

Problem Statement

Will teaching informational literacy skills to sixth grade students have an impact on their ability to determine what is nanotechnology and what effects will nanotechnology have upon the future?

Learner Characteristics

Sixth grade students in the target group are members of the future problem solvers, taught by Nippersink Middle School teacher of the gifted, Belinda Veillon. Students are extremely capable, but have never been taught search strategies or how to evaluate and cite sources from the Internet. Each grading period, these students have a problem-based topic to research, discuss, and present their findings.

Lesson Goal

To locate and use various Internet web sites to learn about nanotechnology and its role in the future.

Objectives

1. Students will be able to locate information about nanotechnology using the Wizard to find pertinent Internet web sites.
2. Students will be able to analyze and evaluate these web sites about nanotechnology.
3. Students will learn how to cite these sources using the Wizard.

Learner Methods and Strategies

1. Teacher lecture and readings from class packets.
2. Librarian and teacher discuss how to search on Internet.
3. Students use computers for searching Internet.
4. Students discuss what worked, what did not work, etc.
5. Students share search history.
6. Teach about evaluating these nanotechnology web sites.
7. Provide time to practice evaluating.
8. Discuss which web sites are the best after evaluating them.

Materials List

1. Teacher packets or handouts about nanotechnology.
2. Computers with Internet access.
3. Handout on recording searches on Internet or record Search Histories.
4. Handouts about searching tips and evaluating tips.
5. Post assessment.
6. Continue with teacher on classroom nanotechnology packet with future implications of nanotechnology.

Bibliography

<http://www.nanozine.com/>

Describes nanotechnology and its potential uses with implications in medicine.

<http://www.howstuffworks.com/nanotechnology.htm>

Has graphics to show how nanotechnology may change manufacturing, health, and every aspect of life in the near future.

<http://www.energy.gov>.

By the Department of Energy, this is a gateway portal with links to information about health, home transportation, schools, business, and the future.

<http://www.nsf.gov/home/crssprgm/nano/start.html> .

<http://www.mrsec.wisc.edu/Edetc/IPSE/Links.html> .

<http://www.sciam.com> .

<http://www.clickit.go2net.com/search2site> .

<http://www.nano.gov/> .

Merkle, Ralph C. *Nanotechnology* in conference proceedings, [commercial]. . Newport Beach, CA: 15-17 November 2002 [cited 29 November 2002]. Available from World Wide Web:

<http://www.zyvex.com/nano/> .

Freitas, Robert A., Jr.. *Nanomedicine* in journal, [organization]. . : October 1999 [cited 19 December 2002]. Available from World Wide Web: www.foresight.org/Nanomedicine/ .

Roco, M. C.. *Search National Nanotechnology Investment in FY2003* in NanoRepublic, [government]. Washington, DC: 3 February 2002 [cited 15 November 2002]. Available from World Wide Web: <http://www.nano.gov/> .

Scientific American, editors. *Understanding Nanotechnology* [book]. . New York, NY: December 2002 [cited 5 December 2002]. Available from World Wide Web: www.amazon.com .

Key Technologies for the 21st Century in Scientific American, [journal]. . : April 1996 [cited 15 November 2002]. Available from World Wide Web: www.clickit.go2net.com/search2site .

Teacher/Librarian's Bibliography

Asimov, Isaac. *Fantastic Voyage* []. reissue. New York, NY: July 1993.

Reissue of 1960's novel will be used with sixth grade future problem-solvers to better understand nanotechnology. Compare and contrast book with movie as an in class project to promote discussion of future of nanotechnology.

Burke, Kay. *The Mindful School: How to Assess Authentic Learning*, [book]. Third. Arlington Heights, IL: 1999. Great resource for teachers and librarians when creating graphic organizers, rubrics, and more.

Crichton, Michael. *Prey*, []. . New York, NY: 2002.

Novelization of problems that may surround nanotechnology in the future.

Key Technologies for the 21st Century in *Scientific American*, [journal]. . : April 1996 [cited 15 November 2002]. Available from World Wide Web: <http://www.clickit.go2net.com/search2site>

Mulhall, Douglas. *Our Molecular Future* in *book*, [book]. . New York, NY: July 2002 [cited 12 November 2002]. Available from World Wide Web: <http://www.ourmolecularfuture.com> .

Roco, M. C.. *Search National Nanotechnology Investment in FY2003* in *NanoRepublic*, [government]. . Washington, DC: 3 February 2002 [cited 15 November 2002]. Available from World Wide Web: <http://nano.gov/> .

Scientific American, editors. *Understanding Nanotechnology* [book]. . New York, NY: December 2002 [cited 5 December 2002]. Available from World Wide Web: www.amazon.com

Assessment

Creation of Rubric for Assessment of Nanotechnology Information Literacy Project

STUDENT'S NAME: _____

RUBRIC FOR ASSESSING NANOTECHNOLOGY INFORMATION LITERACY PROJECT

CRITERIA	0 CAN'T DO IT	1 NEEDS HELP	2 INDEPENDENT
LOCATION			
USES IMSA SEARCH ENGINE			
ACCESS A SPECIFIC WEBSITE			
FIND A NANOTEC- NOLOGY WEBSITE			
USES +, -, AND “ “ TO REFINE SEARCH			
USES SYNONYMS IN QUERY			

CRITERIA	0 CAN'T DO IT	1 NEEDS HELP	2 INDEPENDENT
EVALUATION			
SEARCHES THE INVISIBLE WEB			
CAN USE IMSA'S WEB PAGE EVALUATION FORM OR SOME OTHER FORM			
CAN APPLY EVALUATION TIPS			

CRITERIA	0 CAN'T DO IT	1 NEEDS HELP	2 INDEPENDENT
INTEGRATION			
USES FIND COMMAND TO SEARCH FOR KEY-WORDS			
USES BOOK-MARKS OR FAVORITES			
USES WIZARD TO CREATE CITATIONS			

TOTAL POINTS POSSIBLE= 22

TOTAL POINTS SCORED= _____

Creation of Graphic Organizer in Problem/Solution Boxes about Searching and Evaluating Web sites.

PROBLEM/SOLUTION BOXES

SPECIFIC NANOTECHNOLOGY ISSUE	WEB SITES TO SUPPORT IT

INFORMATION LITERACY INSTRUCTION SUMMARY or KWL:

In your own words, please finish these statements and briefly explain in one or two paragraphs.

- 1. With Mrs. Larson and Mrs. Veillon, I learn how to.....
on the Internet using the IMSA Search Wizard.**

It helped me

- 2. I would like to learn more about**

Here is the form I made to help 6th grade students evaluate web sites:

EVALUATING WEB SITES

Ask yourself these questions when you have found a web site to decide if it is accurate, written by an authority, objective, up-to-date, and can view the information free.

Web site address or URL: _____

Title of the web page: _____

- Who or what organization wrote it? _____
- Is the author an authority on the topic? _____
- Is the publisher of the web site reliable? _____
- Are the pages that link to the author's page reliable? _____
- Is the information about nanotechnology also found in magazines, newspapers, encyclopedias or books? _____
- Are there misspelled words or typos? _____
- When was the web page produced? _____
- When was the web site updated? _____
- Are the links current or up-to-date? _____
- Is the web page objective or biased? _____
- Are the opinions supported in the article? _____
- Who wrote the information and how can you contact the person? Look for an e-mail, address, or phone number? _____

Standards

National Technology Standards:

Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems. (Standards 5 Using Technology Research Tools to locate, evaluate and collect information from a variety of sources...and 6 Using technology resources for problem solving and decision making with real world problems.)

Demonstrate an understanding of concepts, underlying hardware, software, and connectivity, and of practical applications to learning and problem solving. (Standards 1 Use various input devices to operate computers and 6 Using technology resources for problem solving and decision making with real world problems.)

Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems. (Standards 2 Social, ethical, and human issues related to technology; 5 Technology research tools, such as informational literacy skills; and 6 Technology problem-solving and decision-making skills.

Illinois State Learning Standards:

State Goal 11 Understand the process of scientific inquiry and technological design to investigate questions, conduct experiments, and solve problems.

State Goal 13 Understand the relationships among science, technology, and society in historical and contemporary contexts.

Linking For Learning--Information Literacy Standards for Student Learning. Categories I

Information Literacy (Standards 1-3) Category II Independent Learning (Standards 3-6), and Category III Social Responsibility Standards 7-9) all cited on p. 11 Linking For Learning, ISLMA.

District Technology Learning Standards--Equal technology access to all students so that they can become technology literate in an information society. Also as per Nippersink School District Technology Plan.

SUMMARY OF TEACHING RESULTS

Session 1: The sixth grade future problem solvers met in the library. Mrs. Veillon introduced me, since I work at the Richmond Grade School now. I began by informally asking how they searched for information on the Internet. Several students raised their hands and said they liked to use Google or Yahoo to search on the Internet. Some said they go to any browser and type in the word they are searching for in the search area. We brainstormed on the white board about how to search using the Internet and what search engines they were familiar with already. I then asked students if anyone had ever taught them to search and or evaluate information on the Internet. Students responded by saying no. Teacher partner, Belinda Veillon had already told me she thought no one had ever taught these sixth graders how to search and evaluate information on the Internet. Her initial assumption proved to be true.

Previously, students had been working on their future problem solver nanotechnology packets, so they had done some readings, but little searching on the Internet for information. I had prepared a handout about searching tips when using the Internet. I also gave students a chart similar to the one we used in class to record their search histories as they searched. We reviewed terms such as topic, query, search strategies, and comments on the chart. We discussed synonyms to use for nanotechnology, too. I asked if everyone understood how to write down this information, and if they had any questions while searching they could ask Mrs. Veillon or me for help. Next we divided into small groups of eight since there are only eight computers with Internet access in the middle school library. The computer lab was already in use by another class, so it was unavailable. The rest of the students went back to the classroom with Mrs. Veillon, while I instructed the first group to locate information about nanotechnology on the Internet using the Wizard. About 15-20 minute was spent with each group searching for information about nanotechnology on the Internet. Total instruction time was 90 minutes for the first session.

Session 2: We reviewed searching on the Internet for sites about nanotechnology. We used the white board to record synonyms of words used in their searches—nanoscience, nano technology (two words), nano bots, nano medicine, nanobusiness, and nano industry, for example. Some students had been at band missed the earlier session, so this review time was essential. I took these students who had not been instructed in my first group, since we were still in the library, not the lab. Again, we searched for nanotechnology sites. I asked students to write down the best nanotechnology sites they found on the white board. I later wrote these down on paper to give to students as a handout. Additional sites with brief descriptions were already listed in their nanotechnology packets, but some were from 2001 or older.

Students loved the searching and wanted the time to continue searching using the Wizard. They were very responsive to writing down their search histories or how they searched. The searching aspect was an extremely positive experience. We had time for three different groups to search during the second session that was approximately 90 minutes.

Session 3: Gave students a handout about evaluating sites on the Internet. This was the first time we went over evaluation tips. We read and discussed this handout together. Students had time to ask questions. We took a web site from the "Best Sites" handout and had students try to evaluate it. We could not schedule the computer lab, so we had to gain break into smaller groups of eight and evaluate <http://www.zyvex.com>. This was more difficult for the students, so it took at least 20 minutes per group. I realized we were going to have to spend more than one session on evaluation. Some students had many questions, needed lots of help, and found this part more difficult and confusing. I told students they could continue to use the Wizard to finish up their evaluation. We did not get the entire class done with evaluation, so we had to spend more than 90 minutes.

Session 4: We scheduled computer lab to try to get more done by getting all the students on computers together. Before we went to the lab, I handed out a graphic organizer, rubric, and a KWL project. It looked like this would be ideal in the lab, but when we all logged on to the IMSAWizard, many of the students just got the hour glass and the program never actually opened up. The first ten students who got logged into the Wizard were fine, but some students never could use it that session. Students were raising their hands, wondering what to do. Students tried to reboot the system and get into the Wizard, but that did not work in the lab. Instead, I had the ones who could not get into the Wizard work on the graphic organizer, rubric, and KWL handouts while they were waiting. We kept thinking the program would open and they would be able to evaluate. A couple of students were too stressed out to accomplish much after all this. This experience in the lab was disappointing, and students became discouraged. This was the first negative reaction I had gotten from the same students who were so enthusiastic about searching. Luckily, we were able to do away from the computer activities. After 30 minutes, we switched groups, and everyone finally had a chance to try both the search and evaluate aspects.

Session 5: We tried to reschedule the computer lab, but it was already in use by another class. We used the library computers again. This meant we had to divide into groups of eight when we needed to do the evaluate and citation activities. Students worked with their teams for future problem solving doing their graphic organizer, rubric, and KWL handouts. We continued to evaluate and do the citation for <http://www.zyvex.com> in MLA format as Mrs. Veillon said their bibliographies should be done. Students felt that the ten steps of the evaluation were tedious. Some students were on task, while a few other students rushed through the evaluation answering each question Yes or No. I informed them that answering so briefly does not help them use the evaluation tool. One student even commented that he did not like using the Wizard evaluation section. Next we proceeded to the citation section of the Wizard with some success. I conducted the final assessment rubric with half of the class. Belinda Veillon had students work on their nanotechnology packets to send in for scoring and feedback. Belinda Veillon continued the instruction using the Wizard, information literacy, and nanotechnology. She will include the citation section when students are ready to create their bibliographies using MLA format. Also, I suggested they might read a classroom novel about nanotechnology, such as *Fantastic Voyage*

by Isaac Asimov. From this idea, Belinda not only order copies of Fantastic Voyage to read, but will have students compare and contrast the book with the movie in their discussions and readings about nanotechnology.

Belinda Veillon let me do the major instruction of Internet information literacy about nanotechnology. She was very gracious in making me feel at ease with her and the students. Furthermore, she offered wonderful suggestions for creating the rubric for assessment, graphic organizer, and KWL handouts. Theories of education and problem-based learning are her strengths, since she is working on her doctorate in curriculum and instruction. Teachers are constantly partnering with Belinda Veillon she is such a wealth of information while fostering collaboration. I feel I helped Belinda know and understand the Wizard so that she can continue using it with the sixth grade future problem solvers, as well as the seventh and eighth grade teams, as well.

What Worked:

- Students loved the searching component of the Wizard.
- The library setting worked out better than the computer lab.
- Students did well with their search histories.
- Students were more motivated to learn about nanotechnology by teaching Internet Information Literacy Skills.
- Students were engaged learners who used the information they obtained in this class in their nanotechnology future problem solving packets.

Things to Change:

- Try to get the computer lab to be accessible to more than 10 users of the Wizard at a time.
- Teach for at least 7-10 sessions, preferably consecutive day for more continuity.
- Try to team-teach more so that teacher partner can help with computer activities.
- Give a short, written pretest about Internet information literacy at the first session or have teacher partner administer it before I begin instructing for establishing a baseline.
- Perhaps focus mainly on teaching searching strategies with sixth grade students while having Belinda Veillon or teacher partner incorporate all the aspects of the Wizard, such as locate, evaluate, integrate, and citations.
- Take only twelve students to the computer lab per session due to access problems and let teacher partner work on same lesson in library, for example.
- Plan on spending more time on evaluation component, since it seems to be more difficult for students to learn than searching.
- Have teacher partner help me do the assessment, which involves direct observation of student competencies using the Wizard.
- Give students more guided practice time on evaluation section in class.