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ABSTRACT

The interdisciplinary approach to the research process using information technology as implemented for sophomores at Stearns High School in Millinocket (Maine) integrates information skills and technology into biology and English curricula by helping students overcome obstacles encountered in the presearch or planning phase of the research process. After an introductory unit on genetics, each student selects a topic related to his family medical history and disease prevention. Each student uses information technologies to formulate a central research question and then to organize and conduct the search. Seven teachers work with about 100 students during this unit. The library media specialist serves as a facilitator. Because other schools might consider adopting this approach, program goals and outcomes are described, with specific procedures and instructions for program implementation. At Stearns High School, InfoTrac is the electronic magazine index used. The interdisciplinary approach teaches students how to use the research process to develop a plan for a healthy lifestyle as it improves writing skills and teaches the value of information technology. Five handouts complement the discussion. (Contains 2 references.) (SLD)

"AN INTERDISCIPLINARY APPROACH TO TEACHING THE RESEARCH PROCESS USING INFORMATION TECHNOLOGY"

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Project SEED

the Center
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An Interdisciplinary Approach to the Research Process Using Information Technology

What is our role as educators in the Information Age? How do we help our students cope with the proliferation of information and the rapid advances in information technology? As Dr. Samuel Johnson said, "knowledge is of two kinds: we know a subject ourselves, or we know where we can find information upon it." AN INTERDISCIPLINARY APPROACH TO THE RESEARCH PROCESS USING INFORMATION TECHNOLOGY is based on the following premise: along with giving our students a basic command of subject matter, we must also help them acquire the skills needed to process information in each content area. In other words, we must help them become "information literate" by teaching them *how to 1) recognize the need for information and 2) locate, evaluate, and use information to solve problems, make decisions, and enrich their lives.*

AN INTERDISCIPLINARY APPROACH TO THE RESEARCH PROCESS USING INFORMATION TECHNOLOGY integrates information skills and technology into the biology and

English curriculae by helping students overcome obstacles encountered during the *pre-search* or planning phase of the research process. After an introductory unit on genetics, each biology student selects a topic related to an aspect of his/her family's medical history and disease prevention. Working with the biology and English teachers and the library media specialist, each student then uses information technologies to formulate a central research question, identify key words and names relevant to the subject, integrate concepts, and develop questions to organize the search. By integrating research skills with the study of biology and English, students receive the reinforcement needed to succeed as researchers and writers.

Participants

Since all 10th graders must take biology and English, the sophomore curriculum at Stearns High School lends itself to a interdisciplinary information skills project . A total of seven teachers work with approximately one hundred students during this unit. To avoid the problems that might develop from coordinating so many students and teachers, the library media specialist serves as a facilitator. She organizes activities and maintains open lines of communication among English and biology teachers.

Although both biology and English classes are tracked, *students from all academic backgrounds must learn how to use information to solve problems, make decisions, and enrich their lives.* Thus, we have the same expectations for all students, regardless of placement. When necessary, special education students receive assistance from their resource room teacher and/or teacher aide. Students needing extra help who do not qualify for the special education program receive one-on -one assistance from one of the classroom teachers or the library media specialist.

Library Media Specialist Marilyn Joyce, English Department Chairman Robert Tinkham, and biology teacher David Trainor began this project three years ago. By working as a team, they feel they create a better learning environment for students. Moreover, the ability to solve problems as a team and share insights about the research process has enhanced their teaching.

Who Might Consider Adapting the Program

Teachers and library media specialists interested in integrating research skills and information technology into their curriculum should consider adapting this program. The activities for the project are appropriate

for students in grades seven through twelve and can be easily adapted for interdisciplinary units in other content areas.

Program Goals

Our goals address student needs in terms of content and process. Through the biology component, students use information to anticipate health problems inherent in their family's medical history and develop a plan of action for creating a healthy lifestyle and preventing disease. Through the English component, they learn to write research papers and access and manipulate information using CD-ROM databases. Through the information skills component, they develop the strategies needed to implement the research process, a process which be transferred to other resource-based assignments.

Outcomes

Through our three years of experience teaching AN INTERDISCIPLINARY APPROACH TO THE RESEARCH PROCESS USING INFORMATION TECHNOLOGY, we have observed changes in our students' attitudes towards their health and research. They have developed a positive attitude toward disease prevention and an

interest in exploring current information on scientific topics--even after completing the project. As juniors and seniors, they are no longer apprehensive about long -range research assignments because they know if they follow the research process, they will successfully complete their task. And their teachers are delighted with the improved content and organization of research papers, which results from the use of the research process. Finally, students have an increased interest in and value of information technology.

Procedures and Instructions

While the process used to plan and implement this unit will vary depending upon your subject matter and goals, we want to share our procedure with you.

1) Several weeks before beginning the unit, biology and English teachers meet with the library media specialist to plan the unit. Using the research process outlined in the *Information Skills Guide for Maine Educators* (see bibliography) as our guide, we formulate goals and plan appropriate student activities. Finally we establish a timeline for the project.

While this planning is important, we also recognize the importance of flexibility. Goals, activities, and the

timeline can be revised as the need arises.

2) After an introductory unit on genetics, each biology student is assigned a three to five page research paper on a topic related to some aspect of his/her family's medical history and disease prevention. Working with biology teachers and the library media specialist, students first learn how to select and narrow topics by brainstorming and exploring potential topics on InfoTrac, an automated reference system stored on a compact disc that provides bibliographic references for magazines. They also learn how to print and download information from the computer database.

3) The remainder of the pre-search stage of the assignment is completed in English classes. Students work with English teachers and the library media specialist to complete pre-notetaking charts asking students to identify what they know, don't know, and want to know about their topics. They also begin to develop a preliminary list of sources. Once the pre-notetaking sheet is completed, they employ webbing diagrams and formal outlines to organize the information obtained through their exploration of InfoTrac's index, abstracts, and selected full-text articles. Finally, they generate the questions that will guide their research.

4) Biology teachers also check pre-notetaking sheets for content and conference with students about sources.

5) The completion of the pre-search stage marks the end of the formal collaboration among biology and English teachers. The English teachers, with the assistance of the library media specialist, complete the remainder of the traditional research paper. This includes notetaking, organizing notecards, writing the rough draft, revising, and footnoting. Biology teachers hold "workshop" days so that students can share their progress with classmates and discuss their research. Students also participate in writing groups in English classes which gives them the opportunity to share their writing with other students and receive helpful feedback from their peers.

6) Finally, student progress is assessed and papers evaluated in several ways. Steps in the pre-search process are graded on a pass-fail basis. Students who have successfully accomplished an activity can move to the next stage in the process. Those who still need help receive assistance from the appropriate teacher or the library media specialist. By intervening at each stage of the process, the chances of creating a quality final product improves dramatically. The final paper is given

a formal grade by both the biology and English teachers.

Two key points remain. Throughout all of the above stages, *the library media center is a laboratory where students gain hands-on experience in the process, and teachers and the library media specialist become facilitators.* Moreover, *the library media specialist also takes on part of the teaching responsibility.* For example, in our process the library media specialist goes into the biology classroom to teach a lesson on how to use indexes and table of contents to create research questions. She also does mini-lessons on how to conduct an efficient search on InfoTrac in the English classroom.

Sound confusing? Remember, you do not have to incorporate every step of our process into your plan. You might simply want to use some of our activities and models. Give us a call at Stearns High School at (207) 723-6430 and ask for our activities packet. It includes pre-notetaking charts, instructions for writing research questions, and model student pre-notetaking charts, webbing diagrams, and final papers.

Duration

During our first year, the project required two

organizational meetings, one several weeks before the project and one in the middle of the process. In susequent years we found most problems could be resolved by having the library media specialist serve as a liaison among the teachers. Thus, concerns can be addressed without having to schedule formal meetings. As for the student activities the pre-search stage usually requires a two to three week period. An additional three to four weeks is needed to complete the research paper.

Resources

Materials and Facilities

Although a similar project could be initiated without InfoTrac, the presence of information technology enhances the research process. Our TOM version of InfoTrac runs on an IBM PS/2 with CD-ROM drive. In addition, we subscribe to a basic microfiche package of magazines containing articles indexed on InfoTrac. For those who do not already subscribe to InfoTrac or another electronic magazine index, the yearly subscription might at first seem costly. Nevertheless, School Consultants Walter Taranko and Dorothy Gregory, Maine State Library, regularly recommend InfoTrac and its accompanying microfiche as a cost-effective method of increasing a school library's periodical collection. Since the subscriber receives a new, updated disk each

month, information remains current. Finally, because InfoTrac indexes a variety of magazines covering science, health, current events, and history, its materials will support a number of diverse resource -based projects.

Outside Materials

Also integral to our project is the research process described in Maine Educational Media Association's *Information Skills Guide for Maine Educators*. Copies of the guide may be purchased for $2.00 by calling the Maine State Library Media Services at (207) 289-5620. Permission to copy the contents of this guide is not only granted, but it is also encouraged.

Project Cost

A new subscription to the TOM version of InfoTrac on CD-ROM costs $1,445.00 although a discount price is sometimes available for libraries with standing orders. The basic microfiche package costs $550.

Conclusion

AN INTERDISCIPLINARY APPROACH TO TEACHING THE RESEARCH PROCESS USING INFORMATION TECHNOLOGY integrates information skills and technology into the biology and English curriculae. It teaches students how to use the research process to develop a plan of action

for developing a healthy lifestyle, as well as improves their writing skills and teaches them the value of information technology.

In addition, this project illustrates the evolving role of the school library media center and the library media specialist. In the past, librarians taught students how to *locate* information in the print materials housed in the school library. Today the library media specialist forms partnerships with teachers. As a team, they guide students through the process which helps students use information to solve problems and make decisions. Using the library media center as an "information laboratory" also changes its atmosphere. When students use the library media center for hands-on activities related to their classroom studies, the library media center becomes more than just a place to store books or "hang-out" during study halls. It is a vital extension of the classroom.

Bibliography

Information Power: Guidelines for School Library Media Programs. AASL/AECT. Chicago: American Library Association, 1988.

Information Skills Guide for Maine Educators. Maine Educational Media Association. Augusta, ME: Maine State Library Media Services, 1990.

PRESEARCH PROCESS

1. Select a topic.

2. Formulate a central research question. The question should have a specific focus.

   How can people protect themselves from Lyme disease?
   How is DNA "fingerprinting" being used to solve crimes?
   Should pregnant women who abuse drugs be sent to jail?
   What are the most common myths about bats?
   How do dolphins communicate with each other and humans?

3. Identify key words and names relevant to the subject. These are the terms used for locating sources and information in indexes.

4. Develop questions to organize the search by skimming indexes, table of contents, and abstracts and by surveying magazine articles.

5. Integrate concepts by creating a formal outline and/or webbing diagram.

Name:

Pr -notetaking Sheet

Topic:

What I Know	What I Don't Know	What I Want to Answer in my Research

Sources: Record all print and nonprint materials used during the pre-search stage. Place a check next to the items which best answer your research questions.

_____ 1.

_____ 2.

_____ 3.

_____ 4.

_____ 5.

_____ 6.

_____ 7.

_____ 8.

_____ 9.

_____ 10.

Approved by: _____

Name: Nikki Legere, Grade 10

Pre-notetaking Sheet

Topic: Downs Syndrome

What I Know	What I Don't Know	What I Want to Answer in my Research
1. One of my friends, Kenny B. has Downs. I know it doesn't mean he lacks certain abilities. 2. Kenny has shown me that he is very active and able to do many things you wouldn't expect him to do. 3. Some people with Downs are very capable, like Chris Burke, the TV actor in "Life Goes On." 4. Human chromosome 21 has something to do with this disorder. It has to do with genetics.	1. What are the causes? 2. When do you find out a child has Downs? How do doctors diagnose it? 3. How do doctors care and treat people with this syndrome? 4. What role does genetics play in this syndrome? 5. What are some of the complications and risk factors? 6. How does having Downs effect your personality? 7. Can students with Downs take classes with "normal" students? What is "normal"? 8. To what extent can people with Downs live normal lives? Work? Live alone? Have children? Raise a family? 9. Do people with Downs get embarrassed by it? 10. How do people react to those with Downs? How do people with Downs react to others?	1. Can people with Downs Syndrome live "normal" lives--live alone, work, marry, have children? 2. Should children with this disorder be in the same classroom with "normal" children? What is "normal"? 3. How does having Downs Syndrome effect your personality? 4. How are people with Downs treated by other people?

How to Write Research Questions

1. Use key words and names found in indexes to create questions to guide your research. Combine these words with who? what? when? where? why? and how?

Below is a partial listing of key words found under "cystic fibrosis" in the TOM version of Info Trac:

CYSTIC FIBROSIS
- -bibliographies
- -care and treatment
- -case studies
- -cases
- -diagnosis
- -genetics

SAMPLE QUESTIONS based on key words from index:

1. How do doctors treat cystic fibrosis?
2. What is the genetic background of the disease?
3. What is the cause? When is it first diagnosed?
4. How do doctors diagnose cystic fibrosis?
5. What happens to people with cystic fibrosis? What can be learned from case studies?
6. What bibliographies are available on the subject?

2. Survey newspaper and magazine articles and create questions from headlines, items in bold type or italics, information in the introductory paragraph, illustrations, charts, graphs, photographs, and the concluding paragraph.

New York Times, Wednesday, January 6, 1993:

NEW FOSSILS POINT TO EARLY DINOSAUR

Remains of Dog-Sized Reptile to Shed Light on Ancestor of Giant Creatures

by Warren E. Leary

Washington, Jan. 6 -- Scientists said today that they discovered the 225 million-year-old remains of the world's most primitive dinosaur, a dog-sized creature that they said would shed new light on the dinosaurs' early family tree?

SAMPLE QUESTIONS:

1. What do new fossils tell scientists?
2. How large were the fossils?
3. Who made the discovery?
4. When and where was the discovery made?
5. Why are these findings important?
6. How old are the fossils?

Preliminary Webbing Diagram: My mother has adult-onset diabetes. How can I help her stay on her diet?