Technology Swarms for Digital Learners

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What have we learned from "the decade of Web 2.0"?

At the dawn of the new millennium, the nature of the web began to change. Rather than a passive place for reading web-based content, the web has become a dynamic place where people can interact, participate, and share ideas without needing skills in web development.Reflect on how much the Internet has changed in the past decade. To compare the "old way" and the "new way," go to the Wayback Machine <archive.org/web/web.php>. This website has been archiving websites since 1996. Trace the changes in 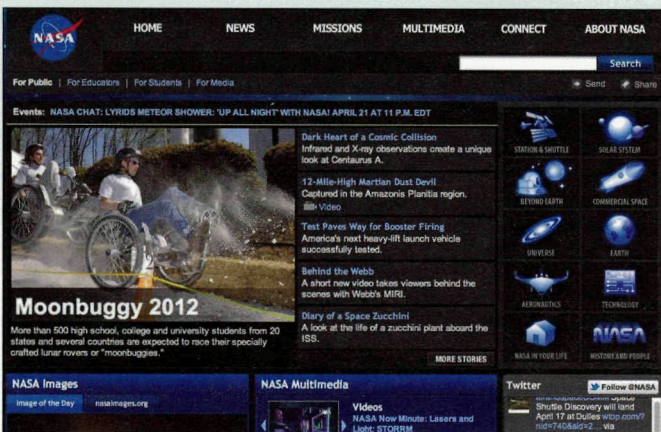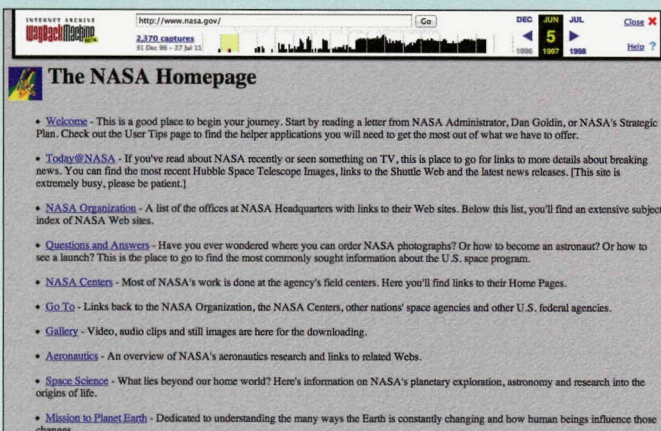a website such as NASA <nasa.gov>. How have features such as blog articles, Twitter updates, and multimedia programs changed how the website is used?

Web 2.0 is now the standard for websites that incorporate the following four elements:

Dynamic Elements. The website is constantly changing and being updated automatically through RSS feeds, calendars, and other features.

Social Elements. People are able to interact and add their own ideas through blogs, micro-blogs, and discussion areas. They can also easily share postings with others.

Participatory Elements. Users can participate by rating articles, adding comments, and incorporating their own sightings and data.

Interactive Elements. The website content includes active elements such as audio, video, animation, text, and graphics that are triggered by users.

THE POWER OF THE WEB IN SCHOOL LIBRARIES

Many students are unaware of how much the Internet has evolved and how they can use the power of online resources and tools for inquiry. Empower young people with free web-based technologies that help them transform web-based information into meaningful, motivating learning experiences.
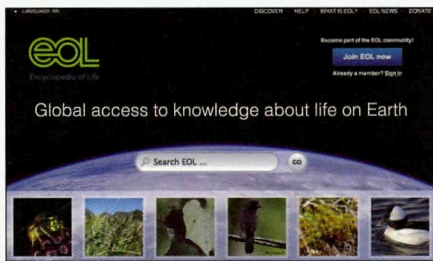
As you select websites to use with students, ask yourself how they will help students think, create, or share. Stress how the dynamic, social, participatory, and interactive elements contribute to the power of a website. For instance, go to the Encyclopedia of Life <eol.org> and you'll notice the many ways that powerful elements are incorporated into the site.

Participants can set up a profile page, create a collection of creatures, and join online communities related to their interests. Users can also create and share field guides. In addition to photographs, maps, and audio and video clips about animals, users can change the language of the website to meet their needs. RSS feeds provide access to news and podcasts, and a rating system allows participants to evaluate the materials submitted by others.

In addition to resources on the website itself, participants can also extend the experience through social network pages such as Twitter, Facebook, Flickr, and YouTube. When searching for information about the honeybee, users can view a variety of media as well as participate in online discussions.

COLONY COLLAPSE OR SURVIVE AND THRIVE?

The honeybee population has been hit hard the past few years by a phenomenon known as Colony Collapse. Like the current crisis we're facing with the loss of school libraries and professional librarians, there seems to be no single cause or solution. Let's use technology tools to help students and teachers thrive in their school hives. From pollinating to producing honey, worker bees are busy. Our students are busy, too, using tools to perform tasks. Let's explore these tools, task-by-task, as we examine six roles for today's digital learners.

Figure 1. NASA website then and now.

Figure 2. Encyclopedia of Life website.

Currently in the Encyclopedia of Life

eol	940,949 Pages	How can I use EOL?
	54,643 Members like you	How can I join?
	2,078 Collections	How can I create one?
	115 Communities	How can I participate?
	1,286,886 Images	How can I contribute?
	202 Content Partners	How can I become one?

SWARM 1: THE SEARCHERS

Digital learners need tools for finding quality information. The nature of searching has changed in the past decade, but there is a continued need for quality information.

The Old Way: Enter a keyword to find static web pages.

The New Way: Enter a word or a picture, sound, or idea to reveal a wide range of information sources. For instance, you can drag an image into the **Google Image** <images.google.com> search. Or use a search tool like **Instagrok** <instagrok.com> to access age-appropriate content presented in an interactive multimedia interface.

Figure 3. Example of instaGrok search for the topic of honeybees.

Many learning tasks revolve around developing questions or identifying problems, then seeking appropriate answers or solutions using online resources. Design specific standards-based activities that help students implement and practice the skills of "digital searcher."

Mainstream Search Tools. Where do you search for information? If you're like most people, you simply "google it." However to find exactly want you need, it's important to know search strategies and alternative search tools. Go to **Google's InsideSearch** <google.com/insidesearch> for lots of ideas on how to make a search more
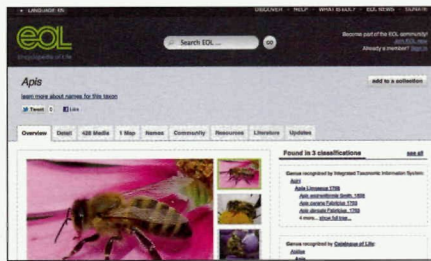
effective. For instance, students can now search by the readability of a web page.

Search Tool Alternatives. Many specialty tools provide special features. Look for those that meet your needs. For instance, **Sweet Search** <sweetsearch.com> is specifically designed for students and **CompletePlanet** <aip.completeplanet.com> searches the deep web including databases and specialty search engines. **Behold** <behold.cc> searches for public domain and free images.

SWARM 2: THE CURATORS

Digital learners need tools for organizing, storing, and accessing information.

The Old Way: Create static pages with static links.

The New Way: Create dynamic pages with constantly updated information.

Content on webpages is now dynamic. You can add to the work of others or create your own. Both students and teachers need to constantly locate, evaluate, select, organize, and share resources on topics of interest. This is called content curation.

Explore tools for content curation, content contribution, and content collaboration.

Content Curation. You can organize content for your own use or the use of others. For instance, with **Scoop.it** <scoop.it>, you can create a topic, add static and dynamic content, add descriptions, questions, or interaction, and embed widgets and video. Go to **Read Science** <scoop.it/t/lets-read> for an example. Tools like **Bagtheweb** <bagtheweb.com>, **Only2Clicks** <only2clicks.com>, and **Pinterest** <pinterest.com> provide similar ways to organize content. In addition to logging websites, one can use **LiveBinders** <livebinders.com> to organize specific files such as videos, PDFs, and images.

Content Contribution. In addition to curating existing content, students can add to the work of others. Look for websites that allow users to share experiences. For instance, **Did You Feel It?** <earthquake.usgs.gov/earthquakes/dyfi/> asks people to log their earthquake experiences. Projects like **Journey North** <jnorth.org> involve participants in sharing science data. Getting students involved with adding and editing pages at **Wikipedia** <wikipedia.org> or **Wikibooks Junior** <en.wikibooks.org/wiki/Wikijunior> can be another powerful, active experience.

Content Collaboration. Create your own collaborative content curation project by establishing a wiki or other collaborative space for sharing content. Use tools like **Wikispaces** <wikispaces.com/content/teacher> and **PBWorks** <pbworks.com/using-pbworks-individual-classrooms> to build the foundation for this type of project.

SWARM 3: THE INQUIRERS

Digital learners need tools for building a personal learning network. Help your students create environments for self-management. Learners need tools to organize their personal, academic, and ultimately professional information and inquiries. This personal learning network helps students bridge home, school, and eventually professional life.

The Old Way: Create bookmarks and take notes with a word processor.

The New Way: Create a dynamic environment for self-management and inquiry.

Explore tools for building a personal learning network including personal portal, bookmarking, highlighting and annotating, and note-taking.

Personal Portal. Today's learner moves among many different devices such as smartphones, tablets, and laptops. Students need to learn how to create their own starting point for the web that can be accessed from all their devices. It's called a personal portal and can be customized with features like RSS feeds and widgets. Although these pages can be made public, a personal portal is really designed for an individual user with password access.

Most students have Google accounts they use either inside or outside school. They need skills in managing these accounts. For instance, ask students to go to **Google Dashboard** <google.com/dashboard> and view the information in their Google account. It's important that students are aware of how passwords work and how they are used to access multiple services.

Demonstrate how to use free services such as **iGoogle** <google.com/ig> or **MyYahoo** <my.yahoo.com> to create a personal portal of their favorite websites from **Lego** <lego.com> to **Poptropica** <poptropica.com>. Then, introduce learning websites such as **PBS** <pbs.org> and **Cool Math** <coolmath.com> that they might not have considered for their personal portal.

Finally, expand their thinking to online reference tools, databases, and other scholarly tools. You might also encourage students to use tools such as **Google Reader** <reader.google.com> to set up their own RSS feeds for easy access.

Bookmarking. Because students often use multiple computers, it's useful for them to maintain personal bookmarks that aren't dependent on a particular web browser. It's also a nice way to keep track of websites used in class projects. Use the Delicious stack **Chopin's Musical Biography** <delicious.com/stacks/view/HROqZO> as an example. Keep in mind that most of these tools have options to make the resources public or private. They also have collaborative options.
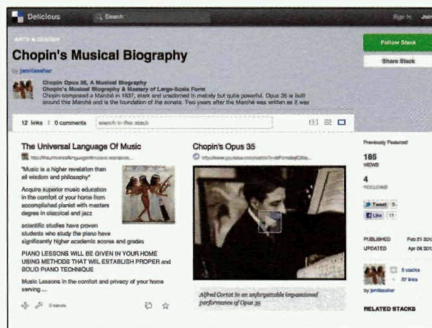
Figure 4. A Delicious stack titled Chopin's Musical Biography.

Highlighting and Annotating. Use tools that help students record thoughts related to readings. Rather than using a word processor for notes, consider highlighting and annotating online resources. Many websites will take a screen shot of a website and let you write or post stickynotes on the page. Look for tools that are easy for all ages like **Twiddla** <twiddla.com>. Older students may benefit from the addition of forums and other social tools found in **Diigo** <diigo.com>.

Note-taking. Traditionally, word processors have been used for note-taking activities. However consider other tools that are specifically designed for this activity. **Evernote** <evernote.com> is popular, but must be installed on computers or mobile devices. **Springnote** <springnote.com> allows students to create note pages that can be shared. The site also allows invitations for collaboration.

SWARM 4: THE SOCIALIZERS

Digital learners need to be able to use tools for building a social learning community. Once students have a handle on their personal information management, they're ready to make connections to the outside world.

The Old Way: Use email, post projects, and participate in discussions.

The New Way: Participate and collaborate in the cloud.

Explore tools for building a social learning network including journaling, dynamic stickywalls, backchanneling, social networks, working in the cloud, and live conferencing.

Journaling. Although blogging is often thought of as a social activity, it originated as a journaling tool. While some people use it as a tool to share their experiences, inquiries, and thoughts, others use it as a tool for reporting and sharing with the world. Blogging with a tool like **WordPress** <wordpress.com> is an easy way to connect to the world and view outside comments and ideas. Microblogging with a tool like **Twitter** <twitter.com> is designed for short, concise entries.

Dynamic Sticky Walls. Sometimes students need a place where they can organize ideas with others and share text, photos, images, and other materials. Stickywalls are an effective way to promote sharing and collaboration. Basic stickywalls like **Wallwisher** <wallwisher.com> and **PrimaryWall** <primarywall.com> provide notes that can contain text, images, video, and links. These notes can be organized. Complex stickywalls like **Stixy** <stixy.com> provide more extensive capabilities and ways of organizing stickynotes and online resources.
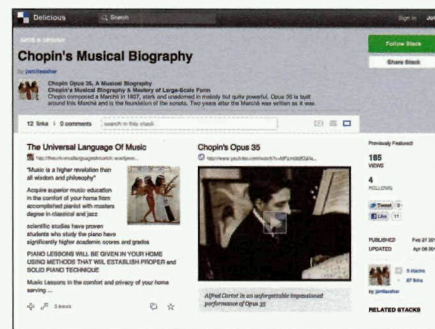
Figure 5. A project on the Korean War organized in Stixy.

Back Channeling. Back channeling or chatting sites allow users to ask questions, discuss, and post ideas. The tool **TodaysMeet** <todaysmeet.com> allows a teacher or student to create a message room for a specific time period.

Social Networks. Social networks provide spaces where people can connect with each other. Tools are provided for posting discussions, embedding images, videos, and links, and other features. **Edmodo** <edmodo.com> is the most popular choice for educators, because it's specifically designed for teaching and learning.

Rather than creating your own class-room network, consider joining an existing service and building a community within that service. For instance, many English teachers and school libraries use **Figment** <figment.com>, **GoodReads** <goodreads.com>, and **LibraryThing** <librarything.com> to share reading and writing ideas.

Working in the Cloud. Working in the cloud involves making use of off-site resources and storage spaces for cooperating, collaborating, and sharing. Many websites contain collaborative elements. The key is to select those that meet the specific collaborative need.

Collaborative apps like **Google Docs** <docs.google.com> are those applications that allow users to create, store, and share information virtually. In many cases users can collaborate live, in real time.

File sharing is the ability to synch and share documents through a remote server. Tools like **Dropbox** <dropbox.com> provide file synching and easy-to-use sharing tools.

Poll and survey tools allow participants to share their thoughts, opinions, and data. **Google Forms** <docs.google.com> is a great tool for teachers to collect and organize information from students. **Survey-monkey** <surveymonkey.com> is an easy-to-use tool for collecting polls and survey data.

Live Conferencing. There are times when students and educators want live, real-time communication that includes talking, writing, and presentations. This approach is particularly useful for global activities and cultural exchanges.

Collaborative whiteboards like **Scribblar** <scribblar.com> provide a shared drawing area. These tools have similar features to the highlighting and sticky note tools.

For video conferencing, **Google Chat** <google.com/talk>, **Skype** <education.skype.com>, and **Facetime** <apple.com/mac/facetime> are services that provide voice and video over the Internet.

For full service conferencing, look for services that provide video conferencing along with whiteboards, chat, presentations, and other resources such as **Ellumi-nate** <elluminate.com>.

SWARM 5: THE ORGANIZERS

Digital learners need to be able to use tools for processing and organizing information. As you think about differentiation in learning, consider the many ways that students can arrange ideas to assist in the process of assimilation and inference.

The Old Way: Use productivity tools such as word processors and spreadsheets.

The New Way: Use dynamic tools for organizing and calculating information.

Explore tools that process and organize information including charts and graphs, graphic organizers, timelines, and citation tools.

Charts and Graphs. Many great online tools are available for creating graphics including **Create A Graph** <nces.ed.gov/nceskids/createagraph>.

Use existing data to create a chart, graph, or map such as **Gapminder** <gapminder.org>, **Public Data Explorer** <google.com/publicdata>, and **Worldmapper** <worldmapper.org>.

Graphic Organizers. Concept maps are an effective and efficient way to organize information. In the past, the computer-based software called Inspiration was the first choice. If funding is available, try the cloud-based tool **Webspiration** <mywebspiration.com> from the makers of Inspiration.

For many students, it's nice to have a starting point for creating concept maps. **Exploratree** <exploratree.org.uk> provides wonderful templates to get students started.

Many times you begin a project from scratch. Look for simple tools for basic maps such as **Bubbl.us** <bubbl.us>.
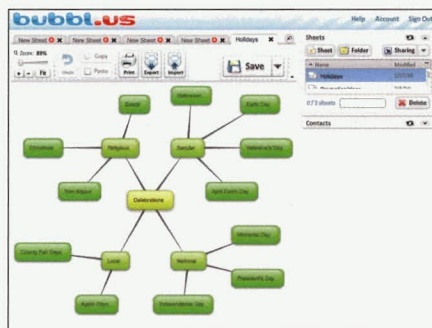
Figure 6. Example using Bubbl.us.

Timelines. Think about assignments that involve chronology. Ask students to organize their thoughts or information about the project chronologically. **Tikitoki** <tiki-toki.com> and **TimeGlider** <timeglider.com> provide tools for creating a timeline with text, images, audio, video, and links. **Myhistro** <myhistro.com> combines a timeline with a map.

Citation Services. It's important for students to cite the works they use in their assignments. Citation tools like **NoodleBib** <noodletools.com> can make this easy.

SWARM 6: THE STORYTELLERS

Digital learners need to be able to use tools for sharing understandings. With web-based tools, students can create, collaborate, and share their fiction and nonfiction stories online.

The Old Way: Use software such as PowerPoint or Moviemaker to create communications.

The New Way: Use multimedia tools for communicating and sharing with the world.

TOOLS FOR CREATING

Whether creating text, images, audio, or video, there are many online tools that can be used for both production and sharing.

Animation Creators. Animation tools like **GoAnimate** <goanimate4schools.com> allow students to create short animation projects and share them on the web.

Audio Creators. While some tools allow voice recording, others provide space for students to type their text and the computer generates audio.

Basic tools such as **Voki** <voki.com> or **Vocaroo** <vocaroo.com> allow voice recording or computer-generated voices. Advanced tools like **Voicethread** <voicethread.com> provide features such as audio commenting, slideshows, and other enhancements.

Comic Creators. Both basic and complex comic tools are available online. For those services that don't provide an option to print or save, consider creating a screen shot. **Pixton** <pixton.com> is a popular

choice, because a school version is available.

Image Creators. Many tools help students create or edit images. For instance, Photo Flex <fotoflexer.com> is an easy-to-use photo editor, and SumoPaint <sumopaint.com> is great for digital painting.

Map Creators. Add your own ideas and resources to popular maps or create your own. Google Maps <maps.google.com> is great for general map projects, while Historypin <historypin.com> works well for historical locations.

Figure 7. Historypin project.

Poster Creators. Rather than focusing on copy/paste activities, look for ways to promote deep thinking through digital posters. Glogster <edu.glogster.com> provides tools for creating digital posters with embedded text, audio, video, and other resources. Examine the Best Glogs <edu.glogster.com/glogpedia> section for lots of ideas. Speaking Image <speakingimage.org> is a tool that allows users to create interactive images.

Multimedia Presentation Creators. From basic presentation tools to full-featured multimedia authoring tools, you can find many options online. Keep in mind that many of these tools are intended to sell memory books or online services.

Basic presentation tools such as Google Docs Presents <docs.google.com> provide options similar to Microsoft PowerPoint online with the addition of collaboration and sharing tools. Intermediate presentation tools such as Prezi <prezi.com> provide additional features such as interactivity, animation and other features.

Screen Capture Creators. From creating tutorials to sharing an experience, screen capture tools are a great way to share understandings. Screencast-O-matic <screencast-o-matic.com> is popular, because it doesn't require a download. However, TechSmith <techsmith.com> provides the most powerful tools for screencasting. Spreadsheet Creators. Online spreadsheets such as Google Docs Spreadsheet <docs.google.com > are great for both creation and collaboration.

Storytelling Creators. Tools are available for all ages that want to create online stories. Storybird <storybird.com>, Kerpoof <kerpoof.com>, and Storymaker <carnegielibrary.org/kids/storymaker> are popular choices.

Video Creators. Use tools like Animoto <animoto.com> to combine photos, video clips, music, and audio into great multimedia projects. Most of the popular online tools are now subscription services. However, try the following options:

Web Page Creators. Weebly <weebly.com> and Google Sites <sites.google.com> are powerful tools for building web pages.

Word Cloud Creators. Word clouds are an interesting way to visualize ideas using text. The result is a graphical representation of word frequency. Wordle <wordle.net> is popular, but others like Tagul <tagul.com>, ABCYa <abcya.com/word_clouds.htm> and Tagxedo <tagxedo.com> may address specific needs.

Word Processing Tools. Both basic and advanced word processing tools are available online. QikPad <qikpad.co.uk> is useful as a quick, one-shot tool for student collaboration, while Google Docs <docs.google.com> is great for collaboration, saving, sharing, and publishing.

TOOLS FOR SHARING

Many tools allow you to share materials you've created yourself either off-line or online. The key is examining the sharing features.

Document Sharing. Online services such as Scribd <scribd.com> allow users to post documents such as PDF files.

Photo Sharing. Flickr <flickr.com> allows anyone to share photos. Many government agencies, such as the Smithsonian <flickr.com/photos/smithsonian>, house collections at Flickr.

Presentation Sharing. Create a presentation in PowerPoint or another tool and share it on the web using a tool like Slideshare <slideshare.net>.

Video Sharing. Vimeo <vimeo.com> and SchoolTube <schooltube.com> are great alternatives to YouTube <youtube.com>. However, be sure to check out the new YouTube for Schools <youtube.com/schools> program.

WEBSITE RESOURCE SELECTION

With endless online tools and resources, how do you choose what to use with stu-

BEST NEW SOFTWARE

Big Screen Books: The Dot. http://fablevisionlearning.com/ Gr. K – 5. The wonderful combination of storytelling and technology comes to life with Big Screen Books from Peter Reynolds and FableVision. Beginning with the work **The Dot**, the transformation of the book to the computer screen comes to life. Users can explore this story page by page, have it read to them, or record their own narration. Each reading screen provides access to discussion prompts related to that page, a glossary, and learning activities. As students dig deeper into the text, the glossary information includes the part of speech, a definition of the word, and a sentence using the word. The activity choices range from "Tale Twister," which has the student arrange in correct order between four, seven, or ten pictures from the story, to "Story Starters," which includes a wide range of writing prompts. The "Author Visit" is a video option about Peter Reynolds.

Teachers should begin by exploring the Teacher Tools options. Here the discussion starters can be customized for any page of the story. In addition to changing the text, teachers can add images and links to a discussion starter. Glossary words can be highlighted in the reading mode. The story narration mode can be changed from the author reading to custom recordings done by students or parents. Options are available for how the screens are composed, for the page transitions, for autoplay, and for including highlighting as the words are read. A class list can be entered to use in the pick-a-student feature. In addition, the "Story Starters" can also be customized and new ones created.

The wonderful translation of a classic Peter Reynolds book provides access to the story via a computer screen or an interactive whiteboard. Plan to share this information with parents as well.

dents? Do you want something that is free, quick, and easy? Or, do you prefer a tool that is subscription-based, sophisticated, and designed for education? Use the following criteria as you think about the dynamic, social, participatory, and interactive elements of today's websites.

ACCOUNTS AND ACCESS

- What does the "terms of service" say about use and age?
- Does the tool require a sign-in? What's the procedure? Can students use a class login? Can they use a Google account?
- Are controls provided that limit access to private, semi-private, group access, or public settings?
- Are teacher controls separated from student controls?
- Is it possible to track student progress or performance?
- Is personal data protected?
- Does the tool work with your computers, browsers, and infrastructure (i.e. proxy, filters)?
- Will downloads, browser plug-ins, or other system requirements interfere with use?
- Does the cost and/or advertising meet the needs of the assignment? Is it free, ad supported, or limited by subscription? What are the limitations of the free or reduced cost service? Is the service worth the cost of a subscription?
- Does the website have a good track record for availability, speed, and long-term access?
- Is the tool accessible to all students? Does it comply with ADA?
- Is an RSS feed available to track work? Can reports be sent by email or to an RSS reader?

PRODUCTIVITY

- Can work be saved for future editing? Can it be downloaded, exported, or printed?
- Is there a way to back-up the system if it becomes inaccessible?
- Are the tools easy-to-use?

- Does the tool allow for different forms of communication such as text, images, audio, video, widgets, and links? Which of these are important for the assignment?

COLLABORATIVE AND PUBLISHING FEATURES

- What are options for sharing online? Can materials be embedded in other websites?
- Are options provided for private and public commenting? Can these be moderated or controlled?
- What options exist for collaboration and peer editing? Are there options for ratings, comments, or other feedback?
- Do the tools provided fit the needs of the project?
- Do the tools allow retention of intellectual property rights?
- Are options provided to label the copyright status of the materials?

USABILITY

- Is it easy to use and understand? Is it intuitive?
- Does the help section provide quality information?
- Does the website work well or does it crash or lose data?

TECHNOLOGY SWARMS IN YOUR LIBRARY

Don't get stung by using traditional approaches with today's digital learners. The new millennium introduced new ways of thinking about online content and tools. To become information fluent, our learners need to be searchers, curators, inquirers, socializers, organizers, and storytellers. Organize lessons around these technology swarms that build essential 21st century skills.

Adapted from a presentation titled "Technology Swarms for Digital Learners" available at *http://eduscapes.com/sessions/swarms*