rather than suppress rebuttal evidence, disguise commercial motives, or manipulate an audience’s self-interest or identity, we would like students to presume that, like the president, members of their audience want coherent information, fairly presented, so that they can reason through the curated evidence in order to understand and evaluate the merits of the claims. This is sense-making, not opinion-making (per CCSS.ELA-Literacy.RI.7.8).

Real-World Models

In real life we see argument infographics in investigative news, scientific papers, research studies, policy papers, and technical reports. The Upshot column edited by David Leonhardt for the New York Times <www.nytimes.com/upshot> and the FiveThirtyEight blog by Nate Silver and others <http://fivethirtyeight.com> are examples of conversationally written arguments in social media that use infographics to invite an educated reader into dialogue with the author and his sources. Rather than “eye candy—luscious but not nutritious” (Abilock, Bergson-Michelson, Fontichiaro, and Seroff), their visualizations employ photographs, charts, and graphs to elucidate ideas better than words alone can do.

As we began our own inquiry journey into instructional design, we wondered if we could craft an assignment that included a series of feedback loops so that students would create an argument infographic of substance (per CCSS.ELA-Literacy.CCRA.W.8). For that achievement we needed to think more about the teacher’s learning goal and how it would be assessed.

Time for Friction

The basic premise that emerged from our conversations was that the majority of student time should be spent prior to constructing the infographic. We identified teaching interventions, four key opportunities for “friction,” where we could slow students’ thinking (Abilock 2014a):

1. Craft a working inquiry question through exploratory pre-research.
2. Re-research and curate relevant sources to follow other lines of inquiry, harvest potential sub-questions, and identify common knowledge.
3. Select and closely read key resources to pinpoint disagreements and assess relative authority.
4. Extract essential notes, then re-read, annotate, and tag ideas, evidence, and data to compare and organize them.

From Topic to Inquiry

Many school and college librarians hope that the instructor’s assignment will position students for inquiry. In reality, whether students are doing college research or second-grade animal reports, they often come to the library with broad topics. Jay Joel Burkholder, instruction librarian and assistant professor at York College of Pennsylvania, shared with us that his business school students define their assignment as “to research a company.” We’ve seen equivalent assignments in K-12 schools such as “Pick a topic from any time period we’ve studied this year...” or “Write about climate change.” Students dutifully attempt to interpret these instructions, but, without the benefit of careful instructional scaffolding, they are unable to narrow the scope and uncover a topic that is both interesting and doable.

To gain teacher buy-in for reworking their assignments, Kristin Fontichiaro suggests somewhat tongue in cheek that we model the student’s search process for the teacher:

If the teacher stands firm on dehydrating a source into discrete facts and then rehydrating those facts into an essay, it can be illuminating to model a sample student search: ‘So, to research this, a student would search for… and then he’d click on the first link… aha! There’s the answer! Yipes! That was awfully fast. Is that what you were hoping for?’ (2014. 50)

Connie, a school librarian at Petaluma High School, respectfully requests a meeting with the
teacher before the infographic is assigned. She explains that, if they can identify the learning goal—for example, how the infographic demonstrates students’ understanding of a big idea taught during the unit—she will be responsible for helping students develop a question that focuses on making new connections within learned material or applying the big idea in a novel way (Wiggins and McTighe 2005, 163). Debbie, the other author of this article, has identified infographics and student work (Abilock 2014b) that can help educators define high-caliber work and craft lessons that result in quality argument infographics rather than “eye candy” visuals. She conducts professional workshops for educators and librarians with “EyeCandyShop Thinkers” Kristin Fontichiaro of the University of Michigan, School of Information in Ann Arbor; Tasha Bergson-Michelson, instructional and programming librarian; and Jole Seroff, director of library and information services, both of Castilleja School in Palo Alto.

When advance consulting isn’t possible, Connie has begun offering a version of “concierge service” (Abilock, Fontichiaro, and Harada 2012), working one-on-one with students by appointment on any aspect of their research. As she guides a student through a pre-focus exploration (Kuhlthau 2004, 47) to stimulate initial wondering, she may pull an encyclopedia article for a “read-through” to seed questions based on themes, single events, or interesting people. If she senses that a student is apathetic about a chosen question, she will ask motivating sub-questions related to a student’s personal interests so that, rather than taking notes, the student begins to take note of how, for example, sports or clothing styles might have been influenced by attitudes toward race or gender during an era.

The challenge of an inquiry process is moving from meandering “wonders” toward focused questions while maintaining the student’s motivation. A number of general questioning strategies have emerged from literacy research to steer instructional winnowing. Cornelia Brunner (quoted in EDC 2012) modifies Donna Ogle’s K-W-L questions (1986) to frame that process:

• What do I want to know about this topic?
• What do I need to know?
• What do I know already, and how do I know it?
• What might a possible answer be?


Violet H. Harada, emeritus professor, Department of Information and Computer Science, University of Hawaii at Manoa (quoted in Fontichiaro 2014, 50), suggests Cloze questions that scaffold a type of thinking (e.g., compare and contrast, cause and effect):

• How would ________ be different if there had been no ______?
• How would ________ have changed________?
• How did power impact ________?

Deborah Levitov, previously a school librarian and coordinator of library services in Lincoln, Nebraska, who is currently the managing editor of School Library Monthly, recommends a traffic light metaphor of red light (convergent) versus green light (divergent) to frame students’ self-assessment of their researchable (green light) questions:

• Does your question lead you to more information?
• Are you asking “why” or “what if”?
• Does your question make you investigate further?
• Does your question make you think of more ideas? (2009)
The Missing Piece: Authentic Context

What is absent from these questioning strategies is recognition of the necessity for a genuine audience or authentic disciplinary purpose, precisely those elements that can motivate students to care about their topic and process.

Therefore, when creating an argument infographic, the student’s working questions must address five elements:

1. Who is an audience that cares about this problem?
2. What is the problem or issue that they care about?
3. What choices, options, or trade-offs will they need to consider in order to make a decision?
4. What types of thinking will you have to do to organize the information you gather?
5. What content have you learned that you can draw on?

We recommend that students use our Infographic Question Matrix (figure 1) to compose each of their draft questions so as to ensure that all five elements (audience, problem, choices, thinking, and content) are addressed. In particular, the type(s) of thinking they expect to do informs how students will organize their information in preparation for synthesis.

A common misconception is that inquiry starts with an immutable, clearly formulated question. On the contrary, the question evolves during inquiry. Our matrix elements and the corresponding questions were revised multiple times based on what we learned during pre-search and re-research. Students must be encouraged (and even celebrated) as they continue to refine the wording in their cells, including the thinking category, as they evaluate source authority, weigh evidence, and organize facts, images, and data.

Scaffolding Synthesis

Inquiry—sometimes messy and even meandering—requires a systematic way to manage ideas, data, and other information as students uncover connections and perceive new patterns, evolving toward synthesis (Abilock 2014b). If we expect students to think (as opposed to just organize by keeping quotes connected to citations), they must sift, order, compare, and evaluate their notes multiple times. Students working offline can use sticky notes or paper note cards of different colors to make notes and organize them into various categories. Online note cards enable students to tag by color, process, and keyword criteria (names, concepts, themes). By flexibly organizing notes in combination, then regrouping, and sorting categories into thinking diagrams, students will develop additional sub-questions for their outline.

As they review their notes, students may find that they started out with cause-and-effect reasoning but are now comparing and contrasting information. Re-reading, annotating, evaluating—and then tagging, ordering, reordering—help them identify the strongest evidence for their claims. It enables them to construct a reasoned argument that is understood by and useful to a specific audience for a particular purpose. When combined with the teacher’s and librarian’s just-in-time, right-in-place formative feedback in online note cards, students experience the necessary “friction” that will result in the deliberative thinking essential for inquiry research.

Example One:
Infographic for a U.S. Government Class

Working Question: What options do undocumented immigrants have to gain legal status?
## Infographic Question Matrix

<table>
<thead>
<tr>
<th>AUDIENCE</th>
<th>PROBLEM</th>
<th>CHOICES</th>
<th>THINKING</th>
<th>CLASS CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Example One:</strong> An infographic for a U.S. government class</td>
<td>Undocumented immigrants</td>
<td>Legal status</td>
<td>Legal options</td>
<td>Enumerate, describe</td>
</tr>
<tr>
<td><strong>Working Question:</strong> What options do undocumented immigrants have to gain legal status?</td>
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<tr>
<th>AUDIENCE</th>
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<th>CHOICES</th>
<th>THINKING</th>
<th>CLASS CONTENT</th>
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</thead>
<tbody>
<tr>
<td><strong>Example Two:</strong> An infographic for a school recycling initiative</td>
<td>Our town</td>
<td>Treating consumer electronics waste</td>
<td>Economic trade-offs</td>
<td>Compare and contrast, ranked results</td>
</tr>
<tr>
<td><strong>Working Question:</strong> What economic trade-offs should our town consider for treating consumer electronics waste?</td>
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<th>CHOICES</th>
<th>THINKING</th>
<th>CLASS CONTENT</th>
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<tbody>
<tr>
<td><strong>Example Three:</strong> An infographic for a health education class</td>
<td>Doctors</td>
<td>Bacterial resistance to antibiotics</td>
<td>Treatment options</td>
<td>Cause and effect, classification</td>
</tr>
<tr>
<td><strong>Working Question:</strong> How might doctors reason through their treatment options to minimize bacterial resistance to antibiotics?</td>
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<th>CHOICES</th>
<th>THINKING</th>
<th>CLASS CONTENT</th>
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<tbody>
<tr>
<td><strong>Example Four:</strong> An infographic for a world history class</td>
<td>Sunnis and Shiites</td>
<td>Sectarian violence in Iraq</td>
<td>Conflict resolution options</td>
<td>Problem(s) and solutions, compare and contrast</td>
</tr>
<tr>
<td><strong>Working Question:</strong> How might the provisions and process of crafting Northern Ireland’s Good Friday agreement provide Sunnis and Shiites with strategies and solutions to sectarian violence in Iraq?</td>
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<tr>
<th>AUDIENCE</th>
<th>PROBLEM</th>
<th>CHOICES</th>
<th>THINKING</th>
<th>CLASS CONTENT</th>
</tr>
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<tbody>
<tr>
<td><strong>Example Five:</strong> An infographic for an elementary school unit on bees</td>
<td>My parents</td>
<td>Bees dying off</td>
<td>Best plants for my yard that I can help grow</td>
<td>List, evaluate, rank</td>
</tr>
<tr>
<td><strong>Working Question:</strong> What are the best plants to grow in our yard that my parents and I can plant to give honeybees the food they need to stay healthy?</td>
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Figure 1. Infographic Question Matrix to structure students’ thinking about the components of an inquiry question.
Translating Thinking into Design

Essentially an argument infographic is intellectually designed as a coherent and creative response to an inquiry question. The next task is to organize information visually. Many educators steer students to Richard Saul Wurman’s LATCH acronym (Location, Alphabetical, Temporal, Categorical, and Hierarchical) (2001). If a student is merely rehashing ready-made information on a poster or pushing a preconceived position into an infographic, LATCH is sufficient because its purpose is to shape the design output. It does not help students organize the thinking that they must do before choosing a fitting display to communicate it. For example, the “A” (alphabetical organization) is, by nature, random and likely to result in forced connections, a shortcoming often evident in picture-book alphabets. On the other hand, while an alphabetical design doesn’t work for an entire infographic, an alphabetical index can provide quick access to definitions of specialized vocabulary (What does afforestation mean?) or symbols (What does N2O stand for?) or as a legend for a map in one section of an infographic.

In contrast, we propose using an Infographic Design Matrix (figure 2) to scaffold students’ use of evidence for each question and sub-question prior to visualizing an overall design. This second matrix prepares students to create what we’re naming an Infographic Storyframe, a rough-draft design of a final infographic.

Scaffolding Visual Design

When the student is ready to make design decisions, the Infographic Storyframe uses a combination of storyboarding and wireframing to plan the graphic design of the final visual product. A storyboard is a progression of squares that sequence the images in a video, photo shoot, multimedia news story, puppet show, or other type of storytelling. A wireframe visually maps the relationship among elements on a proposed webpage or website. For an Infographic Storyframe the student uses sticky notes on paper; the notes are connected by lines, arrows, circles, etc. to plot the progression and relationship of the elements within the confined space of the infographic.

Continue to encourage students to experiment—this time with reorganizing their storyframes multiple times to test which display best addresses their infographic questions. Provide opportunities for audience feedback. For example, teachers can orchestrate a gallery walk to elicit peer feedback. Or pairs of students can exchange storyframes without the corresponding inquiry questions so that each student can speculate about the question that their partner’s infographic draft addresses. By giving students access to multiple sources of feedback on their paper design, you deepen their thinking and motivate them to do high-quality inquiry before they become wedded to a single attractive format for their digital product. In addition, the subject-area teacher can use the storyboard to assess content knowledge and provide low-stakes feedback before the polished infographic is holistically assessed with a rubric.

Invitation to Cook with Us

As part of our workshops and presentations over the past two years the EyeCandyShop thinkers have been refining a rubric <http://bit.ly/EyeCandyRubric> (Abilock, Fontichiaro, and Bergson-
### Infographic Design Matrix

<table>
<thead>
<tr>
<th>INQUIRY QUESTION</th>
<th>SUB-QUESTIONS</th>
<th>ORGANIZING INFORMATION</th>
<th>VISUALIZATION WITHIN THE INFOGRAPHIC</th>
<th>INFOGRAPHIC DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the single driving question that my information answers? Who needs this information?</td>
<td>What sub-questions help me mine data and evidence for my question?</td>
<td>How might I organize each pile of evidence to help me synthesize my thinking about each sub-question prior to deciding how to display it in a section of an infographic?</td>
<td>What is the best way to display that specific sub-synthesis in my infographic?</td>
<td>(Storyframe) What metaphor or visualization or design coherently presents my entire inquiry question to that audience?</td>
</tr>
<tr>
<td>What options do eco-tourists in California have to view orca whales and learn more about their behavior in captivity and in the wild? (Audience: Tourists in CA)</td>
<td>Are whales smart? How do the brains of humans and orcas compare? Do orcas act differently in captivity than in the wild?</td>
<td>Parallel columns to record the function and volume of each brain region and the percentage of the whole that each region occupies in each animal Parallel columns to compare behaviors they would see</td>
<td>Two brain maps show the regions by volume with matching colors for similar functions for a human and an orca whale Pictures of orcas in different locations connected to a map of California</td>
<td>Might a geographical map with place markers and legends be useful to tourists? What about a large tourist poster? Maybe everything fits inside the shape of an orca whale? A tour bus or boat?</td>
</tr>
<tr>
<td>How can we reduce the crime rate in East Palo Alto? (Audience: Palo Alto and East Palo Alto town council members)</td>
<td>Why does the number of crimes increase in densely crowded, poorer neighborhoods?</td>
<td>Matrix to collect information by neighborhood in columns for population density, median housing prices, and crime incidents</td>
<td>A graduated circle map showing clusters of crime incidents by neighborhood (Midtown, Professorville, College Terrace, etc.), with population density shown by color and median housing prices in the legend</td>
<td>Student brainstorms</td>
</tr>
<tr>
<td>Do we have an effective plan for managing injuries from a terrorist act within the United States? (Audience: Department of Homeland Security)</td>
<td>How does a hospital decide what type of injuries to treat first?</td>
<td>Flowchart showing triage options by steps</td>
<td>A decision tree to show how triage works in a hospital emergency room</td>
<td>Student brainstorms</td>
</tr>
<tr>
<td>How could we translate A Prayer for Owen Meany into a movie? (Audience: Movie producers)</td>
<td>How does the order of the events contribute to the understanding of the main characters?</td>
<td>Timeline to sequence the order of events with notes about Owen’s and John’s character development and relationship</td>
<td>A storyboard of the selected flashbacks</td>
<td>Student brainstorms</td>
</tr>
<tr>
<td>What lessons can Hebei Province learn from our industrial revolution? (Audience: President Xi Jinping and the Chinese government)</td>
<td>How did technology inventions affect the way that our country grew and changed?</td>
<td>Fishbone for the causes and effects by type</td>
<td>A display of the effects of our industrialization under snippets from actual news stories about China’s industrial problems</td>
<td>Student brainstorms</td>
</tr>
<tr>
<td>Should child offenders be sentenced to life without parole? (Audience: United States Congress)</td>
<td>How does the United States court system currently handle appeals from local court decisions?</td>
<td>Hierarchical diagram with flow chart lines</td>
<td>A chart of the process for appealing decisions from lower courts up to the Supreme Court</td>
<td>Student brainstorms</td>
</tr>
<tr>
<td>What dog should you get me for my birthday? (Audience: My parents)</td>
<td>Which dog is best for a family with a small apartment and young children?</td>
<td>Venn diagram to compare types of dogs by three criteria</td>
<td>Pictures of dogs grouped by signs (e.g., “Easy to Train,” “Small Size,” and “Low Shedding”).</td>
<td>Student brainstorms</td>
</tr>
</tbody>
</table>

Figure 2. An Infographic Design Matrix to structure students’ thinking about how parts of the display will address questions and sub-questions.
Tools to Make an Infographic

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>WAYS TO VISUALIZE DATA</th>
<th>EASE OF USE</th>
<th>THE GOOD</th>
<th>GOOD TO KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Google [drawing tools]</strong></td>
<td>Both of these use drawing tools to create posters / infographics</td>
<td>Have standard drawing tools; once you know how the tools work, the files are easy to reuse</td>
<td>Download images, use text boxes; a myriad of options are available</td>
<td>Create in Google and save to your drive.</td>
</tr>
<tr>
<td><strong>PowerPoint</strong></td>
<td></td>
<td></td>
<td></td>
<td>PowerPoint: A single slide with flexible drawing tools</td>
</tr>
<tr>
<td><strong>NCES</strong></td>
<td>Graphs</td>
<td>Designed for younger students; easy to use</td>
<td>Many graph templates provided</td>
<td>Having previous knowledge of how graphs work will help</td>
</tr>
<tr>
<td><strong>Chart Chooser</strong></td>
<td>Charts</td>
<td>Knowledge of Excel important</td>
<td>Many choices</td>
<td>If you don’t know Excel, learning will take time</td>
</tr>
<tr>
<td><strong>Infogr.am</strong></td>
<td>Graphs</td>
<td>Easy to use, especially if you have data ready to go</td>
<td>Can download charts</td>
<td>Easily sharable</td>
</tr>
<tr>
<td><strong>Easel.y</strong></td>
<td>Variety of visualization options</td>
<td>Drop and drag visual is intuitive; no previous skills required</td>
<td>Text and images are simple and can be manipulated to create various “looks”</td>
<td>Completed infographic can be downloaded for printing; has an easel.y “look” to it</td>
</tr>
<tr>
<td><strong>Piktochart</strong></td>
<td>Allows you to choose a variety of presentation styles</td>
<td>Intuitive editing options</td>
<td>Many themes available in the free version</td>
<td>Only Pro allows for download; make screenshot or share via social media</td>
</tr>
<tr>
<td><strong>Dipity</strong></td>
<td>Timeline maker; social media timelines</td>
<td>Allows inclusion of events, images, and text</td>
<td>Integrates Web information easily</td>
<td>Online only</td>
</tr>
</tbody>
</table>

* Easel.y was named an AASL Best Website in 2013; Dipity was named an AASL Best Website in 2011.

## AASL Infographic Contest

AASL is hosting an infographic recipe contest for adults.

Craft your own infographic to teach students how to create an infographic as a product of inquiry. Post your submission on AASL’s Facebook page at [www.facebook.com/aaslala](http://www.facebook.com/aaslala). Test the rubric [http://bit.ly/EyeCandyRubric](http://bit.ly/EyeCandyRubric) on your submission and post your feedback as part of your submission. AASL members will then vote for the entry they think best displays how to create an infographic through inquiry. The winning entry will be featured on AASL’s website and through AASL’s Hotlinks newsletter.
Debbie Abilock, a former school administrator and school librarian, cofounded and directs the education vision of NoodleTools. She writes Adding Friction, a column in Library Media Connection <http://bit.ly/FrictionLMC>, and her recent publications include a co-authored award-winning reference book Growing Schools: Librarians as Professional Developers (Libraries Unlimited 2012) and a contributed chapter in Mining Complex Text: Using and Creating Graphic Organizers to Grasp Content and Share New Understandings (Corwin 2014). She speaks internationally and consults in schools.

Connie Williams is the school librarian at Petaluma High School in Petaluma, California. She is a past president of the California School Library Association; cofounder of Classroom Learning and School Library Learning 2.0 tutorials; author of articles for Library Media Connection, Knowledge Quest, and other journals; and author of the chapter “They Call It Learning” in Growing Schools: Librarians as Professional Developers (Libraries Unlimited 2012). She presents at library, social studies, and other conferences.

Works Cited:


COMMUNITY COLLABORATION

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Synergy may be defined as the collaboration between two or more parties to produce a combined effect greater than the sum of their separate parts. That is exactly what happened in Denton, Texas, when all types of librarians collaborated on a community reading initiative. In 2007 Denton Reads—a One Book, One Community organization—was formed with librarians from the Denton Independent School District (Denton ISD), the Denton Public Library, the University of North Texas (UNT), and Texas Woman’s University (TWU). The Denton Reads program ran successfully for three years. During their years of collaboration, the librarians at all levels realized the emphasis of instruction was on database use; critical information literacy skills were not being addressed.

In addition, a number of outside forces caused librarians to reexamine their library instruction:

- Texas, recognizing the need for an educated population and workforce in the future, implemented a statewide program to increase the number of students enrolled in higher education by more than 500,000 students over the next fifteen years and to increase the degree completion rate by 50 percent during the same time. According to the state curriculum standards, the Texas Essential Knowledge and Skills (TEKS), K–12 students are expected to ask open-ended questions, use information from a variety of sources, compare, summarize, organize, synthesize, analyze, connect to personal experiences, make inferences, identify, generate criteria for evaluating, produce and present research, and evaluate source materials. These expectations are found across the core content areas of the TEKS.

- AASL’s Standards for the 21st-Century Learner focus on students’ becoming independent learners who inquire, access, and use information from multiple literacies effectively and learn from others as well as produce and share information in a variety of ways. The AASL/CCSS crosswalk (available at <www.ala.org/aasl/standards-guidelines/crosswalk>) notes commonalities between the AASL standards and the Common Core State Standards.

- The Partnership for the 21st Century Skills outlines skills students must master to be successful in college, career, and life, including problem-solving skills, critical thinking, collaboration, information and technology literacy, creativity, and flexibility, among others.

- The Association of College and Research Libraries (ACRL) information literacy standards, currently under revision, also include many of these skills.

With so many standards and state programs embracing inquiry and information literacy skills, the librarians saw opportunities where their collaboration would benefit K–20 goals to improve student performance and to graduate a stronger workforce. The solution to meeting these needs for 21st-century learners was to create a K–20 information literacy curriculum that included an inquiry focus.

**Getting Started**

Responding to these needs and opportunities, Donna Kearley, Denton ISD library services coordinator, and Annie Downey, department head of UNT Libraries Research and Instructional Services, proposed to their administrators that librarians work cooperatively to positively impact both sets of goals—student performance and career readiness—by using a spiraled K–20 information literacy curriculum integrating an inquiry process. K–12 students who had been taught inquiry skills and given opportunities to practice those skills would be prepared for the transition between high school and college research. Continued instruction in college would further support students to become successful college graduates and part of a well-educated workforce.

With their administrators’ enthusiastic endorsement, again all of the Denton librarians joined together to create a new organization, the Denton Inquiry 4 Lifelong Learning (DI4LL). At this point, librarians from Denton Public Library and faculty from both TWU and UNT library schools joined the group to create this unique collaborative organization. The DI4LL members searched for a model curriculum that taught students information literacy skills starting in kindergarten and continued through college graduate level.

However, a thorough search of the literature revealed no information literacy curriculum for K–20. Therefore, the DI4LL members decided to create their own curriculum. They selected the Guided Inquiry Design as the inquiry model. This inquiry process offered a scaffold approach that could be woven into the expectations found in the Research Strand of the TEKS. Students would gain a deeper understanding of content and an inquiry process they could use in college, careers, and life.

The DI4LL team’s first action was a book study using *Guided Inquiry Design: A Framework for Inquiry in Your...*
The new plans called for more library instruction throughout the inquiry process rather than just instruction on accessing information and resources.

School by Carol C. Kuhlthau, Leslie K. Maniotes, and Ann K. Caspari (Libraries Unlimited 2012). An online book study was launched in October 2012 along with a plan for the systemic shift from isolated information skills to a library curriculum built on the Guided Inquiry process. To build a collective sense of what inquiry was, knowledge of the steps in the Guided Inquiry process, and the rationale for the new direction of the school library programs, librarians met regularly to share ideas, discuss other inquiry articles, and develop new instructional plans.

Moving Forward

After a few months it became clear that more support was needed for the librarians. All participants were busy with full-time jobs with little extra time to create a K–20 information literacy curriculum, learn the Guided Inquiry Design, or develop lessons to implement the new plan. The DI4LL team realized that, to move this initiative forward to actual implementation, additional assistance was needed. Academic librarians Lilly Ramin, Gayla Byerly, and Cindy Batman applied for and received a Texas State Library and Archives Commission (TSLAC) Cooperation grant for $75,000. The grant funded a project manager and a consultant. Dr. Judi Moreillon, assistant professor at the School of Library and Information Studies at TWU, consulted and wrote sample lesson plans using Guided Inquiry and the TEKS Social Studies Standards for Grades 3, 8, and 9. Cherry Fuller, the project manager and a former school library coordinator, and Donna Kearley, Denton ISD library coordinator, began working together to write the K–20 information literacy units.

The information literacy units were divided according to the four subsections of the Research Strand of the TEKS English Language Arts and Reading Standards. These four units are the Research Plan Unit; the Gather Unit; the Synthesis, Create, and Share Unit; and the Evaluate Unit. Each of these units includes the student expectations listed in that particular subsection’s knowledge and skills statements and the appropriate steps of the Guided Inquiry Design correlating to that subsection. For example, the Research Plan Unit lists knowledge and skills statements such as “Students ask open-ended questions and develop a plan for answering them.” Within that statement are several student expectations at each grade level. For example, in kindergarten, the student is expected to “ask questions about topics of class-wide interest (with adult assistance).” At the high school level, students are expected to “brainstorm, consult with others, decide upon a topic, and formulate a major research question to address the major research topic.”

The Guided Inquiry Design steps “Open,” “Immerse,” “Explore,” and “Identify” correlate well with this unit topic and are woven into the learning plan of the unit.

Shifting Perspectives

Librarians soon discovered they would have to look at their instructional role differently. The new plans called for more library instruction throughout the inquiry process rather than just instruction on accessing information and resources. Librarians would be involved in the beginning stages of the research process, helping students learn how to ask open-ended questions, build background knowledge and personal connections, explore the topics, and identify a research focus.

Traditionally, research is assigned; students are expected to look for the information and create the research paper. In this old scenario librarians help students find, access, and use resources after the assignment is made; teachers assume students have the skills to complete the project independently. Often students search the Web to locate information related to their topic. The results of this kind of research are reports with a set of facts the student located. In contrast, when implementing an inquiry process, students develop their own meaningful questions that guide their research, learn how to analyze texts, justify their ideas, and share with their learning community, not simply engage in fact-finding using a set of predetermined questions. With guidance from the learning team, the students gain important skills that transfer to other areas of the curriculum.

As the librarians learned about the new inquiry process, they soon realized that they were actually...
working through the stages of the process themselves and having many of the thoughts and feelings found in Carol Kuhlthau’s Information Search Process model. Some librarians experienced confusion about the concepts in each step and uncertainty about changing what they were doing. Others had only vague ideas about how to revise assignments to make them more inquiry-based. With additional grant funds, multiple professional development opportunities were provided that immersed the school librarians in Guided Inquiry, helped them develop a sense of direction by seeing examples of inquiry-based instruction, and increased their confidence and capacity to implement the new curriculum by experiencing typical strategies and the learning team intervention. One school librarian said “I’m so excited to start the school year with these new inquiry projects and collaboration ideas.”

Working together to develop these inquiry research skills at every level prepares students well for college research. Academic librarian Lilly Ramin and high school librarian Jamie Pouster found an opportunity to collaborate based on commonalities of freshman and high school students. These educators are targeting courses where they can develop cross-institutional instruction that bridges the high school to college gap.

Continuing Collaboration

The DI4LL team continues to refine the K–20 information literacy curriculum units, ensuring they meet the K–20 standards expectations and the Guided Inquiry process is clearly integrated. Lessons, projects, and resources are being added to the units, providing quick access to resources. Academic and high school librarians continue to build relationships that promote collaborative opportunities, all focused on improving students’ research skills. More on the work of the Denton Inquiry 4 Lifelong Learning team can be found at <https://dentoninquiry4lifelonglearning.wikispaces.com>.

Cherry Fuller currently serves as a project manager for a TSLAC Cooperation grant between Denton ISD and University of North Texas, Texas Woman’s University, and Denton Public Library. She has been a classroom teacher, district librarian, and regional library coordinator. She developed and implemented several statewide library projects, including a statewide purchasing consortium for school libraries and a statewide library automation system consortium, and assisted in implementing a statewide video streaming project. She is a school library consultant, presents at various conferences, and provides professional development for school librarians. She has been a member of the Texas Library Association, ALA, and AASL for more than twenty-five years.

Donna Kearley is the library coordinator at the Denton Independent School District. She has served as a school librarian at every instructional level, and she is currently serving as past president of the Texas Association of School Library Administrators.

Gayla Byerly serves as the instruction coordinator at the University of North Texas Libraries and as the English Department liaison. She teaches approximately 180 library orientation sessions a year for various classes at UNT. She also teaches in the School of Library and Information Studies at Texas Woman’s University and has taught in the College of Information at UNT. Her area of expertise is assessment of library instruction. She publishes and speaks at both national and international conferences, presenting on assessment of library instruction and instruction techniques. She has taught library instruction workshops for state library associations and the state of Texas. She is also the former head of reference for the University of Texas at Dallas Library.

Lilly Ramin is an instructional technologies librarian at the University of North Texas Libraries in Denton. She was primary investigator for the Denton Inquiry 4 Lifelong Learning (DI4LL) grant awarded by the Texas State Library and Archives Commission, which supports this project. Lilly is a graduate of the Association of College and Research Libraries Immersion Program for instruction. She was named a 2012 ALA Emerging Leader. She blogs at <http://lillylibrarian.wordpress.com>.
Real-life research is incredibly varied. We research cars. We research lawn problems. We research child behavior problems, health issues, possible vacation destinations, and prices to stretch our budgets. No two scenarios are ever alike, and no two health issues should be assumed to be the same. That is reality, and that is a picture of what the Common Core State Standards call “real world problems.”

So if real-world problems are never the same, why are so many research activities designed in a one-size-fits-all fashion? Why do students have to fact-fetch for fill-in-the-blanks, when they have been asked to “solve real-world problems” and “research to build and present knowledge”? These low-level no-thought “research” tasks have got to go, and school librarians could be hosting lunchtime professional development shows dubbed “Research Project Runway Models—Let us make over your unit.” We (school librarians) should be in the transformation business. We should be transforming old information units into student-centered, inquiry-based learning adventures that encourage students to build knowledge, rather than merely collect information.

The Common Core State Standards (CCSS) call for rigor and relevance, and fill-in-the blank research packets are neither rigorous nor relevant. A “packet” is a teacher’s assignment and a teacher’s creation. The Common Core State Standards call for students to “conduct short research projects to answer a question…generating additional related, focused questions…” (see sidebar).

So, if the CCSS ask the students to generate questions, then why are we predefining the questions for our students’ research? Therein lies the issue of why we need research makeovers. It is by teachers’ letting go of control that ownership transfers to the student and research becomes relevant to the
WHEN TEACHERS EMBARK ON STUDENT-CENTERED INQUIRY-BASED RESEARCH PROJECTS, ASSIGNMENTS BECOME LEARNING ADVENTURES.

learner. It is by asking a difficult inquiry-based essential question that we spawn a rigorous and relevant learning task aligned with Common Core standards related to research for writing.

When teachers embark on student-centered inquiry-based research projects, assignments become learning adventures, rather than information packets that have to be completed for a grade. When research is performed with the goal of sharing knowledge, the purpose is more than a grade. Only through teachers’ letting go will students be empowered to define direction and investigate. Otherwise, we are operating in a paradigm of fact-fetching. Fact-fetching instruction was born in the Industrial Age when information was difficult to find and the learning goal was merely to teach us how to discover information. We must move beyond mining data and into transforming data into meaning. Students need to investigate, synthesize, conclude, and share their knowledge. They need to reflect on the process and do it “routinely,” as the Common Core says in writing for information standards 6, 7, 8, 9, and 10.

To help teachers make over their research packets, we can suggest a few steps:

1. Admit the old paradigm is outdated.
2. Adopt a goal of knowledge, rather than information.
3. Adopt a role of “learning concierge” and get ready for some messy learning adventures.
4. Package your instructional goals (curriculum learning targets) in questions that can be answered only through an investigation.
5. Let the students brainstorm their own wonder and investigation questions, rather than giving learners predefined packets.
6. Embed an element of choice within the project so that the students will “own” the task.
7. Connect with emotion somehow, to foster interest and care in the project.
8. Don’t cheat students out of the opportunity to share their knowledge with others.

If students have no opportunity to share their knowledge products, then educators are not meeting the Common Core State Standards and are cheating students out of the experience of feeling validation of their research and creation tasks.

From Information Product to Inquiry Knowledge Product

We are all familiar with the types of “projects” that result in information end products. Students are either assigned a topic or select one from a preapproved list. What topic is selected or assigned turns out to be largely irrelevant. Students might be asked

### Selection of Research-Related Common Core Writing Standards [www.corestandards.org](http://www.corestandards.org)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCSS.ELA-LITERACY.W.7.7</td>
<td>Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.</td>
</tr>
<tr>
<td>CCSS.ELA-LITERACY.W.7.8</td>
<td>Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.</td>
</tr>
<tr>
<td>CCSS.ELA-LITERACY.W.7.9</td>
<td>Draw evidence from… informational texts to support analysis, reflection, and research.</td>
</tr>
</tbody>
</table>
to read about a scientist and write about that scientist, or read about an animal and write about that animal, or read about an ancient civilization and write about that civilization. The very interchangeability of the topics is a clear indicator of the fact that the assignment will result in copy and paste work from the student. The demand for more specific information (i.e., when the scientist was born, where she lived, what she contributed to science, when she died, or what the animal’s habitat and eating habits are) does nothing whatsoever to increase the rigor of the task or get the student to a deeper understanding of the content.

It might easily be argued that this hyper-definition of what specific information to include in the “report” serves only to further distance the student from the task. When students are given a list of questions to answer through “research,” we deprive them of figuring out what they want to know about a topic and virtually ensure that when they read, they will skim for answers—versus engaging with the text deeply enough to generate their own questions about what they have read so that they can research their topics further. While it is one thing to create a purpose for reading by offering some guidance ahead of time, it is altogether another thing to limit what a student reads deeply to what an educator has predefined as important to know about a topic. In point of fact, if the predetermined questions are fact-retrieval ones, students may well be able to answer them without having read at all! A task that requires minimal student engagement will invariably result in information retrieval completed with little or no learning whatsoever having taken place.

In this scenario, even if we are enlisted to teach note taking, resource location and evaluation, database use, and bibliographic citation, deeply meaningful learning is prevented—by the assignment itself—from entering the scene. Clearly, this situation results from the assignment’s not being designed with inquiry in mind. The most crucial phase of inquiry is completely missing in an information-focused assignment.

Figure 1. Example of an assignment transformed from information-focused to inquiry learning.

<table>
<thead>
<tr>
<th>TRADITIONAL</th>
<th>RE-CRAFTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSIGNMENT</td>
<td>Research the types of jobs that child laborers held in the United States at the turn of the century. Be sure to describe each job and what it entailed.</td>
</tr>
<tr>
<td>SKILLS THE LIBRARIAN CAN TEACH</td>
<td>• Database use • Locating resources on the library’s shelves and online • Resource and information evaluation • Note taking • Citation</td>
</tr>
<tr>
<td>RESULTING PRODUCT</td>
<td>A “report” on the types of jobs that child laborers held in the U.S. at the turn of the century, with a description of each of these jobs.</td>
</tr>
</tbody>
</table>
An inquiry assignment requires students to do something with the information that they have gathered and organized. Namely, it requires them to synthesize information and make some claim with it. Synthesis constructs new understandings and knowledge that students did not have when they started. Until the assignments and tasks change, the end product will remain fact presentations, and school librarians will be stuck teaching only information-gathering skills and the express phase of inquiry. Only when the task is changed does our instructional role become critical and the skills we teach expand to include critical-thinking skills. (See figure 1 for an illustration of how a re-crafted task results in deeper instruction and in an inquiry investigation.)

What’s the Difference Anyway?
The single greatest difference between traditional and re-crafted assignments is that the latter require the students to provide the “so what?” to go with the investigation. While both assignments ask the students to investigate a topic, the traditional assignment ends once the investigation is done and the assignment questions are answered. The re-crafted assignment compels students to synthesize information so that they can make some sensible claim based on it and support that claim with the best possible evidence. Additionally, students are asked to consider multiple perspectives on the topic rather than merely being asked to describe something.

Investigation for investigation’s sake is largely a pointless activity—one completely devoid of engagement and meaningful learning. It is only when students engage with the information they have gathered, by making a claim from it, that true research has taken place. Regurgitation of the results of an investigation does not research make. An opportunity to share their new understanding reinforces students’ engagement and ownership of their learning.

An additional difference is that in the re-crafted assignment scenario, the role of the school librarian is greatly expanded. The additional skills the re-crafted assignment allows us to teach are critical for students to learn. These are the skills at the center of all the CCSS reading and writing standards (for ELA as well as social studies and science). In this new assignment scenario, we are instructional leaders in our buildings, able to assist all our colleagues with both crafting more rigorous assignments and determining the specific instruction that must follow from this increase in the rigor of tasks.

Conclusion
An old proverb states: “In all your getting, get understanding.” We love that piece of simple advice, as understanding is the result of deep discovery. It is the byproduct of synthesis and application. Only through understanding do learners recall, discover, comprehend, and advance. If all our students are “getting” is facts, then—to paraphrase 1 Corinthians—we of all people are to be pitied. Our efforts will not equip students to understand and improve—only recall.

We are educating the next generation that will run the world. For that reason we need students who can wonder, investigate, synthesize, conclude, improve, and share their findings. This inquiry-based learning is how we will create college- and career-ready young minds. Through participation in this learning will students change the world for the better. This outcome is how we will feel rewarded. This is a real-life makeover. Let’s run with it.
Inquiry, the New National Social Studies and Science Standards, and You
In an attempt to be excellent parents, we frequently strapped our two boys into their back seat restraints and took mind-numbing rides to historic sites, museums, and distant natural wonders. Pinned down back there, they fought despair with crackers and a game called "I'm that!" Rife with gasoline-driven lust, lightning-quick reflexes, and brother-against-brother power struggles, they would spot hot, huge, unique, cool, loud, turbo-charged vehicles around them and call out "I'm that!" The ownership and personal enhancement that came with the call, qualitatively aligned with the vehicle spotted, gave them the sweet and victorious one-upmanship every brother craves. We drove on.

The strategic school librarian lives in a parallel dimension to the competitors in our back seat. Indeed, in time and space that librarian is in motion, with a swift current of vehicles purportedly representing best practices speeding by. Some go unnoticed. Some are hot or cool. Some are powerful but overwhelming. Sometimes standards fall in that last category. To be recognized and adopted, the promise and potential of national standards must validate the instructional role of the school librarian and build formative knowledge through authentic process and products. Inquiry is a direct link to those dimensions.

Curricular standards that resonate with brain-based learning and respond to the compelling research that supports it, embed the inquiry process in learning. As school librarians know, inquiry works when rote learning and traditional attempts at “content coverage” fail. Cognitive development must be reflected in quality standards, with benchmarks for levels. Standards that merit adoption and our attention build formative knowledge with unifying concepts that are deeply understood. The brain has limited short-term memory capacity and quickly forgets information bits that lack context or meaning. Meaning emerges as learners manipulate, use, and apply concepts in authentic student work. Ultimately, standards must require learners to demonstrate skills and understanding, draw conclusions, analyze, and think critically.

Standards that are rigorous and relevant optimize the developing brain’s affinity for building relationships among ideas, attending to what is compelling, and making sense out of information. Strategic school librarians heed the news flash. Opportunity is knocking. Inquiry- and brain-based learning has arrived in national curricular guides, and it looks a lot like a lifeboat.

School librarians could shout “I’m that!” when inquiry process helps to launch change with the Common Core State Standards (CCSS). School librarians can shout “I’m that!” when reviewing the national social studies and science standards. The choice to implement these standards brings learners to the information environment and information literacy, on a path to deep content knowledge.

Lift an observing eye out of the fray and see the inquiry-driven innovations not to be missed. The school librarian who recognizes the potential of the College, Career, and Civic Life (C3) Framework for Social Studies State Standards and the Next Generation Science Standards opens a doorway to rigorous collaborative practice aligned with the Common Core State Standards. To the benefit of school library programs, CCSS ELA literacy standards are a part of these 2013 inquiry-driven packages of social studies and science standards.

Exploring these road maps for teaching social studies and science puts the school librarian on the entrance ramp to relevant and meaningful practice in a curricular domain. Assimilating these frameworks engages teachers and
school librarians in curriculum transformed for critical thinking, research, and life-long learning. Many school librarians have expertise to bring to the table as these standards are implemented. Question development, the process of inquiry, evaluating sources, and using evidence are part of school librarians’ skill sets.

AASL and Inquiry
In the past two decades inquiry has become a booster rocket for teaching and learning in many school libraries. AASL’s Standards for the 21st-Century Learner are based on effective and motivational pedagogy that is brain-based and inquiry-driven. These standards align with the CCSS on many levels. A comprehensive crosswalk is available on the ALA website at <www.ala.org/aasl/standards-guidelines/crosswalk>. AASL standard 1.1, for example, states: “Follow an inquiry-based process in seeking knowledge in curricular subjects and make real world connection for using this process in own life” (2007, 4). CCSS Writing Standard 9-10.7 states:

"Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation." (CCSS Initiative 2010)

The Common Core State Standards and both discipline-specific guides referenced here set the same standard, with strong emphasis on problem solving and real-world connections. These standards

“Now more than ever, students need the intellectual power to recognize societal problems; ask good questions and develop robust investigations into them; consider possible solutions and consequences; separate evidence-based claims from parochial opinions; and communicate and act upon what they learn. And most importantly, they must possess the capability and commitment to repeat that process as long as is necessary.” (NCSS 2013, 6)
target deep understanding and formative knowledge that grows out of questions, background building, investigation, evaluation, synthesis, communication, and reflection. All three frameworks easily resonate with AASL’s Standards for the 21st-Century Learner, creating a powerful convergence and common ground.

- Inquire, think critically, and gain knowledge.
- Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge.
- Share knowledge and participate ethically and productively as members of our democratic society. (AASL 2007, 3)

School librarians who invest in inquiry have a premium of expertise to bring to national standards reform. Many school librarians have already implemented student-centered processes, higher-level thinking, and questioning. In a school library, big ideas are synthesized from details, and meaningful and authentic investigations do not start or end with one right answer. Learners go to the school library to discover, uncover, connect ideas, and analyze—a redirect from content coverage in the classroom. In the school library learners manipulate, use, and apply the background information and big ideas of the content at hand. Skills and habits of mind for a viable future are mastered.

Higher education and employers need high school graduates who can make informed decisions, solve problems, and negotiate and appreciate perspectives. The ability to interrogate evidence-based arguments and generate a conclusion based on original thinking is imperative for every learner. Graduates must be effective communicators and collaborators. Inquiry is the key.

**College, Career, and Civic Life (C3) Framework for Social Studies State Standards**

Published by the National Council for Social Studies in 2013, the College, Career, and Civic Life (C3) Framework for Social Studies State Standards is a richly collaborative response to the merger of social studies and ELA in the CCSS. The C3 Framework’s stated purpose is to provide guidance to states and practitioners enhancing the rigor of K–12 civics, economics, geography, and history curricula. Teachers, curriculum developers, and school districts are also in the target audience. A PDF file of this framework can be found at <www.socialstudies.org/system/files/c3/C3-Framework-for-Social-Studies.pdf>.

The fifteen professional organizations and thousands of contributing practitioners who crafted these frameworks set their GPS for the school library with the goal of building critical-thinking, problem-solving, and participatory skills of learners. The universal value of knowledgeable, thinking, and active citizens moves the framework forward. The C3 Framework for social studies embraces the arc of inquiry with four library-friendly dimensions:

- Developing questions and planning inquiries
- Applying disciplinary concepts and tools
- Evaluating sources and using evidence
- Communicating conclusions and taking informed action.

Proactively addressing the ineffectiveness of instruction driven by textbooks, rote response to end-of-chapter questions, and multiple-choice tests, the C3 Framework commits to fostering real-world connections and meaning. Truly and essentially rigorous overarching ideas and unifying concepts provide the architecture for the framework, which posits the guiding principles below:

- Social studies prepares the nation’s young people for college, careers, and civic life.
- Inquiry is at the heart of social studies.
- Social studies involves interdisciplinary applications and welcomes integration of the arts and humanities.
- Social studies is composed of deep and enduring understandings, concepts, and skills from the following disciplines: civics, economics, history, and geography.
- Social studies emphasizes skills and practices as preparation for democratic decision making.
- Social studies education should have direct and explicit connections to the Common Core State Standards for English Language Arts and Literacy in History/Social Studies.

“Young people need strong tools for, and methods of, clear and disciplined thinking in order to traverse successfully the worlds of college, career, and civic life.” (NCSS 2013, 15)
Big Ideas to Take Away: C3 Framework

- Each of the four C3 dimensions (see above) are expanded by specific performance indicators and cross-walked with CCSS ELA literacy standards.
- The framework uses performance indicators to communicate desired learning outcomes.
- The indicators have continuity across a range of grade levels, with progressive levels of rigor.
- Questions and the desire to answer them give life to inquiry and, thus, to the C3 Framework. Questions arise from students’ innate curiosity about the world and from their efforts to make sense of how that world works. Questions are generated by teachers and students.

Next Generation Science Standards

A second prospect for curricular innovation and collaborative planning is the Next Generation Science Standards (NGSS) available at <www.nextgenscience.org/next-generation-science-standards>.

Published in 2013, the standards were developed by a consortium of twenty-six states in a process managed by Achieve, Inc. These organized and scaffolded science standards merge conceptually with CCSS ELA literacy. That merger provides a common ground for school librarians to support short and sustained research and engage in collaborative practice with teachers. ELA standards built into the NGSS culminate in student research with expository writing, making and supporting evidence-based claims, and even creating narratives based on scientific knowledge.

For example, a middle school NGSS standard addresses interdependent relationships in ecosystems. As a part of the standard, CCSS ELA literacy standards in science and technical subjects for that level are embedded. Making a distinction between fact and opinion in a text, critically analyzing and evaluating an argument in a text, writing explanatory texts to convey ideas, and speaking to support claims with evidence are all built into the science standards.

The need for quality information, critical thinking, and evaluation of sources for objectivity and authority demands the active role of the school librarian. Discipline-specific higher-level thinking and problem solving form a rich and consistent spine for the widely adopted science standards. Carefully developed and reviewed
by the National Research Council, National Science Teachers Association, American Association for the Advancement of Science, and Achieve, the Next Generation Science Standards call for research that culminates in knowledge products created by learners’ synthesizing information. Evidence-based claims and decision making are characterized by rigor and relevance. These standards explicitly and comprehensively build scientific inquiry into their core.

**Big Ideas to Take Away: Next Generation Science Standards**

- The standards connect scientific concepts across disciplines and frame scientific knowledge as it is experienced in the real world.
- Authentic knowledge products frequently involve investigation, analysis of data, use of information resources, and synthesis.
- ELA literacy standards are embedded.
- Disciplinary core concepts, scientific practices, and concepts that cut across all standards are featured together in each standard.
- The NGSS have a goal of improving student performance and fostering development of deep understanding of concepts.
- Knowledge of science and the practice of scientific inquiry are mutually reinforcing in these standards.
- The standards use performance indicators to communicate desired learning outcomes across grade levels.
- The indicators become more rigorous as students progress but connect to core concepts that

“Active and responsible citizens identify and analyze public problems; deliberate with other people about how to define and address issues; take constructive, collaborative action; reflect on their actions; create and sustain groups; and influence institutions both large and small.” (NCSS 2013, 19)

“Helping students develop a capacity for gathering and evaluating sources and then using evidence in disciplinary ways is a central feature of the Inquiry Arc.” (NCSS 2013, 18)
Evidence-based claims and decision making are characterized by rigor and relevance. These standards explicitly and comprehensively build scientific inquiry into their core.

are the architecture for the standards.

• Students demonstrate understanding of core concepts in authentic products such as debates, evidence-based claims, models, and persuasive writing.

• The standards have a goal of moving learners from novice to expert in their scientific knowledge and thinking by learners’ use of scientific practices, often based on inquiry.

• Physical sciences, life sciences, earth and space sciences, engineering, technology, and the application of science are the disciplines for which the NGSS are intended.

• Mathematical standards are embedded, highlighting the connections between science and math in relation to core concepts.

Conclusion: Common Ground for the Common Core

As a way to ensure deep understanding of key concepts, both the social studies and the science standards incorporate question development, use of information, close reading, consideration of opposing perspectives, arguments supported with evidence, and the inquiry process. Both sets of standards explicitly embed CCSS ELA literacy standards into their frameworks. Both sets of standards take an inquiry path to synthesis and evidence-based conclusions. Both sets of standards culminate in writing, speaking, listening, thinking, and communicating. Both sets of standards lead to deep conceptual understanding with global scope and even action by learners. Both sets of standards are connected to the real world.

Developing a deep understanding of these frameworks pulls the school librarian into the high-occupancy vehicle lane on the learning highway. Partnering with grade-level teachers and subject specialists, the school librarian is not stuck alone in a reactive gridlock. Leading for learning, the school librarian is in a vehicle geared to college- and career-readiness, and learners who think, create, share, and grow—learners for life.

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Works Cited:


Socrative 2.0 is an online assessment and student response tool that can be run on any platform that has a connection to the Internet. An AASL Best Website and Best App for 2013, this system was created by a team that is passionate about education, and that passion is obvious in their work. The system can be used as a student engagement tool and as either a formative or summative assessment mechanism. Laptop or computer users can just log in to join their class through a student website. An app is also available for tablets and smartphones. Two separate apps are needed to use the Socrative 2.0 tool: a Teacher App and a Student App that must be downloaded onto each device. As of this writing, both the online website and the tablet apps are free to all users.

The newest version of the Socrative 2.0 program was released in July 2014 after several months of testing. The system has a limit of fifty simultaneous online users, more than enough for a typical school setting. A helpful user guide can be downloaded and printed. A number of tutorial videos show step by step how to navigate and manipulate the system. Although the system is very intuitive, the availability of the user guide and tutorial videos is a convenient back-up feature.

For a school librarian, Socrative 2.0 is an effective and easy tool for keeping tabs on students’ progress. Prior knowledge can quickly be assessed with a pretest. Students can easily be engaged and their understanding of a lesson assessed. An air of competition and collaboration can be created within the class. Within the system, quiz administrators have many ways to achieve these objectives.

**Quiz Options**

The quizzes are simple to construct and can be tagged with Common Core State Standards objectives by clicking through the Socrative 2.0 interface to pull tags from the Common Core State Standards Initiative website. Alternatively, quizzes can be tagged by selecting objectives from the list provided within Socrative 2.0.

A quiz can contain a mix of multiple-choice, true-false, or short-answer questions; explanations of correct answers are optional. A useful feature that accommodates different students’ learning styles is the ability to add a picture to each question. Inserting the picture is a very easy, straightforward process; the picture is displayed with each question for every student. A built-in Exit...
Ticket quiz can also be run; it contains three basic questions to gauge students’ understanding in real-time.

**Student Engagement**

To engage every student in the class, the Quick Question function supports posing a question aloud to students; they answer via their devices, and the quiz administrator immediately sees the results on his or her device. Each student is engaged and can submit an answer without fear of answering incorrectly in front of the rest of the class. Every class member’s understanding can immediately be assessed.

Another Socrative 2.0 feature that can foster engagement is the Space Race, a team competition. This tool can be used with any quiz containing only multiple-choice and true-false questions. During quiz configuration the number of teams is specified. Groups of students then race to the finish, trying to get the most correct answers as a team. The progress of the race can be projected for the whole class to watch as the teams work—collaboration and competition at its best!

**Quiz Bank**

A powerful component of the Socrative 2.0 system is the bank of quizzes that have been shared among educators. After logging in at [www.socrative.com](http://www.socrative.com), instructors can pull up a Google Doc of more than 1,300 quizzes that have been shared—a great open-source sharing of resources. Any quiz from the bank can be imported by pasting its SOC number in the Import Quiz field. An imported quiz can be edited and customized for a specific class. Incorporating quizzes into instruction is easy.

**Quiz Administration**

Creating a quiz is quite simple, and powerful administration options have recently been added to provide flexibility in how quizzes are presented:

- **The Student Paced—Immediate Feedback option** gives students immediate right/wrong feedback and explanations after they respond to each question. Students must answer each question in order and cannot skip questions or change their answers. The educator can watch students’ progress through a Live Results Table displayed on his or her device.

- **The Student Paced—Student Navigation option** lets students have control of the order in which they answer, and they can move forward and backward through the quiz. They can go back and change answers and then click the Submit button when they decide they are finished. With this option, students’ progress through the quiz can also be monitored by the administrator.

- **The Teacher Paced option** gives the quiz administrator control in delivering each question to the students. The teacher can choose to go back and review a question or just let each question flow to the students.

Among the additional settings available are randomizing question order and/or sequence of multiple-choice answers. In addition, the option that displays immediate feedback to students can be disabled. In all of the presentation options display of students’ names can be disabled.

**Results Reports**

A report of the quiz results can be sent to the quiz administrator via e-mail, downloaded, accessed in Google Drive, or saved with the View Later function. Reports available are: Whole Class Excel file, Individual Student(s) PDF file, or Question Specific PDF file. The data returned is valuable for assessing students’ understanding, evaluating the effectiveness of lessons, and planning future lessons.

Judy Deichman is the school librarian at Nottoway Middle School in Crewe, Virginia. She received the 2014 Technology Leadership Award from the Southside Virginia Regional Technology Consortium. She is an AASL member and serves on the AASL Blog Committee and AASL Standards and Guidelines Committee. She is also AASL L4L Virginia Representative. She’s the newly elected treasurer for VAASL. She authored a lesson plan in ALA’s Tablet Computers in School Libraries and Classrooms. She blogs at [Nottowaylibrary.wordpress.com](http://Nottowaylibrary.wordpress.com).

A powerful component of the Socrative 2.0 system is the bank of quizzes that have been shared among educators.
Today I wondered why a deer that was lying in the road three houses down from mine was removed within a day, but the seagull that expired on the road in front of my house remained in the street for three weeks.

About that deer…
- Did a car hit it?
- Was the driver injured?
- Was the car damaged?
- Were the police called?
- Who removed the deer?
- What happened to the deer after it was picked up?
- Are many deer killed in my community?
- Should a deer crossing sign be posted on the street?
- Is my home located in an area over-populated by deer?
- If it is, what is being done to reduce the deer population?
- Should I be concerned?

About that seagull…
- Why did it take so long for the town to pick up the bird?
- Hasn’t the community been warned about zoonotic diseases (more than sixty illnesses) birds can transmit to humans? (Duvall 2014)
- After the gull was picked up, was it tested for disease? If it was, did it have any diseases?
- Was the bird dangerous to the community?

As school librarians we can begin this shift by collaborating with teachers to tweak projects so there is no right answer. No more copying from a reference book, but, instead, encouraging students to reach a conclusion supported with evidence gathered from a variety of resources.
• Did the gull have infectious agents that can be spread by birds?
• If it was not tested, why not?
• Who in the town is responsible for keeping the community safe from animal-carried diseases?
• Have other community-discovered dead gulls been tested for disease?
• What was the result of the testing?
• Should I be concerned?

These were just a few of the questions I asked today. In this reflection, I considered how many questions I answer. I spent the day with my grandson, an almost kindergartner, who always has a plethora of questions about everything and anything. When he and I discussed my upcoming visit to the Finger Lakes region in New York State, he asked:

- Why were they called Finger Lakes?
- Are there roads to get there?
- Why were we (grandparents) going there?
- How long would it take to get there?
- Were we coming back? When?

So, we began with a map to begin to answer the questions.

AASL’s Standards for the 21st-Century Learner “offer a vision for teaching and learning to both guide and beckon the school library profession as education leaders. The learning standards shape the library program and serve as a tool for school librarians to use to shape the learning of students in the school” (AASL 2014). The standards have definitely changed the way I approach learning with students, teachers, and even grandchildren.

When the standards were first published, I was ecstatic. The focus is on learning, not on the quantity of resources but on supporting Learning for Life (L4L). The four basic strategies promoted in Standards for the 21st-Century Learner—Think, Create, Share, Grow—simplify the inquiry process.

In Wikipedia, inquiry is defined as “any process that has the aim of augmenting knowledge, resolving doubt, or solving a problem. A theory of inquiry is an account of the various types of inquiry and a treatment of the ways that each type of inquiry achieves its aim” (2014).

A more-widely accepted source, Merriam-Webster (2014) defines inquiry as:

- A request for information
- An official effort to collect and examine information about something
- The act of asking questions in order to gather or collect information

To begin the inquiry process, “Wonder” is critical. Peter Haiman, in the article “Developing a Sense of Wonder in Young Children,” stated that “children in schools and preschools are influenced by educators who often ask, rather than teachers who usually tell” (2014). As school librarians we can begin this shift by collaborating with teachers to tweak projects so there is no right answer. No more copying from a reference book, but, instead, encouraging students to reach a conclusion supported with evidence gathered from a variety of resources. Also important is encouraging students to think by asking questions that encourage thought rather than expecting learners to repeat what was heard. Consider the learning potential of the assignments in table 1.

Paige Jaeger stated in “Missing in the Common Core: Participatory Problem Solvers”:

> if we embrace inquiry-based learning (IBL) and higher level thought, model it with carefully crafted projects, and promote it in our learning culture, we are likely to graduate college and career ready students. When a teacher arrives at your doorstep to research, scrutinize the project for higher level thought and say, “Would you mind if we carefully craft the research question to foster student conclusions?” (2013, 47)

This process supports school library learning standards and Common Core State Standards. Following the “thinking” strategy, it is important to create something from the ideas and information gathered. This “something” can

<table>
<thead>
<tr>
<th>THOUGHT-LESS</th>
<th>THOUGHTFUL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report on Endangered Animals</td>
<td>If you could save only one endangered animal, which one would you choose? Why? How?</td>
</tr>
<tr>
<td>State Report</td>
<td>Two companies have offered your dad a job: one in Boston, Massachusetts, and one in Denver, Colorado. Considering what your family enjoys doing, which city should your family choose? Why? What helped your family decide?</td>
</tr>
<tr>
<td>Examples of Primary Source Materials</td>
<td>Working with your family, construct a box in which to place primary resources for your great grandchildren. What would you include and why?</td>
</tr>
</tbody>
</table>

Table 1. Example inquiry assignments.
take a variety of formats such as a monograph, video, spreadsheet, infographic, speech to the state legislature, or another format appropriate for presenting answers to the questions developed and posed while thinking.

Bloom’s Taxonomy was created in 1956 with three domains; the one most applicable to educators, the cognitive domain, was revised in 2000 (Clark 2014). The revision brought creating to the top of the taxonomy. However, creation is only the second step in the inquiry process supported by AASL’s Standards for the 21st-Century Learner. Why? Because L4L does not stop at the top of Bloom’s Taxonomy; L4L raises the importance of inquiry to include sharing what was learned during the creation process and growing as a result of the process and newly acquired knowledge.

Creating augmentative knowledge, resolving doubt, or solving problems—though integral to the inquiry process—is not a conclusion, but a beginning. Value is ascribed to the sharing of the inquiry. If a solution to a problem is reached through reliable and valid resources it should be shared. If my concerns over today’s wonderings about dead wildlife were validated, it would be unethical and unconscionable for me not to share what I discovered, especially if the local community needs to be informed of a possible spread of disease. Students need to embrace ethical use of the information they learn and be guided by standards for ethical behavior in the use of information as promoted by AASL’s Standards for the 21st-Century Learner.

The final step in the inquiry process is essential: reflection. Why is learning about endangered animals important? Could the research actually save a species? How might I change the fate of a species? Consider how the inquiry will impact future inquiries. How will I use what I learned? Why?

The inquiry process embraces Standards for the 21st-Century Learner, supports the Common Core State Standards, extends learning beyond Bloom’s Taxonomy, and “develops, preserves, and enriches a sense of wonder in children—of all ages” (Haiman 2014), including school librarians.

Catherine E. Marriott, a retired school district administrator (director of technology and information services), is the part time director of the Erie-Catt Teacher Center in Eden, NY, where she continues to work with teachers to ensure that all students become life-long learners. She is an AASL member. She was a Region 2 Representative to the AASL Board of Directors and a Member-at-Large for ALA Council.
All three authors agreed that they used inquiry and research in the hatching of their novels—and also in writing the nonfiction sections at the end of each book. But which came first? Inquiry or research? The chicken or the egg?

The Roles of Inquiry and Research in Hatching the Glorious Goddesses

Shirin Yim Bridges, with Janie Havemeyer and Gretchen Maurer
shirin.bridges@goosebottombooks.com

What’s better than asking an author about the different roles that inquiry and research play in the writing process? Asking three authors. Or in this case, three geese.

Janie Havemeyer, Gretchen Maurer, and Shirin Yim Bridges are all author-geese for the nonfiction press Goosebottom Books. (Bridges is also the Head Goose, or publisher.) This fall they are adding to Goosebottom’s list with a brand new series: A Treasury of Glorious Goddesses. Havemeyer is the goose behind Call Me Ixchel, Mayan Goddess of the Moon. Maurer’s title is Call Me Isis, Egyptian Goddess of Magic. Bridges wrote Call Me Athena, Greek Goddess of Wisdom.

All three authors agreed that they used inquiry and research in the hatching of their novels—and also in writing the nonfiction sections at the end of each book. But which came first? Inquiry or research? The chicken or the egg?

“I started out by embarking on a quest to become an expert on the ancient Maya,” says Havemeyer. “That, of course, took extensive research: an immersion in the culture that would form the backbone of my story.”

Maurer agrees. “I did most of my research in the beginning. I like to immerse myself in the subject before even thinking how the story might take shape. I learned about the history, geography, religion, and cultural practices of the ancient Egyptians.”

“It was a little different for me,” says Bridges. “I’ve been a fan of Greek mythology since I was a kid, so I was able to quickly sketch out which myths I wanted to incorporate into my book. My first challenge was then not the research but the question: What was the story? Because I knew the mythology, I already had various plot points. But what could tie them all together and make them interesting and relatable to a young reader? So I started with inquiry.”

Whether research or inquiry was the first step, all authors felt that the two went hand in hand.
“One example of research leading to inquiry that then fueled more research is my discovery of pohatok,” says Havemeyer. “After encountering stories in ancient sources of mortals playing this ball game with the demons of the Mayan underworld, I wanted to find out how pohatok was played. How important was it in the lives of the Mesoamerican people? These inquiries led to further research, and I found my answers in new and surprising places, like watching a reenactment of pohatok and examining Mayan works of art that depicted ballplayers and their equipment.”

“My research also led to inquiry,” says Maurer, “but not only about factual accuracies. For example, I learned that Isis’s husband Osiris ignored Isis once he was reincarnated in the Underworld. That got me thinking: How would Isis feel? How would she react to this snub? What would she do? So research led to inquiry and a deeper understanding of the fictional characters in my head.”

“Oh yes,” agrees Havemeyer, “One of the challenges of retelling Ixchel’s myth for a middle school audience is that her story involves domestic abuse, a delicate subject for any audience. Even though I didn’t want to show the physical abuse, I still wanted to develop a relationship that was authentic to the patterns and behaviors of domestic abuse, ultimately leading the reader to realize, alongside Ixchel, that her relationship with the Sun God was unhealthy.

“How could I do this? What are some patterns that abusers use to control their partners? Is there a ‘personality type’ associated with this kind of scenario? These questions led me to learn more about domestic violence and to shape the character of K’inch Ajaw accordingly.”

“So in my case where inquiry came first,” says Bridges, “it led to research, and, ultimately, to a more accurate portrayal. Because of my One Big Question, I realized that Athena’s story is really a ‘new kid in school’ story. Athena arrives on Olympus to find the Olympian world already in full swing. She feels unsure of herself, out of place. That situation meant I had to write scenes that would show how imposing and isolating Olympus could feel. Inquiry led to research. What building materials would have been used? How would they have furnished and heated their rooms? In Athena’s bedroom, I had lined her walls with bookshelves until research revealed that no such thing existed. Of course not! In that era, the Greeks used scrolls, not books! So then I had to reline her walls with cubby holes to hold her scrolls instead.”

So how would these authors advise young writers to harness both research and inquiry?

“Research gives writers information they can use to add depth and richness to a story,” says Havemeyer. “When I found out what kind of fruit trees grew in Mesoamerica, I was able to create an orchard for Ixchel and K’inch Ajaw. Now not only do readers have a picture of what the couple’s backyard looked like but readers can also imagine what it might have smelled like and what types of meals might have ended up on the table. Research helped me to build a world.

“Inquiry, on the other hand, is the force that drives the research. My tip to young writers is to write down a list of questions you need to answer to write your story. Be creative about the ways you search for your answers. Seeing movies, looking at art, asking questions of the experts are all avenues—in addition to reading books—that can help you answer your questions.”
books—that can help you answer your questions."

"Research and inquiry create a feedback loop," adds Maurer. "I’d urge young writers to ask questions, dive into research to answer those questions, note the new questions raised, chase down those answers with more research. Then your brain will crackle with new information and ideas."

"I agree that both inquiry and research are absolutely necessary," says Bridges, "but I think that research skills are often taught whereas inquisitional skills are not. Yet for the writer, inquiry is key. If research can help you create your context, only inquiry can flesh out your fictional characters. So my parting tip is to ask: Who is the character? What does this person want? What does he or she fear? And what, deep deep down, is his or her secret?"

Shirin Yim Bridges wrote Ruby’s Wish (Chronicle Books 2002), a Publishers Weekly Best Children’s Book and winner of the Ezra Jack Keats Award; The Umbrella Queen (Greenwillow 2008), a TIME/CNN Top 10 Children’s Book; and Mary Wrightly, So Politely (Houghton Mifflin Harcourt 2013), which earned starred reviews in Kirkus, Publishers Weekly, and Shelf Awareness. She is also the Head Goose of Goosebottom Books, proud publishers of The Thinking Girl’s Treasury of Dastardly Dames, named a Top 10 Nonfiction Series for Youth by ALA; The Thinking Girl’s Treasury of Real Princesses, a medalist at the 2011 IPPY Awards; and Horrible Hauntings, an IRA/CBC Children’s Choices winner.

Gretchen Maurer is the California Reading Association Eureka Medal–winning author of Mary Tudor: “Bloody Mary” (2011) in The Thinking Girl’s Treasury of Dastardly Dames. Her writing has also been published in Frances Mayes’s The Discovery of Poetry (Harcourt 2001) and in the anthology A Cup of Comfort for Mothers to Be (Adams Media 2006). She cowrote the screenplay for Alma, a 2007 short film that has won multiple awards. She lives in northern California with her family.

Janie Havemeyer has worked as a museum educator at the Metropolitan Museum of Art, an elementary school teacher in the San Francisco Bay area, a social studies curriculum designer, and a literacy tutor. She writes narrative nonfiction picture books for children and is busy thinking about the next eccentric character whose story she wants to tell. Janie is the author of Catherine de’ Medici: “The Black Queen” (2011) and Njinga “The Warrior Queen” (2012), both in The Thinking Girl’s Treasury of Dastardly Dames.