Teaching Internet Literacy Strategies: The Hero Inquiry Project

Navigating the Internet has become an essential literacy task for today's middle school students. The World Wide Web is a uniquely rich resource for authentic inquiry, but students must learn to orchestrate sophisticated strategies to become literate in this complex environment (Eagleton, 2002).

Despite the fact that 71% of *adult* Web users experience frustration when searching, and that the average Internet user feels discouraged after only 12 minutes of searching" (IDC, 2001), standards at national, state, and local levels call for integrating modern technologies such as the Internet into the classroom. For example, the National Council of Teachers of English and the International Reading Association Standards for the English Language Arts state that middle school students should "conduct research on issues and interests by generating ideas and questions, and by posing problems" using "a variety of technological and information resources" (NCTE/IRA Standards, 2000). With 99% of U.S. public schools reporting Internet access, 85% of those with high-speed Internet access (National Center for Education Statistics, 2002), many language arts teachers now have the resources to meet these standards. Although many middle schoolers may be fluent with word processing or instant messaging, we cannot assume that students know how to find information efficiently on the Internet, and students who cannot find relevant information quickly will be disad-

vantaged in today's information society (Leu, 2000).

To teach these critical skills, we designed a six-week Internet inquiry unit in which eighth graders were required to use both print and Internet resources to research a personal hero, and then present their findings via two formats of their choosing (e.g., slide show, poster, impersonation). While numerous strategies and skills can be emphasized in project-based learning, we focused on the earlier stages of the inquiry process (choosing topics, asking research questions, and selecting keywords). The later stages of the process (identifying relevant information, notetaking, synthesizing, and transforming ideas) were not the focus of this instructional intervention because they are similar for online and traditional library research. Karen, the third author, taught the unit to eight language arts classes over two grading periods while the first two authors observed and collected data for a research study funded by the U.S. Department of Education, Office of Special Education Programs. The curriculum was based on Universal Design for Learning (Meyer & Rose, 2002), a philosophy that seeks to create tools and materials in which the content, means of expression, and balance of support and challenge are customizable to support individual learners. Although the original target population for our research was mainstreamed students with learning disabilities, we quickly discovered that the Internet inquiry process is a challenging literacy task for all middle school learners.

In this article, we describe the hero inquiry project in detail so readers may implement similar units of study in their classrooms.

Hero Inquiry Project

The following description of the six-week hero inquiry project is based on a 50-minute class period with the first 5 minutes dedicated to goal-stating, brief assessments, and student questions, then 15 minutes of teaching, modeling, and/or review, 25 minutes of guided and/or independent practice, and 5 minutes at the end of the period for students to reflect on their progress. These guidelines were flexible depending on the school calendar, computer availability, students' individual needs, and daily instructional objectives.

Week 1: Introduction

The first week was dedicated to setting goals, administering pre-test assessments, brainstorming final formats (see Table 1), introducing tools (search engines, library resources), and exploring the hero theme.

Discussing project objectives with students up front and having them set learning goals were crucial. Clear goals are essential for learning (Meyer & Rose, 2002); however, we have observed in previous (unpublished) pilot studies that many middle school students begin researching without explicit goals or strategies for approaching the task. We showed the eighth graders exactly how their work would be evaluated, using a grading rubric that allowed them to self-assess *process*, *progress*, and *products* (see Table 2). This grading system helped level the playing field for students with varying degrees of Internet inquiry expertise.

The grading rubric not only helped students understand project objectives, but also gave them a framework for setting personal learning goals and an opportunity to assess their growth.

To find out what students already knew about searching the Internet, we asked them to list the steps involved in searching (see Figure 1), and then observed some individual students as they carried out a search on the Internet for an unfamiliar subject (e.g., "Imagine someone gave you a lory [a type of parrot] as a pet and you need to get information on the Internet. Show me how you would find the information that you would need, and talk through every step as you go so I can understand what you're thinking."). To save time, we also administered individual offline search simulations and took note of students' responses (e.g. "Let's say your family is given an exotic pet such as a leopard and you need to get information on the Internet. Talk through all the steps you'd go through to get the information you need.").

Another way we assessed students' searching ability was to assign a scavenger hunt that required them to search the Internet for specific facts. Our pre-test scavenger hunt required students to find answers to the following high-interest questions: (1) How many actors have played James Bond?

1. Log online
2. go to a search site
3. type in a few key words
4. press search!
5. click on a site that looks good
6. write down all information that looks good.
7. go back and try another site until done.
8. Sign off.
9.
10.

Figure 1. Search steps assessment

Table 1: Potential Formats for Presenting Research Findings

Print	Multimedia	Performance	Art
Newspaper article	Web site	Skit	Diorama
Poem	Slide show	Mock interview	Captioned poster
Diary	Children's book	Impersonation	Board game
Opinion paper	Brochure	Song	Timeline
Essay	Video	Speech	Wanted poster

Table 2: Partial Grading Rubric

PROCESS	4	3	2	1	0	STUDENT SCORE	TEACHER SCORE
Class Work	I turned in *every* class assignment	I turned in *most* class assignments	I turned in *some* class assignments	I turned in a *few* class assignments	I didn't turn in any class assignments		
Effort	I put forth a *ton* of effort	I put forth *a lot* of effort	I put forth *some* effort	I put forth a *little* effort	I put forth no effort		
PROGRESS							
Internet Searching	I learned or used a *ton* of new skills	I learned or used *a lot* of new skills	I learned or used *some* new skills	I learned or used a *few* new skills	I didn't learn anything new		
Library Skills	I learned or used a *ton* of new skills	I learned or used *a lot* of new skills	I learned or used *some* new skills	I learned or used a *few* new skills	I didn't learn anything new		
PRODUCTS							
HERO PRODUCT #1	My focus is very clear and my info is *totally* organized	My focus is clear and my info is *mostly* organized	My focus is sort of clear and my info is *somewhat* organized	My focus is fuzzy and I have very *little* info	My focus is fuzzy and I have no new information		
	I gathered info from *tons* of sources	I gathered info from *a lot* of sources	I gathered info from *some* sources	I gathered info from a *few* sources	I gathered info from one source		
	I *totally* transformed the info into my own ideas	I *mostly* transformed the info into my own ideas	I *somewhat* transformed the info into my own ideas	I *sort of* transformed the info into my own ideas	I copied the info straight from the source		
HERO AGENDA	I presented two clear focus areas, formats, and *totally* accurate sources	I presented two focus areas, formats, and *mostly* accurate sources	I presented two focus areas, formats, and *some* sources	I had some focus areas and *no* sources	I did not have an agenda		
					TOTAL SCORE		

(2) Which U.S. President got stuck in his bathtub? and (3) Who co-directed the movie "Shrek"? The first hunt required two keywords that could be drawn directly from the question <actors + "James Bond">; the second hunt required three keywords <president + stuck + bathtub>; and the third hunt required a substitution <directors + Shrek>. The scavenger hunt was also an excellent teaching tool, since the students learned essential criteria about keyword strategies when Karen reviewed the activity with the whole class afterward.

Because keyword selection is a lynchpin to successful Internet searching, we also conducted a keyword pre-test (see Figure 2) that required students to identify strong or weak keywords and provide an explanation. This assessment was repeated throughout the unit (with comparable questions) in order to monitor student progress. As with the scavenger hunt, the keyword assessment was a powerful teaching tool when reviewed with the whole class afterward. It was surprising how weak the eighth graders in our study were at

selecting appropriate keywords for their hero inquiries, even after instruction and practice. For example, we saw queries such as: <Mia + Hamm + Who influenced Mia to become a great soccer player>; <paul McCartney + become a Beatle>; <who were they + lucille balls parents>; <Poem + Leader of his country>; and <Red Sox + Nomar + Money he makes a year>. For more guidance on efficient keyword selection, see Eagleton & Guinee (2002).

In hindsight, we also would have included a questionnaire that assessed students' knowledge of computers and the Internet so that tech-savvy students could be enlisted for technical support for students who lacked computer skills, and a pre- and post-test that required students to identify appropriate research questions (i.e., too broad, appropriately focused, too narrow).

While students were working on the pre-tests (we conducted one per day so as not to overwhelm students), Karen introduced search engines, gave a library tour, showed past student projects, and began exploring the hero theme with the class. Following a class discussion about the definition of a hero (e.g., real, researchable, and role model), the students interviewed two adults and one student about heroes in various domains (artists, business leaders, earth keepers, explorers, humanitarians, scientists, athletes, and writers) in order to brainstorm possible topics for their research.

Week 2: Keyword Instruction

Although many students were eager to immediately begin searching for information about a hero, the second week of the project provided intensive instruction and practice in selecting keywords. Karen also modeled the inquiry process, emphasizing appropriate breadth and depth of topics and research questions; while it is tempting to focus on content acquisition or the final products of online research, it is imperative that language arts teachers emphasize the inquiry *process* instead. Once students selected their heroes, Karen assessed their prior subject knowledge before they began searching for information. In addition, students engaged in two more scavenger hunts and

reviewed them afterward in order to facilitate practice and reinforcement of efficient keyword strategies.

A simple way to assess students' prior knowledge about their chosen hero was to ask them to draw a subject knowledge bubble map (see Figure 3). This was a useful starting point for the students' inquiry and also alerted Karen if students knew too much or too little about their topics to be successful. As with the other pre-test measures, the subject knowledge bubble map was repeated at the end of the project to measure student progress.

During the scavenger hunts, the primary tool we used for scaffolding students' understanding of keywords was the keyword-category concept map (see Figure 4), which required students to insert keywords into teacher-prepared templates with blank bubbles for topic and focus area. The

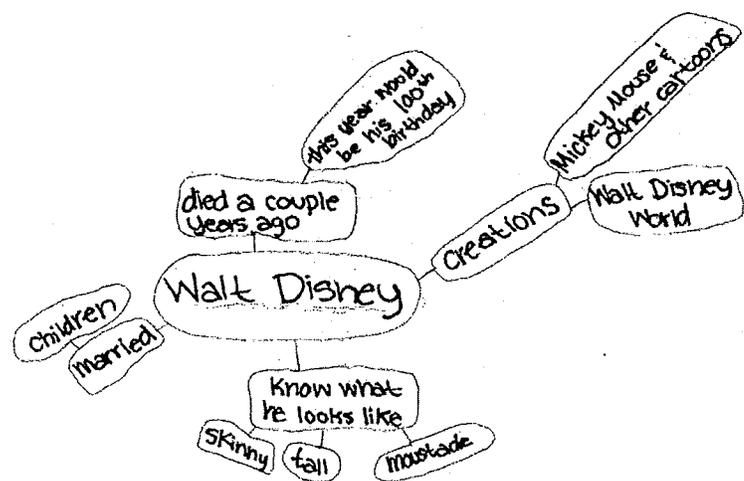**Figure 2.** Partial keyword assessment

Figure 3. Subject knowledge bubble map

Fill in the missing topic and focus bubbles to find your search terms.
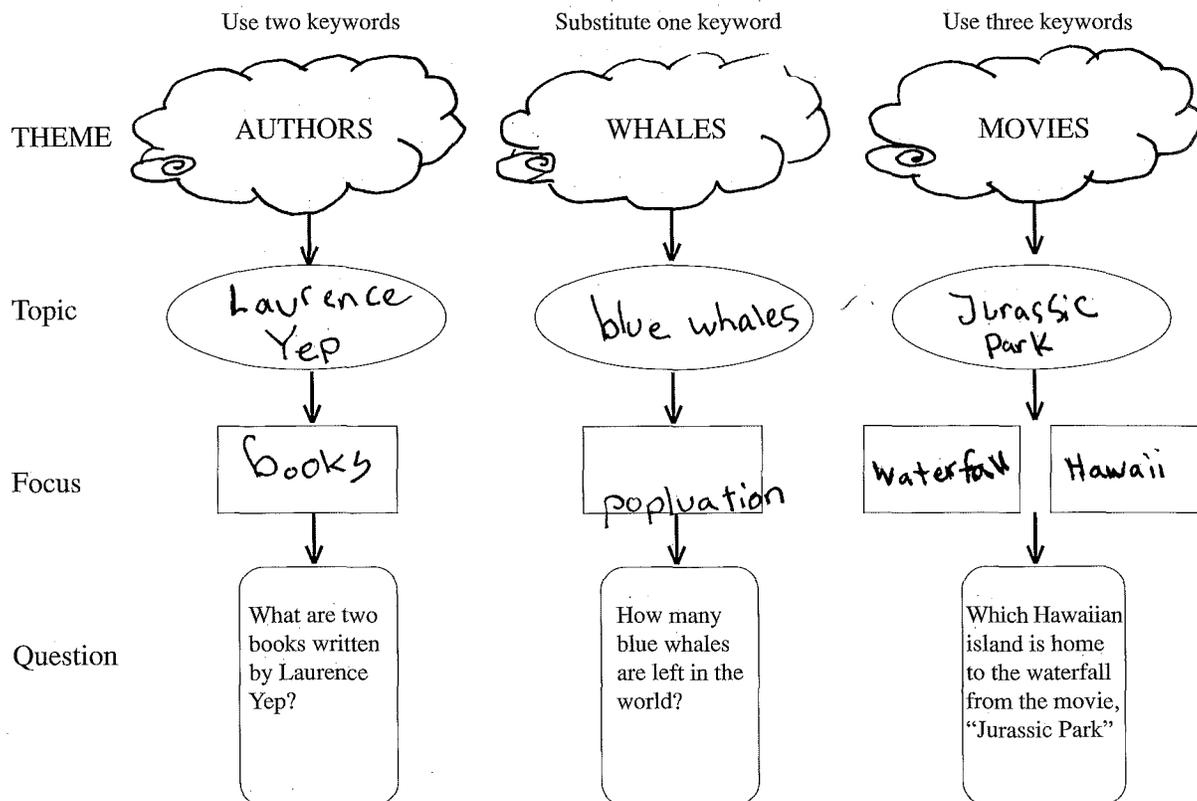

Figure 4. Keyword-category concept map

topic and focus area then became the keywords. In the example above, the student began his scavenger hunt searches with <Laurence Yep + books>, <blue whales + population>, and <Jurassic Park + waterfall + Hawaii>.

The keyword-category concept maps were used for independent as well as guided practice in which the whole group worked with Karen to brainstorm topics and foci for each research question before actually searching the Internet for an answer. Students practiced identifying keywords that were directly stated in the question, keywords that needed to be substituted from the question, and searches that required more than two keywords.

Week 3: Narrowing Topics

Week 3 was devoted to selecting focus areas, conferencing with the teacher, and beginning to

search. It was a good time to address topic, audience, and purpose (TAP) for their final presentations and to direct students' attention to the difference between a scavenger hunt (in which the search is for one fact that can be found on one Web site) and a research project (in which the search involves synthesizing and transforming complex information from multiple sources.

Since it is unrealistic to research everything about a hero in just a few weeks, students selected two areas on which to focus their inquiries (e.g., family life, childhood, career, achievements, personality). Our eighth graders brainstormed as many questions about their hero as they could and wrote them on notecards. Then, they sorted the notecards into piles based on the focus or content area of each question. Finally, they identified two areas of primary interest. A blank keyword-category concept map (see Figure 5) was helpful for

identifying initial keywords for the students' selected focus areas. In Figure 6 the student used the keyword-category map to isolate <"Walt Disney" + career> and <"Walt Disney" + family> as appropriate keywords for starting her Internet research.

In preparation for conferencing with Karen, the students in our study carried out mini-searches on their hero, and then prepared a rough draft of an agenda that they eventually revised and distributed to the class when presenting their research. On the agenda, the students identified two formats that appropriately matched their focus areas (e.g., a slide show on the hero's family life and a timeline of her/his achievements); they also stated why this person was their hero and identified at least three print resources and three Web sites that were potential resources for their inquiry. Once their hero was approved as respectable and researchable, the students were free to begin researching.

Week 4: Searching

During the fourth week of the unit, students engaged in concentrated searching, both on the Internet and in the library. Karen's role was to observe closely and assist where needed, particularly with topic narrowing, research questions, and keyword selection, since these were the primary instructional objectives of the project. However, students also needed help analyzing search engine results, evaluating Web site relevancy and credibility, and documenting sources. In addition, we found notetaking and synthesizing to be particularly difficult for middle school age students, so Karen provided guidance with those tasks as well.

When students felt they had collected enough information, they submitted their notes to Karen for review in order to confirm and ensure progress. At this time, students began collecting images and other artifacts to use in their final formats. Occasionally, students had to select a new hero because they were unable to find adequate information; in
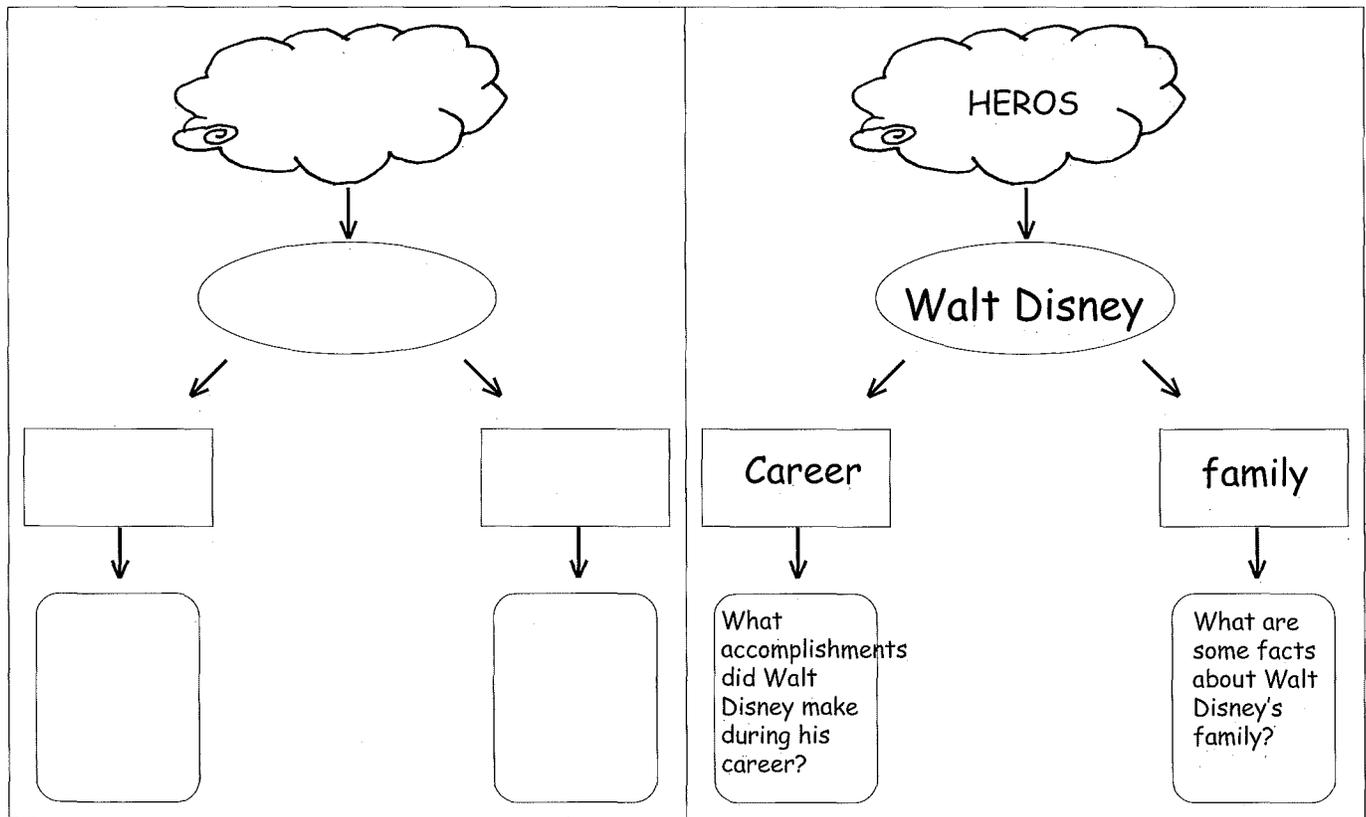

Figure 5. Blank web

Figure 6. Completed hero project map

these cases, they submitted new subject knowledge bubble maps, focus area selection, and draft agendas before having a second conference.

Week 5: Construction

When Karen agreed that students had gathered sufficient information, the students began constructing their final formats. She helped them envision ways to transform the information they had collected into something original, another challenging task for this age group. Karen also reinforced appropriate matches between the focus area and the format used to present what had been learned. The expectations for various formats often needed clarification; for example, pasting magazine pictures on a poster without captions or any obvious organizational scheme did not demonstrate that learning had taken place. Another common pitfall was multimedia productions that contained "bells and whistles" but lacked substantive content. Further, although we expected middle school students to be conscious of plagiarism and be able to avoid it, many students copied and pasted entire Web sites in their final formats. Once formats were finalized, students submitted a final agenda with proper bibliographic documentation and prepared to present what they had learned.

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In hindsight, we wished there had been time for Karen and/or peers to review rough drafts of the formats to ensure synthesis of content matter and demonstration of knowledge. Tricia Armstrong's excellent book, *Information Transformation: Teaching Strategies for Authentic Research, Projects, and Activities* offers additional practical ideas.

Week 6: Presenting

The final week of the project was filled with post-tests and student presentations. We found it wise to have students practice their presentations ahead of time, particularly digital formats that had to be preloaded. Students were asked to introduce their hero with relevant background information, present both formats, and conclude with a statement about why that person was their hero. Despite these instructions, it was surprising how many eighth graders failed to provide adequate background information about their heroes before presenting. As Karen notes:

> A student presented this morning on Jackie Robinson. She had a fabulous *Inspiration* [graphics program] document, which was a bubble map that she used to talk about his family. She had a *PowerPoint* that traced his career, and she had a fabulous skit in two scenes, which showed Jackie Robinson being turned away from a restaurant because of his color. However, in the introduction, she didn't tell the class he was the first African-American baseball player or that this happened before the Civil Rights Act in 1964, so he encountered a lot of discrimination. *I* knew that, but without that prior knowledge, the students had to kind of figure that out as they went through the presentation. So a lot of the impact of her information was lost.

Once students presented their work, they assessed themselves using the grading rubric and submitted it, along with their two formats, for final evaluation.

Conclusion

Searching the Internet for relevant information is a challenging literacy task for anyone, and is particularly difficult for middle school students. It involves choosing topics, setting goals, asking questions, applying search strategies, selecting keywords, analyzing search results, evaluating Web site relevancy, documenting sources, notetaking, synthesizing, transforming, and presenting findings. Fortunately, most students are motivated to learn how to search the Internet more efficiently because they view computers as essential tools for communication and research (Eagleton, 2002). Most of our students enjoyed the activities presented in this article because they focused on strengthening skills for online research, and the hero theme was successful because students were allowed to research a self-selected topic of personal interest. Inquiry-based learning, such as this

hero inquiry project, enables teachers to meet multiple instructional objectives and literacy standards while also integrating technology into the curriculum.

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