



Building Digital Skills: Helping Students Learn and Communicate with Technology

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Contents

Digital Skills: Trends and Needs	1
Academic Integration	3
Digital Narrative Project for Macromedia Flash MX 2004	3
Town Website Project for Macromedia Dreamweaver MX 2004	4
Multimedia Projects for Macromedia Flash MX 2004 and Dreamweaver MX 2004	4
Career Skills.....	7
Digital Design Curriculum Guide: Foundations of Web Design	7
Tools Skills.....	10
Studio MX 2004 Step-by-Step.....	10
Conclusion	12
Curriculum Appendix.....	13
Bibliography.....	14

The need to prepare students to function and excel in a digital world combined with the need to meet national and state technology standards requires a change in the way many courses are taught. When schools effectively integrate web technology into their courses, they enable students to demonstrate knowledge, develop essential communication skills, and build foundations for their careers.

Digital Skills: Trends and Needs

We use technology every day of our lives: Communication via email, information acquisition on the Internet, and file sharing and exchanging (i.e. photos, documents, movies, etc.). Regular tasks as well as tasks related to specific job functions require digital proficiency or literacy. Digital literacy can be defined as "...the ability to use digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society" (Lemke, 2003). Technology changes the way we communicate and process information. The need for students to build digital skills is increasingly more important in an age where technology and its uses are becoming more sophisticated and widespread.

The first web and multimedia projects arrived in schools because students were clamoring for the newest technology. Early enthusiasts were typically high achievers from homes with computers and computer-literate parents. Today, most occupations use technology, so all students should be introduced to basic information technology (IT) skills. Matriculating students need a combination of basic and job specific technical skills.

Organizations at the local, state, and national levels recognize and support this need for digital literacy. They have identified technology skill standards in the areas of basic digital skills and career technical skills. The International Society for Technology Education (ISTE) identifies general standards for all students to learn:

- Basic operations and concepts
- Social, ethical, and human issues
- Technology productivity tools
- Technology communication tools
- Technology research tools
- Technology problem solving and decision-making tools

These standards describe the basic digital literacy that students can achieve when schools support teachers teaching technology skills and technology integration into academic subjects.

For students who strive to enter a technical job field, standards identified by the National Workforce for Emerging Technology (NWCET) describe job specific or career technical skills. Many states have produced their own standards based on these national standards, such as Michigan's technology content standards. Career and Technical Education (CTE) programs support the reality of the workplace. Since technology changes rapidly, future employees who can rapidly adapt and who can communicate and work effectively with others will be employable. CTE courses are an excellent venue to teach these skills in real-world situations. And if they do, the course content by its very nature will build crucial academic skills.

Accountability and the need to prepare students to function in a growing technical age greatly impact present and future course content, teaching and outcomes.

In addition to external forces for including and integrating technology education, there have been many studies showing the importance of technology to improve and enhance learning. Researchers assert, "... new information and communications technologies (ICT) can bring exciting curricula based on real-world problems into the classroom, and provide scaffolds and tools to enhance learning. The interactivity of technologies is cited as a key feature that enables students to receive feedback on their performance, test and reflect on their ideas, and revise their understanding" (Kozma, 2003). Technology integrated with methods for communicating knowledge can enhance and stimulate learning. For example, at Mt. Diablo High school, are assigned to build interactive modules about the solar system that elementary school children can use as a learning tool. These modules communicate student knowledge and are structured to clearly convey information to a particular audience. Throughout the process of designing and building these modules, students must test and incorporate feedback on the educational value of the module. With the use of technology, knowledge can be captured, formalized, structured and delivered by students in new ways:

- Hyper-linked, not just hierarchical
- Multi-dimensional, not just linear
- Constructed, not just displayed
- Held graphically, aurally and as video, not just as text
- Supporting dynamic interactions with the audience, not just static
- With powerful search engines, not just indexes

Students can structure knowledge in new ways and this enables them to think, interact, and communicate differently. The most powerful knowledge communications capitalize on using the most effective medium. Technology enables students to create multimedia communications: Posters, presentations, edited videos and web pages. It also enables students to have a wider audience, to think and express themselves visually and aurally, and to communicate their learning. Technology can motivate students and help prepare them for jobs.

As technology plays a larger role in our everyday lives, three main areas of need emerge: A greater need for regular users to know basic web skills, a greater demand for professional designers and developers, and a greater need to have in-depth, specific knowledge of particular technology tools. Education can begin to meet these needs in several ways:

- Integrating technology into academic courses
- Offering courses that build technical career skills
- Teaching the tools professionals use

Academic Integration

In the past, knowledge has been captured, formalized and structured through text. The organizational structures for knowledge that best suit text have become dominant: Book, chapters, and indexes. For students, their knowledge construction and understanding has been best understood through text based means: Papers, tests, and quizzes.

In the relatively recent past it has become practicable and affordable to incorporate pictures and diagrams in books. However, it has been difficult and time-consuming for students to use more than simple diagrams in their work to communicate their understanding of knowledge.

Mediums and methods to communicate have evolved from mainly word processors built around the hierarchical structures of text to hyperstacks and databases, built around nonlinear access to text, to rich media and multimedia, built around linear and non linear access to text, audio, imagery, and video. With the advent of the web, these previous forms of communication can be integrated to construct, organize, share, and express knowledge. The following are three curricula where technology helps students construct and express their knowledge within an academic context.

Digital Narrative Project for Macromedia Flash MX 2004

In the Digital Narrative project, students build an online narrative presentation. They gather information about the topic of the digital narrative and produce design documents, including scripts and storyboards. Students then work with Macromedia Flash MX 2004 to create a narrative presentation that contains text, images, animation, and sound. They create a title page that flows into pages illustrating a concept. Narrative pages can easily be added to expand the project if the topic requires additional pages.

Students not only learn the technical skills including techniques for creating digital art and animated elements, but the project also reinforces concept knowledge by representing it with text, images, sound and motion. For example, the sample project has students create an animated sequence describing photosynthesis. Each activity incorporates aspects of planning, design, building, and testing:

- Activity 1 Planning the Narrative
- Activity 2 Getting Acquainted with Macromedia Flash MX 2004
- Activity 3 Building a Narrative from a Template
- Activity 4 Building a Title Page
- Activity 5 Building a Narrative Page

- Activity 6 Building Additional Narrative Pages
- Activity 7 Making a Movie Accessible
- Activity 8 Testing and Publishing a Narrative

Town Website Project for Macromedia Dreamweaver MX 2004

In the Town Website Project for Macromedia Dreamweaver MX 2004, students build a basic informational website about their village, town, or city neighborhood. They gather information about their neighborhood and plan the design of the website. Then they work with Macromedia Dreamweaver MX 2004 to create linked, web-ready pages that contain text, images, hyperlinks, and tables. They create a home page that introduces the town, with hyperlinks that link to four other pages including history, events, maps, and a local directory. They can also add pages to expand the project.

Students not only learn the technical skills such as techniques for creating and editing web pages, they also learn to condense and organize information visually to communicate a particular purpose to and to communicate to a particular audience. Each activity incorporates aspects of planning, design, building, and testing:

- Activity 1 Planning the Website
- Activity 2 Getting Acquainted with Macromedia Dreamweaver MX 2004
- Activity 3 Setting up the Local Site and Root Folder
- Activity 4 Creating the Home Page
- Activity 5 Creating the Other Web Pages
- Activity 6 Connecting the Web Pages
- Activity 7 Testing the Website
- Activity 8 Managing the Website

Multimedia Projects for Macromedia Flash MX 2004 and Dreamweaver MX 2004

Multimedia Projects for Macromedia Flash MX 2004 and Dreamweaver MX 2004 integrates web multimedia projects within academic disciplines such as writing, social studies, and foreign languages. This curriculum binder contains five projects, including an electronic portfolio and digital autobiography that use Flash or Dreamweaver for multimedia authoring. Each of the five projects provides teacher planning, step-by-step instructions to use Macromedia tools, multimedia assessment, and discussion about integrating the project across different disciplines.

In the Electronic Portfolio project, students build an online collection of their work. Portfolios are a popular way to communicate progress and learning. In this project, students select the work from a course they would like to include in a portfolio, as modeled by a sample history portfolio. Instructors determine the type of portfolio, whether it represents a learning process or examples of best work. Students plan the website design with a site map then work with Dreamweaver MX 2004 to build a site structure and pages. They consider navigation and the relationships between the pages. They build a page design that enables consistent navigation, location of common narrative elements such as description, date completed and content. They incorporate text, images, and hyperlinks to reflect their work in a course.

- Activity 1: Planning Your Portfolio
- Activity 2: Macromedia Dreamweaver MX 2004 Overview
- Activity 3: Setting Up the Local Site and Root Folders
- Activity 4: Creating the Home Page
- Activity 5: Creating the Content Pages
- Activity 6: Adding Previously Created Text
- Activity 7: Linking Pages
- Activity 8: Managing Your Web Site
- Assessment Guidelines

In the Basic Web Site project, students explore the different elements of web pages by building a simple school website. They learn about page design, rich media and buttons. They use different types of media to represent different content needs. As they build the site they learn the essential functions of Dreamweaver MX 2004. Teachers can have students build the sample website for Gulf Coast School or design a simple website for their own school.

- Activity 1: Planning the Web Site
- Activity 2: Getting Acquainted with Dreamweaver
- Activity 3: Creating the Web Pages
- Activity 4: Managing the Web Site
- Assessment Guidelines

In the Web Photo Album project, students communicate information about a topic using images and text. Cataloguing content enables communication of the interrelationships between the individual components. Adding annotations conveys more information. Creating an online catalogue allows students to more widely share their research or ideas. An annotated web photo album is an excellent way to explore a topic or idea. In this project the sample website is a collection of images of NASA astronauts, exploring their professional backgrounds. Teachers can use this project for career exploration, or they can use their own content to explore or document other topics such as student art, photographs of plants, chronicles of field trips.

- Activity 1: Defining a Web Site
- Activity 2: Creating a Web Photo Album

- Activity 3: Changing and Adding Text and Hyperlinks
- Assessment Guidelines

In the Mini-Lesson Movie project, students demonstrate their understanding of a foreign language by developing a short lesson about a phrase. They teach the words through images and audio, both in their native tongue and the foreign language. Students use the rich media capabilities of Macromedia Flash MX 2004 to create instruction that appeals to different learning styles such as auditory and kinesthetic learners. Students build several animations, custom buttons, and a Flash movie with multiple scenes. Students then build a simple check for understanding where the learner matches the foreign word to their equivalent English word. This project can be extended beyond language instruction to present concept understating in other subjects.

- Guided Exploration of the Macromedia Flash MX 2004 Interface
- Activity 1: Creating a Plan for Your Animation
- Activity 2: Creating a Short Animation
- Activity 3: Creating a Text Animation
- Activity 4: Importing Sound
- Activity 5: Combining Scenes
- Activity 6: Creating a Drag and Drop Interaction
- Activity 7: Exporting Your Files
- Assessment Guidelines

In the Digital Autobiography project, students tell a story about their family using more than words—employing images, music, family narration, and geography—to tell a journey that their family has made. This project works well in diverse classrooms as a way for students to share their heritage with each other and to make those stories come alive. For many students that find writing difficult, this project provides a way to find their voice using multiple media. Students design a narration as several scenes connected by a menu on the home page. This intermediate project for Macromedia Flash MX 2004 uses path animation on a map. Students also incorporate audio narration and background music.

- Activity 1: Planning Your Movie
- Activity 2: Setting Basic Movie Properties
- Activity 3: Creating an Opening Page and a Menu
- Activity 4: Creating Animated Buttons
- Activity 5: Creating an Animated Graphic
- Activity 6: Creating the Scene Title and Text
- Activity 7: Creating a To Menu Button
- Activity 8: Laying Out the Journey Scene
- Activity 9: Creating a Path Animation
- Activity 10: Adding a Button to Play the Animation

- Activity 11: Exporting Your Files
- Assessment Guidelines

Career Skills

The No Child Left Behind Act of 2001 from the U.S. Department of Education aims to close the achievement gap between disadvantaged and struggling students and their peers. The message is that every child can learn—and that schools are accountable for a child’s progress.

While this new law defines a destination, it is up to the states and school districts to define the paths for getting there. New approaches to Career and Technical Education (CTE) can provide useful roadmaps to engage students in learning. Innovative CTE courses in multimedia design and web development, for instance, combine academic rigor with real-world experience and professional job skills. And equally important, these courses inspire and engage disenfranchised students. For example, the Information Technology Career Cluster Initiative from the Education Development Center (EDC) has inspired states such as Washington to implement programs in web design and development called Digital Design. These programs appeal to diverse populations of students because they develop career related skills in addition to technology skills. Students are motivated by technology and by solving real-world problems. They develop skills to use immediately. For students where college isn’t always an option, CTE courses, such as these, can motivate and prepare them for immediate employment.

Contemporary CTE technology curriculum has a very different flavor from old style shop and cosmetology classes. The courses are standards-based—yet the content is flexible. Courses are practical—yet they are creatively and intellectually challenging. They focus on fundamentals—from reading comprehension to math to written communication. But they also integrate the new skills employers demand such as project management, team building, decision making, problem solving, and hands-on technology experience.

Digital Design Curriculum Guide: Foundations of Web Design

Digital Design Curriculum Guide: Foundations of Web Design is a yearlong, project-based curriculum that teaches the professional Web design and development process using Macromedia Web tools. Digital Design develops four key skill areas:

- Project management and collaboration
- Design
- Research and communication
- Professional Web-authoring tools

Students develop these key skills in a spiral—each project adds more challenging skills onto the foundation proficiencies. Digital Design addresses each of these areas using a project-based approach. Each project has phases that follow the Web design process, from project planning to evaluation. To simulate a professional work environment, students gradually migrate their design work from an individual process to a group process. IT work by its very nature is iterative, so the projects contain activities that require students to evaluate and then redesign and rework their communications. Specific attention has been paid to developing concepts and principles for thorough, effective design. Each of the nine units reinforces key skills in the context of a career in web design and development:

UNIT 1 Introduction to the Internet helps students familiarize themselves with the concept of the internet, its basic vocabulary and history, and its appropriate uses.

- Activity 1.1: Acceptable Use Policies
- Activity 1.2: Introduction to the Internet (Optional)

Unit 2 Graphic Design Using Macromedia Fireworks MX 2004 introduces students to different technologies used in image processing (i.e. digital cameras, scanners, etc), graphic design software, design principles and their applications in building different types of graphics.

- Activity 2.1: Introduction to Graphics and Copyright
- Activity 2.2: Introduction to Scanning
- Activity 2.3: Using a Digital Camera
- Activity 2.4: Optimizing Graphics for the Web
- Activity 2.5: Making a Nameplate
- Activity 2.6: Planning a Logo
- Activity 2.7: Building a Logo
- Activity 2.8: Logo Review and Redesign
- Activity 2.9: Planning a Virtual Business Card
- Activity 2.10: Building a Virtual Business Card
- Activity 2.11: Virtual Business Card Review and Redesign
- Activity 2.12: Naming Conventions

Unit 3 Electronic Portfolios and Macromedia Dreamweaver MX 2004 introduces students to building and designing web pages, organizing information on the web, creating and incorporating graphics for the web, and testing websites for their usability, accessibility, and technical integrity.

- Activity 3.1: Introduction to Macromedia Dreamweaver MX 2004
- Activity 3.2: Analyzing Web Sites
- Activity 3.3: Planning a Portfolio
- Activity 3.4: Managing Files
- Activity 3.5: Planning a Home Page

- Activity 3.6: Creating a Page Banner
- Activity 3.7: Creating a Home Page
- Activity 3.8: Creating Content Pages
- Activity 3.9: Linking Pages
- Activity 3.10: Ensuring Usability and Accessibility
- Activity 3.11: Making a Graphical Navigation Bar
- Activity 3.12: Quality Assurance I: Technical Testing
- Activity 3.13: Quality Assurance II: User Testing
- Activity 3.14: HTML Basics (Optional)

Unit 4 Web Photo Album introduces students to the project management aspect of web design and development. Students begin planning a web project and participating in all areas of defining the project, designing the site, building the site, and testing the site.

- Activity 4.1: Planning a Web Photo Album
- Activity 4.2: Building a Web Photo Album
- Activity 4.3: Adding the Web Photo Album to the Portfolio

Unit 5 Interactivity Design with Macromedia Fireworks MX 2004 introduces students to visually organizing information and using interactivity to display this information for users.

- Activity 5.1: Introducing Visual Information Design
- Activity 5.2: Planning an Interactive Image in Macromedia Fireworks MX
- Activity 5.3: Building an Interactive Image
- Activity 5.4: Adding the Interactive Image to the Portfolio

Unit 6 Review Workshop requires that students critique and improve their websites and graphics incorporating new technical and design techniques they have learned through the semester.

- Activity 6.1: Review Workshop

Unit 7 Building a Basic Client Web Site requires students to work with a client to build an initial website. Students interview clients to ascertain their needs then work with them to design and develop a basic website using the foundation skills they learned in the first semester.

- Activity 7.1: Defining a Client Web Site Project
- Activity 7.2: Planning a Client Project
- Activity 7.3: Structuring a Client Web Site
- Activity 7.4: Designing a Client Web Site
- Activity 7.5: Reviewing and Revising to Client Specifications
- Activity 7.6: Building a Client Web Site
- Activity 7.7: Testing a Client Web Site

- Activity 7.8: Launching a Client Web Site

Unit 8 Redesigning a Client Web Site requires that students improve an existing website to client specifications. Students reinforce all previous web design and development skills while improving their communications with clients.

- Activity 8.1: Defining Client Redesign Needs
- Activity 8.2: Writing a Design Document
- Activity 8.3: Reviewing and Revising with Clients
- Activity 8.4: Building Components of a Redesigned Client Site
- Activity 8.5: Evaluating and Presenting a Redesigned Site

Unit 9 Enhancing User Experience on the Web has students design, build, and test rich media elements to use in websites. Students work to enhance the message of a website with the use of rich media.

- Activity 9.1: Introduction to Macromedia Flash MX 2004
- Activity 9.2: Examining Macromedia Flash on the Web
- Activity 9.3: Creative Effects and Film Techniques with Macromedia Flash
- Activity 9.4: Creating a Script for a Digital Narrative
- Activity 9.5: Creating a Storyboard for a Digital Narrative
- Activity 9.6: Building a Digital Narrative
- Activity 9.7: Reviewing and Redesigning a Digital Narrative

Tools Skills

Technology classes appeal to students that are not pursuing a traditional academic curriculum. Achieving proficiency using particular tools helps these students build in-depth technical skills. Students can enter the job market with professional skills with exposure to different technologies. Varied exposure can help students make career education choices while making them more competitive in the work field. Students follow up initial proficiency with software certification, thereby increasing their value in the field.

Studio MX 2004 Step-by-Step

In Macromedia Studio MX 2004 Step-by-Step students build in-depth commercial websites. The textbook helps instructors create engaging, relevant courses that build students' ability to use professional Web tools. Macromedia Studio MX 2004 Step-by-Step provides an 8-12 hour project for each of the tools in the Studio: Macromedia Flash MX 2004, Dreamweaver MX 2004, Fireworks MX 2004, and FreeHand MX. Each project teaches product fundamentals in the context of building a commercial website.

In the Dreamweaver MX 2004 project, students explore the capabilities of Dreamweaver by building a series of web pages for an adventure travel website. They learn about Dreamweaver through the process of building websites that are designed by a professional designer. Students learn how decisions about page design can affect the look and feel of a site. They learn about links, buttons, images and site management. They explore how to make a site more complex technically while making it more compelling and attractive to a user.

- Lesson 1: Learning the Basics
- Lesson 2: Working with Graphics
- Lesson 3: Creating Links
- Lesson 4: Working with Tables for Page Design
- Lesson 5: Adding User Interactivity
- Lesson 6: Managing Your Site

In the Fireworks MX 2004 project, students build navigation elements for a website about adventure travel. They learn to draw images using the key functions in Fireworks, from drawing simple shapes to creating "sliced" navigation systems. Students build their web graphics skills across several projects, each resulting in finished page elements.

- Lesson 1: Bitmap Editing
- Lesson 2: Working with Vector Graphics
- LESSON 3: Importing, Grouping, and Layers
- Lesson 4: Text, Masks, and Live Effects
- Lesson 5: Creating Buttons
- Lesson 6: Optimizing and Exporting
- Lesson 7: Creating Animations

In the Macromedia Flash MX 2004 projects, students build a rich-media website for a photo gallery. They see how a design can integrate narrative, illustrative and navigation elements to create a cohesive whole that reflects the vision and image of a company. They build a page shell in Flash in which they insert movies about the different offerings from the gallery. They use animation as a way to show progress within the site and illustrate the photographic origins of the work. They use video clips to present the artistic purpose of a featured artist. They employ Flash components to collect visitor information and display sample photography.

- Lesson 1: Introducing Macromedia Flash MX 2004
- Lesson 2: Exploring the Macromedia Flash Workspace
- Lesson 3: Creating a Logo
- Lesson 4: Designing a Home Page
- Lesson 5: Adding Text and Navigation to the Home Page
- Lesson 6: Working with Movie Clips
- Lesson 7: Creating Buttons

- Lesson 8: Motion Tweening
- Lesson 9: Creating an Animated Map
- Lesson 10: Integrating Components and Dynamic Text Boxes with the Animated Map
- Lesson 11: Building the Events Components
- Lesson 12: Video in Macromedia Flash (Optional)
- Lesson 13: Publishing a Macromedia Flash Movie

In the FreeHand MX project, students learn to use the illustration tools in FreeHand to build the elements of a logo and site design for a coffee company. Students also learn how to integrate FreeHand files in Macromedia Flash and Dreamweaver.

- Lesson 1: Introducing Macromedia FreeHand MX
- Lesson 2: Designing Scenes for Macromedia Flash MX 2004
- Lesson 3: Exploring Other FreeHand Features
- Lesson 4: Designing Scenes for Macromedia Flash MX 2004
- Lesson 5: Creating a Flash Animation
- Lesson 6: Integrating FreeHand with Other Macromedia Web Applications

Conclusion

Education should enable people to think, create, communicate and interact with others. If the way we think, create, communicate and interact is changing due to the pervasiveness of technology in our daily personal and professional lives, we must pose the question: What are the implications for education?

The construction of knowledge is important to all subjects in curriculum. Students need to be able to take advantage of all methodologies to communicate knowledge. They can express knowledge in many ways. The process of using technology to construct knowledge engages students and requires higher-order skills while still enabling the student to communicate subject knowledge. Integrating technology into academic subjects not only meets general technology standards, it also addresses the need for improving digital literacy and affords students a powerful method to communication information and ideas.

Career and technical education is also evolving to meet the needs of a new population of students who strive to enter the workforce. Courses that teach all the skills necessary for success in a technical work environment and meet the standards devised by government can help students succeed in their professional endeavors. Professional tool proficiency helps students become competitive in technical environments when employers look for specific skill sets. Technology used in meaningful ways can help students learn and become productive members of society. When schools integrate web technology into their courses, they enable students to demonstrate knowledge, develop essential communication skills, and build foundations for their careers.

Curriculum Appendix

Digital Narrative Project for Macromedia Flash MX 2004

www.macromedia.com/resources/education/curriculum/flash_narrative

Town Website Project for Macromedia Dreamweaver MX 2004

www.macromedia.com/resources/education/curriculum/townproject/

Multimedia Projects for Macromedia Flash MX 2004 and Dreamweaver MX 2004

www.macromedia.com/resources/education/curriculum/multimedia/

Digital Design Curriculum Guide: Foundations of Web Design

www.macromedia.com/resources/education/curriculum/digitaldesign/

Studio MX 2004 Step-by-Step

www.macromedia.com/resources/education/curriculum/studiomx/

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