Chapter Seven:

Hypermedia and Multimedia

The printed page has reigned supreme as the medium of choice for academic publishing for several centuries. Traditionally, a dissertation or thesis was typed, printed, bound, and stored on the researcher's university library shelf. As the technology for photography developed, the text of the document was preserved on microfilm in a central scholarly publication database. That research text was made available to fellow researchers and university scholars upon request. As personal computers became more accessible, word processing software was used to type the document and the text was saved digitally on floppy disk. As standardized cross-platform publishing formats were developed, the concept of digital libraries became a real possibility. With the development of HyperText Markup Language (HTML), a student author could incorporate multimedia elements: sound, graphics, video, animation, and interactivity.

The digital revolution of the late 20th century stimulated dramatic change in the potential for libraries and universities to store and distribute data. McClintock (1999) compared the print culture traditionally supported in education with the possibilities of digital learning communities in "The Educators Manifesto." He described a new possibilities as a result of high-speed wide-area networks, linking people through ubiquitous computers to copious digital libraries, transforming the cultural conditions under which educational interactions take place." McClintock stated that, historically, the technologies of printing were of extraordinary importance in helping educators as they formed and spread ideas and ideals. However, he believed that "digital libraries, multimedia, and augmented skills have changed the limits of educational practice" (1999).

In addition, McClintock believed that ways of knowing are greatly expanded because of the "new media." He stated that "multimedia, and its extension in virtual reality, is not merely a glitzy vehicle for edutainment hype. It is an epistemologically interesting development in our culture." McClintock discussed the fact that the work of thinking has been related to "how people manipulate their spoken and written languages." He believed that multimedia allowed thinking to take place through many forms: "verbal, visual, auditory, kinetic, and blends of all and each." He stated that the new media was becoming more suitable for "serious intellectual work" (1999).

In his paper concerning the shift from "flatland to the e-document," Hinman (1999) stated that the "paradigm for authoring is changing." He claimed that the paper is one-dimensional, black-and-white, static, and flat in comparison to the dynamic multidimensional, interactive, rich-in-multimedia world. Hinman discussed the concept of "authoring" in comparison to "merely putting words on paper." He stated that

multimedia authoring required new skills and access to new multimedia materials: graphics, sounds, audio, and video. Hinman discussed the fact that multimedia contains branching and loop-back possibilities and allows for varied and adjustable durations and sequences of events. Giving the reader (or viewer) choices in a branching or web-like presentation further has challenged the traditional structure of the thesis or dissertation. The sequential linear flow of the text, as well as the typical chapter format expected in scholarly writing, may not be evident, nor considered crucial to a new media presentation of the data. (http://www1.chapman.edu/soe/faculty/piper/casestudy.htm)

Why use Multimedia?

"The combination of creativity and complexity required to author hypermedia in a form that is intrinsically motivating to students (multimedia) makes it probably the most compelling and potentially effective of all Mindtools. The richness of representational forms available in multimedia knowledge bases is greater than in all other Mindtools. Future research will very probably documents the effects of designing with multimedia, rather than learning from it."

From Learners as Designers - "Mind Tools" by David Jonassen - School of Information Science and Learning Technologies of University of Missouri

Technology as Cognitive Tools - Learners as Designers

Electronic portfolios provide teachers with an opportunity to engage the student more completely in the process of self assessment. Selecting evidence of achievement in the multi-dimensional format of multimedia goes beyond the "flat" page of a written document or a percentile ranking on a standardized test.

- Home Page - http://tiger.coe.missouri.edu/~jonassen/
- Key Points from Jonassen's Position Paper: Technology as Cognitive Tools - Learners as Designers - http://it.coe.uga.edu/itforum/paper1/paper1.html
    - **Designers as Learners** - "The people who learn the most from the design and development of instructional materials are the designers."
    - **Learners as Designers** - "Students learn and retain the most from what Salomon calls "mindful" engagement. Some of our best thinking results when students try to represent what they know."
    - **Learners as Thinkers** - "Cognitive tools and environments activate cognitive learning strategies and critical thinking. Knowledge acquisition and integration, according to these definitions, is a constructive process, so when using cognitive tools, learners engage in knowledge construction rather than knowledge reproduction. Cognitive tools actively engage learners in creation of knowledge that reflects their comprehension and conception of the information rather than focusing on the presentation of objective knowledge. They are learner controlled, not teacher or technology-driven."

- **Knowledge Construction, Not Reproduction** - "How we construct knowledge depends upon what the learner already knows which depends on the kinds of experiences that the learner has had, how the learner has organized those experiences into knowledge structures, and the learner's beliefs that are used to interpret objects and events that s/he encounters in the world. Cognitive tools are tools for helping learners to organize and represent what they know. Constructivist models of instruction strive to create environments where learners actively participate in the environment in ways that are intended to help them construct their own knowledge, rather than having the teacher interpret the world and insure that students understand the world as they have told them. In constructivist environments, like cognitive tools, learners are actively engaged in interpreting the external world and reflecting on their interpretations. This is not "active" in the sense that learners actively listen and then mirror the one correct view of reality, but rather "active" in the sense that learners must participate and interact with the surrounding environment in order to create their own view of the subject."
- **Reflective Thinking** - "Reflective thought is the careful, deliberate kind of thinking that helps us make sense out of what we have experienced and what we know. It usually requires external support, such as books, computers, or other people. Computers support reflective thinking when they enable users to compose new knowledge by adding new representations, modifying old ones, and comparing the two."
- **Learning WITH technology** - "When students work WITH computer technology, instead of being controlled by it, they enhance the capabilities of the computer, and the computer enhances their thinking and learning."
- **(Un)Intelligent Tools** - "Cognitive tools are unintelligent tools, relying on the learner to provide the intelligence, not the computer. This means that planning, decision-making, and self-regulation of learning are the responsibility of the learner, not the computer. However, computer systems can serve as powerful catalysts for facilitating these skills assuming they are used in ways that promote reflection, discussion, and problem solving."
- **Distributing Cognitive Processing** - "Cognitive technologies are tools that may be provided by any medium and that help learners transcend the limitations of their minds, such as memory, thinking, or problem solving limitations (Pea, 1985). The most pervasive cognitive technology is language. Imagine trying to learn a complex process without the use of language. Language amplifies the thinking of the learner. Computers may also function as cognitive technologies for amplifying and reorganizing the way that learners think. When learners use computers as partners, they off-load some of the unproductive memorizing tasks to the computer, allowing the learner to think more productively."

Papert writes: "In many schools today, the phrase `computer-aided instruction´ means making the computer teach the child. One might say the computer is being used to program the child. In my vision, the child programs the computer ..." That is what the Turtle project is about. In hypermedia the child is more free in its relation to the computer. It is not like the child is programmed by the computer. When a child learns e.g. maths by a linear computer-program it is much like that the child is programmed by the computer. But that is not the case with hypermedia."

Seymour Papert - Creator of Logo - "Programming the child or the child programming" from: www.mc.hik.se/~mia96luj/hypermedia/hyper2.html (Site no longer available)

What is multimedia? What is the role of the teacher? What are the advantages?

More on Mind Tools - by JoAnne Davies of University of Alberta

- Index - http://www.quasar.ualberta.ca/edpy485/mmedia/index.htm
- Technology in Education Menu - http://www.quasar.ualberta.ca/edpy485/edtech/index.htm
- Mind Tools Menu - http://www.quasar.ualberta.ca/edpy485/edtech/mindtool.htm

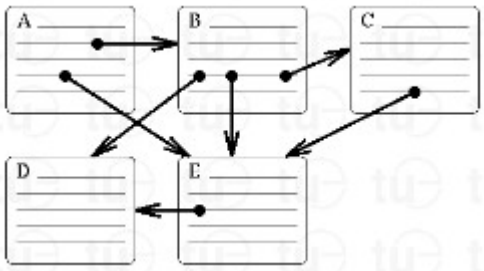
- Definition for multimedia, hypertext, and hypermedia.
  - Multimedia is the integration of media such as text, graphics, animation, sound, and video.
  - Hypertext is a nonsequential, nonlinear method for displaying text and has the following features:
    - nodes or chunks of information
    - links between nodes
    - organizational structure that describes network of ideas
    - dynamic user control
    - multi-user access
  - Hypermedia is the union of multimedia and hypertext.
- The thinking skills used by students when developing a hypermedia presentation.
  - Project Management Skills: create timeline, allocate resources, assign roles

    - Research Skills: determine problem, organize the research, search for information, develop new information, analyze and interpret information
    - Organization and Representation Skills: segment and sequence information, decide how to represent it
    - Presentation Skills: implement ideas in multimedia, maintain audience interest
    - Reflection Skills: evaluate the process / product, revise using feedback
- Role of the Teacher
    - Less directive
    - Prompting and Provoking with Questions
    - Coach student in following processes:
        - Planning: goal, content, interface design, collaboration
        - Transform information into knowledge: search, select, interpret, allocate to nodes, decide on medium, create links
        - Evaluate the knowledge base: assess, information coverage, test browser, solicit feedback
        - Revise the knowledge according to feedback: correct content errors, reorganize and restructure to make the knowledge more accessible or meaningful.
- Advantages of Hypermedia
    - The learner is more mentally engaged by developing materials than studying them
    - Permits concrete representation of abstract ideas
    - Enables multiple representations of ideas
    - Students are actively engaged in creating representations of their own understanding by using their own modes of expression
    - Students are highly motivated due to pride of ownership in the product
    - Orients teachers and students away from "knowledge is inforamtion" and "teacher's role is to transmit knowledge."
    - Promotes development of critical theories of knowledge
- Teaching and Learning with Technology Professional Development Pages - http://www.tlt.ab.ca/index.html
    - Hyperstudio Tutorials: http://www.quasar.ualberta.ca/edpy202/tutorial/hstudio/hstut1/HStut1.html and click at the bottom of page to move through all four tutorials.

Hypermedia and Multimedia have become more important today because of the World Wide Web.

- The World Wide Web
- Powerpoint
- Hyperstudio
- Online Course Designers
- Other Authoring Programs - Flash, Macromedia, Authorware, Viewlets, etc.
- Online Books - Hypertext
- Online Publishing

HYPERTEXT



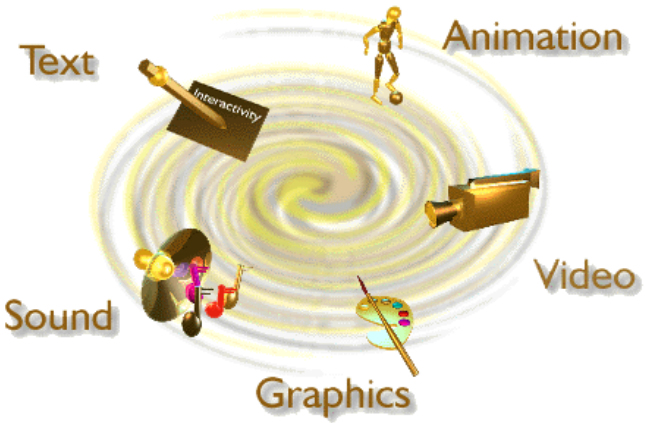
- Example of set of hypertext documents
- Same principles of instructional design apply
- Connections are made demonstrating interrelationship of various documents
- Basis of the World Wide Web and Hypermedia
- Makes traditional linear document seem "flat" in comparison.
- Can be very confusing to people who prefer the linear step-by-step approach to learning. (I feel this is why some people do not care for the web. They may prefer a more logical time sequence based on beginning at one point and moving through to the end and may be distracted with hyperlinks that take them off in too many different directions).

Are there school districts that promote the use of hypermedia with students?

The Ellensburg District in Washington State ("Wonders") provides "A Guide to Multimedia in Education" (http://wonders.eburg.wednet.edu/Topics/GMMIE/default.htm). Although this website is aimed at web multimedia, the same elements are a part of Hyperstudio and Powerpoint. The Grand Tour on this website discusses five types of media: text, animation, sound, graphics, and video. This site provides an overall introduction into the changes that are taking place in education with the emphasis on production, rather than consumption. (http://wonders.eburg.wednet.edu/Topics/GMMIE/issuesEd.htm). The "Trip through the History (and Curriculum) of Microcomputer Madness" (http://wonders.eburg.wednet.edu/Topics/GMMIE/shortHist1.htm) takes you from the 70's "golden age of no" through the 80's "promises unfulfilled." The late 80's are described as "consumption to production" and the 90's as the "information flow." The author defines today as "information flow in both directions." In other words, we (and out students) can find interactive information as we research, but we can also

produce interactive information as we publish. When you get to the end of that page - click on play with it, adding the lines to view the interconnectivity in the graphic.

"Consumption is by far the easiest route to take. With the proper computer and a small collection of CD-ROMs you can be on your way. Add to that a connection to the Internet and it may appear that magic is happening. Ready-made multimedia can be used to augment almost any area of the curriculum. It simply adds one more source to a reference library; it is one more tool in the kit. All of the multimedia formats available: text, sound, video, animation and graphics, already exist in one form or another in most libraries. A well written multimedia title simply allows more student control over the content they are viewing. Students can explore an almost infinite variety of information. All these explorations can certainly lead to new discoveries, but unless consumption is followed by production, the story ends. Without a chance to use their new discoveries and demonstrate what they have learned, the knowledge gained soon becomes the knowledge forgotten. Yet to be truly effective, production methods must change."



Non-Linear Production Model

Professor's Note

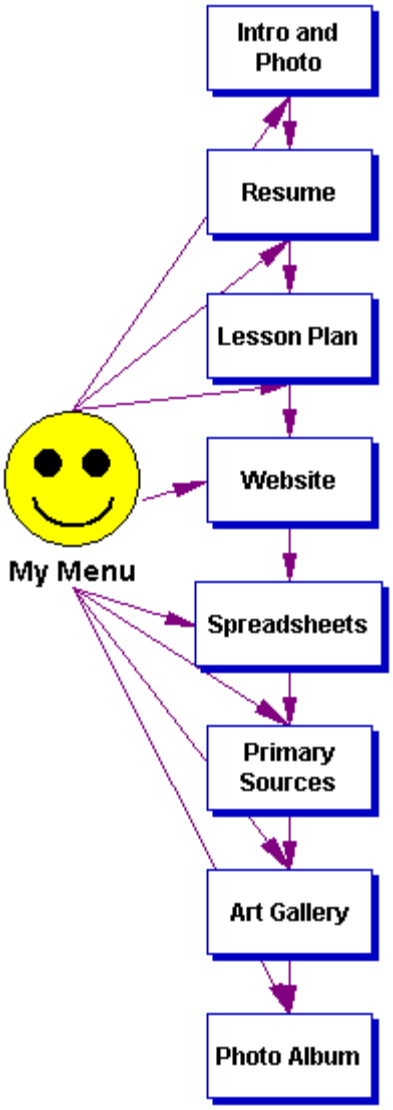
I have included a discussion of Hyperstudio software because of my experience with my Title I students. These students were often unmotivated to work in a traditional teacher-centered classroom environment. Allowing students to create Hyperstudio stacks on curriculum topics aligned with frameworks and standards resulted in a student-centered and engaging learning environment. Project-based learning motivated students to be very creative as they explored, tapped into their prior knowledge, developed new knowledge and skills, solved problems, and collaborated with their peers. Students put hours into their projects, laboriously perfecting every word, graphic, link, and multimedia effect. Their final products were a source of pride for them and their parents.

We documented all projects, along with live video-taping and Powerpoint presentations, on a VHS tape as a video portfolio that they were able to take home at the end of the year. On a personal note: I feel that these students would not have achieved as well as they did in the skill/drill remediation approach currently so popular. In tracking test scores, the majority of my Title I students were no longer in Title I since their test scores had risen above the 25% and below requirement for eligibility. Several Title I students actually tested as gifted in the following year. Of course, to be fair in my analysis, most of the students were English Language Learners. Thus - their language skills were improving at a rapid rate due to many interventions beyond Title one, as well as becoming more comfortable with the language.

Applications for Multimedia Authoring

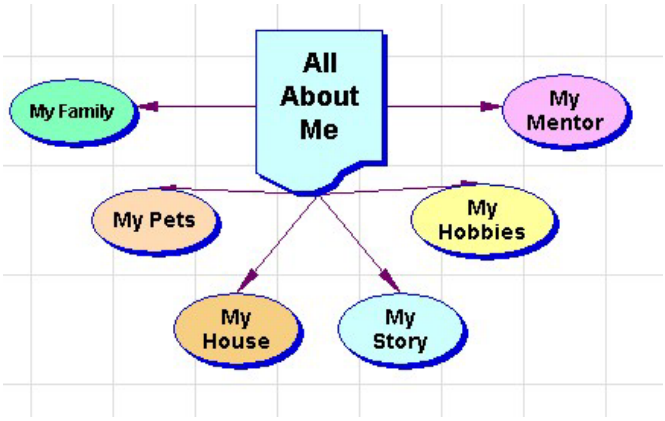
- Hyperstudio
- Powerpoint
- Web Authoring

Multimedia projects and electronic portfolios can be created using a variety of software applications. Although this book will focus on the use of Powerpoint, Hyperstudio is another effective way to create student portfolios. With the ease of web authoring, creating website portfolios has become very popular as well. Your first step will be to determine how you want your portfolio organized. What is the purpose of your portfolio assessment? You may wish to start with a graphic organizer. The technology portfolio graphic organizers below are made in Inspiration.



My Menu in Inspiration

Creating Your Technology Portfolio with Hyperstudio



Example of a Hyperstudio Portfolio Menu

Hyperstudio

Hyperstudio is another program that I recommend as an effective multimedia authoring software for students. It is particularly useful in terms of literacy because you can include text boxes with almost unlimited space for typing and importing from a word processor. I am not requiring that you purchase this program, but student pricing is available. See

the Hyperstudio tutorial in the Unit Six course documents folder for more information. Sunburst Knowledge Adventure refers to Hyperstudio as "a powerful multimedia tool that increases student achievement." I would agree with Sunburst that Hyperstudio provides a tool for the following:

- Problem-solving and creative-thinking and it appeals to a wide variety of student interests and learning styles
- Reinforcement of student development in project-based education
- Meeting ISTE's National Education Standards for developing skills and concepts:
    - Develop creative problem-solving and critical-thinking skills
    - Learn to collaborate and develop team-building skills
    - Research, organize, and present information
    - Use of technology and productivity tools
    - Communicate effectively
    - Develop visualization skills