Facilitating Faculty Connections: The Technology Practices Directory Project

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Background Context

- Learning in a Technology Rich Environment (LITRE) Initiative (http://litre.ncsu.edu/)
  - born out of NC State's SACS quality enhancement plan
  - large scale research project on the effect of technology on student learning.
  - Evaluation of technology-rich learning spaces/classrooms
  - Faculty small grants program
- Faculty, distance learning & information technology, FCTL and University Planning and Assessment effort

Background Context

- goal established in 2006 to gather systematic and broad information regarding current uses of technology as they relate to pedagogy (instructional techniques)
- LITRE funded the design and development of a searchable faculty Technology Practices Directory (TPD) to study how faculty use technology to impact learning

Directory Purposes

- research existing technology practices in campus and distance classes (assessment)
- target training towards under-utilized software, or target resources towards tools with the most use and/or learning impact (campus I.T.)
- develop specialized professional development using peer experts (lts, fctl)
- promote faculty-faculty collaboration through search features to locate others using technologies of interest
- help faculty document and promote innovations in teaching through public, searchable interface

Project Phases

1. theoretical design--what information to capture, and how to associate tool data with pedagogy/teaching practices
2. interface design--print and Web-based prototypes
3. phased release and marketing

Phase 1: Theoretical Design

Theoretical Design

- challenge--how to associate faculty technology use with student learning
- previous surveys--most faculty can easily report tools they use, but have difficulty explaining how those tools impact or promote learning
- a taxonomy was needed for faculty to report tools, but in a framework that simultaneously captured information on the type of learning occurring through use of the tool

Frameworks Connecting Tools with Learning

- Media for Inquiry, Communication, Construction, and Expression taxonomy (Bruce & Levin, 1997)
- taxonomy of cognitive tools used in support of open-ended, student-centered learning environments (Hannafin, Land, & Oliver, 1999; Hill & Hannafin, 2001; Iiyoshi, Hannafin, & Wang, 2005)
- collapsed these frameworks into ten learning-tool categories

10 Learning-Tool Categories

Learning Activities	Example Tools Supporting the Activities
planning class activities or tasks/ projects, setting goals	electronic calendar for instructor to post exam dates, project management software for students to plan detailed steps in an assignment
seeking information, representations, or physical artifacts	search engines and library databases to help research ideas with keywords (information)
	media libraries to help access images, audio, or video; digital libraries to help access scanned copies of letters/papers or other electronic artifacts (representations)
	geiger counter to search for evidence of radiation, telescope to search for asteroids, infra-red homing to seek light emitted by hot objects (physical artifacts)

10 Learning-Tool Categories

Learning Activities	Example Tools Supporting the Activities
collecting/capturing information, representations, or physical artifacts	survey software to capture response data, database software to capture and store client records, bookmarking tool to capture Web addresses, digital drop boxes for files, RSS aggregators to collect and store text-based news feeds and blog entries (information)
	digital cameras to capture images, audio or video recorders to capture vocals and/or moving images, RSS aggregators to collect and store audio podcasts, doppler radar to capture target velocity, magnetic resonance imaging (MRI) to capture representations of the body (representations)
	scientific probeware to capture water molecules (physical artifacts)

10 Learning-Tool Categories

Learning Activities	Example Tools Supporting the Activities
analyzing or manipulating information, representations, or physical artifacts	spreadsheet software, mathematical modeling software, and statistics software to explore numerical data and look for trends; concept mapping software to organize ideas and build relationships (information)
	simulation software or interactive learning objects to alter variables (e.g., force per square inch on a new structure) and analyze resulting output; GIS software to add visual layers on maps and analyze interactions (representations)
	microscope to enhance and study cells on a glass slide, remote-controlled robotic arm to examine hazardous substances (physical artifacts)

10 Learning-Tool Categories

Learning Activities	Example Tools Supporting the Activities
integrating something new with existing information, representations, or physical artifacts; extending, building on	reviewing tools to mark-up or critique others' work/documents, Web 2.0 tools like furl.net or trailfire to add tags and comments/annotations to existing Web pages (information)
	video coding software to mark and tag segments in a captured movie (representations)
	surgical equipment to add a stent to an artery (physical artifacts)

10 Learning-Tool Categories

Learning Activities	Example Tools Supporting the Activities
creating new information, representations, or physical artifacts	word processors, blogging tools, Web page editors, and programming software, to create new papers, reflections, Web sites, and code (information)
	video editing software to produce a new movie, podcast software to create a new audio broadcast, animation software to create a new drawing, computer aided design (CAD) software to create a building layout (representations)
	robotic equipment to create new textiles, 3-D printer to create a tangible object, centrifuge to separate elements and create a new compound (physical artifacts)

10 Learning-Tool Categories

Learning Activities	Example Tools Supporting the Activities
assessing, monitoring progress on student learning	online quizzes and classroom student response systems or "clickers" to gauge student progress, electronic gradebooks to monitor progress, reviewing tools to mark-up or critique others' work/documents
one-way communicating	PowerPoint software or document cameras to support classroom presentations, Camtasia software to record and post a presentation online
two-way communicating	email, discussion boards, or chat software to communicate about course topics
collaborating on tasks/projects	wiki Web pages to co-construct ideas online, groupware and whiteboard software to meet remotely from different locations and work on a project

Other Design Considerations

- who uses a tool, faculty to create materials/courses, or students as part of student-centered activities
- which should faculty report first--tool or activity; may be more comfortable reporting tool, easing into alignment with different activities

Evaluation Questions

1. Which of the ten activities on the taxonomy are most and least frequently applied by faculty, and conversely, by students? What do these activities suggest with regard to general pedagogy or student learning? Are activities different across colleges?
2. What are the primary tools used most across the university and in specific colleges, and what do these uses indicate with regard to general pedagogy or student learning?

Phase 2: Interface Design

Interface Design

- distance learning office provided in-kind support with two Web applications programmers
- translated the theoretical framework into a set of Web-based PHP forms that save entered data in tables on a server
- time consuming process, approximately 8-9 meetings over entire fall semester
- five forms comprise the data entry component

Form 1: Contact Information

- collects typical demographic information from first-time users
  - first and last name
  - title, college, and department from pull-down lists
  - campus address, email address, phone number
  - personal Web site URL

Form 2: Course Information

- faculty must tie their technology/activity use to specific courses, allowing us to assess the types of tools and activities used in different colleges, and at different levels (undergrad versus grad)
- course prefix and number, college and department, any cross-listed college of department, primary level of students who take the course, approximate number of students who take the course, and teaching method for the course (i.e., face-to-face, online, blended, other distance method)

Form 3: Technology Information

- report a single technology used in the course just reported
- start with a pull-down list of commonly used technologies; course management systems, Web page editors, digital audio/video or graphics, internet/online resources, modeling software/simulations, GIS/GPS, office software, statistical/analytical software, programming software, electronic communication/collaboration, classroom presentation

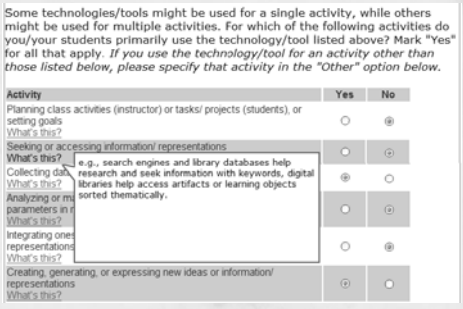
Form 3: Technology Information

- after selecting from *general* list, faculty write-in the name of the *specific* tool they are reporting
- GIS/GPS... ArcView
- Web page editor... Dreamweaver
- by having faculty report both a general and specific instance, search output is improved, since a searcher can retrieve all of the *specific* tools associated with a *general* type

Form 3: Technology Information

- the final selection on form 3 is the alignment of the reported tool with the 10 learning activities (i.e., is this tool associated with any of the following activities)
- pop-up displays with example tools help faculty interpret the activities
- after submitting this page, the reported tool can be associated with a general tool category and learning activities

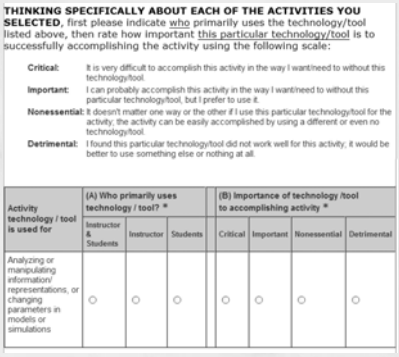
Form 3: Technology Information



Form 4: Detail of Activities

- form 4 is dynamic and built entirely from activities faculty select in form 3
- who uses the tool for each reported activity (faculty, student, or both)
- how important was the tool for accomplishing the activities (scale)
- provide examples of how faculty and/or students use tool for the activities (open-ended)

Form 4: Detail of Activities



THINKING SPECIFICALLY ABOUT EACH OF THE ACTIVITIES YOU SELECTED, first please indicate who primarily uses the technology/tool listed above, then rate how important this particular technology/tool is to successfully accomplishing the activity using the following scale:

Critical: It is very difficult to accomplish this activity in the way I want/need to without this technology/tool.

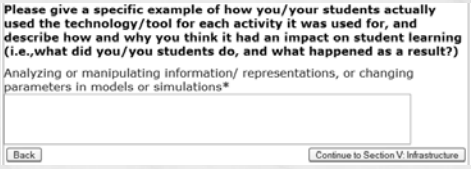
Important: I can probably accomplish this activity in the way I want/need to without this particular technology/tool, but I prefer to use it.

Nonessential: It doesn't matter one way or the other if I use this particular technology/tool for the activity; the activity can be easily accomplished by using a different or even no technology/tool.

Detrimental: I found this particular technology/tool did not work well for this activity; it would be better to use something else or nothing at all.

Activity technology / tool is used for	(A) Who primarily uses technology / tool? *			(B) Importance of technology /tool to accomplishing activity *			
	Instructor & Students	Instructor	Students	Critical	Important	Nonessential	Detrimental
Analyzing or manipulating information/ representations, or changing parameters in models or simulations	○	○	○	○	○	○	○

Form 4: Detail of Activities



Please give a specific example of how you/your students actually used the technology/tool for each activity it was used for, and describe how and why you think it had an impact on student learning (i.e.,what did you/you students do, and what happened as a result?)

Analyzing or manipulating information/ representations, or changing parameters in models or simulations*

Back | Continue to Section V. Infrastructure

Form 4: Detail of Activities

- after submitting this form, the reported tool can be associated with a general tool category, activities, users, an estimate of value, and various descriptions of use

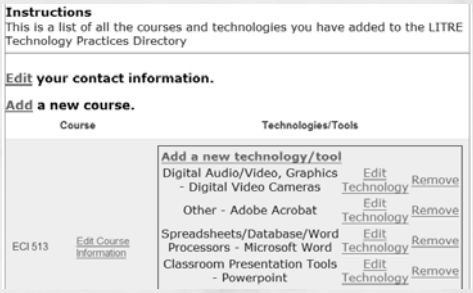
Form 5: Infrastructure

- check all that apply from a list of infrastructure items needed to support the reported tool (e.g., access to Internet in classroom, access to Internet outside classroom, computer labs)
- provide recommendations for any infrastructure improvements that would optimize use of the reported tool (open-ended)
- elect whether or not data can be displayed and made searchable in the public directory, and select where to go next

Summary Page

- after adding courses and tools to the directory, faculty log-in to see a summary page of courses and tools associated with their campus ID
- add/edit/delete courses
- add/edit/delete technologies

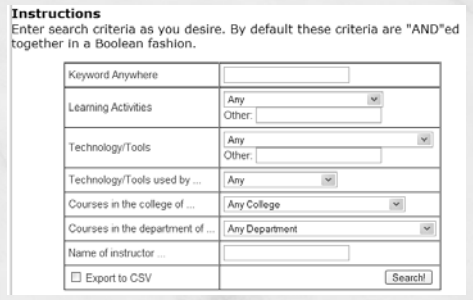
Summary Page



Search Page

- text fields provided to search for keywords or instructor name
- pull-down menus provided to search for tools associated with one of the 10 activities, one of the *general* tool categories, a specific user group (i.e., instructor versus student-oriented tools), a specific college, or a specific department

Search Page



Phase 3: Marketing and Release

Phased Release

- populating the directory with some good examples ahead of the general release was planned, since it was anticipated many in the general faculty would want to search and browse a few existing tool entries before diving in to share their own
- faculty awarded internal grants from the advisory committee or who were on the advisory committee were asked to complete tool entries for a course or two

Marketing Efforts

- Provost's office broadcast an email to all faculty on campus introducing the directory
- followed-up with a printed post card mailed to all faculty describing the purposes for the directory and inviting faculty to participate
- links added to several Web sites
- article prepared for campus newsletter
- follow-up phone calls from student workers deemed cost-prohibitive

Preliminary Findings

- live four months, 89 of 2000 faculty have visited and entered some information
- only half of these have completed a full tool-activity entry
- findings insufficient to generalize
- faculty tend to report "innovative" tools, not common, everyday tools like Word and Powerpoint
- not systematically capturing ALL tools used
- may be attracting only high-end tool users

One-to-One Evaluations

- individually contacted contributors and non-completers
- faculty report activities difficult to translate, particularly for hard sciences (directory modified to include tools that interact with physical artifacts, not just information)
- faculty reluctant to report the same tool two or more times for different courses; suggest a tool-level focus (challenge since tool may have different user or activity relation in different courses--need to capture course-specific information)

One-to-One Evaluations

- forms too lengthy, too time-consuming (some verbage and a few questions cut, but advisory committee is diverse with each group interested in different information; serving multiple masters)
- consideration of opening directory to non-faculty contributors (instructional designers, secretaries, etc.) to enter data on behalf of faculty; question as to whether they can make appropriate tool-activity alignments

Challenges and Opportunities

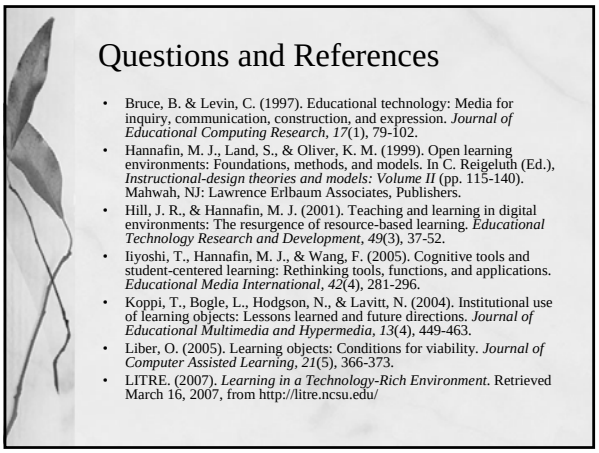
- difficulty launching portals as noted by learning object community
- lack of reward structure for developing learning objects and innovative teaching materials found to be a key barrier for faculty contributors to a learning object catalog (Koppi et al., 2004)
- to encourage a learning object economy, Liber (2005, p. 370) suggests a need exists to fund, support, and reward "communities of teachers committed to particular pedagogical approaches," and that the demand for objects will emerge from sustaining such groups

Ongoing Promotions

- need to achieve a critical mass of users
- enhancing directory to allow faculty to share links to their materials, encouraging sharing and contact
- walking faculty through their first entries during new faculty orientations and summer intensive technology workshops
- securing buy-in from deans and department heads to encourage participation (making data available about their colleges/departments); extrinsic motivators frowned upon by advisory committee

Potential Future Promotions

- funding communities around specific tools, as noted by Liber (2005)
- considering a reversal from top-down identification of faculty "experts" for leading workshops, to what it would take to foster bottom-up faculty-ran communities around tools of interest
- *MySpace*-like system allowing faculty to associate/connect their personal profile and tool entries with other peers and peer groups (e.g., affiliate yourself with the campus 'learning object' group; collaborate on grants)



Questions and References

- Bruce, B. & Levin, C. (1997). Educational technology: Media for inquiry, communication, construction, and expression. *Journal of Educational Computing Research*, *17*(1), 79-102.
- Hannafin, M. J., Land, S., & Oliver, K. M. (1999). Open learning environments: Foundations, methods, and models. In C. Reigeluth (Ed.), *Instructional-design theories and models: Volume II* (pp. 115-140). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Hill, J. R., & Hannafin, M. J. (2001). Teaching and learning in digital environments: The resurgence of resource-based learning. *Educational Technology Research and Development*, *49*(3), 37-52.
- Iiyoshi, T., Hannafin, M. J., & Wang, F. (2005). Cognitive tools and student-centered learning: Rethinking tools, functions, and applications. *Educational Media International*, *42*(4), 281-296.
- Koppi, T., Bogle, L., Hodgson, N., & Lavitt, N. (2004). Institutional use of learning objects: Lessons learned and future directions. *Journal of Educational Multimedia and Hypermedia*, *13*(4), 449-463.
- Liber, O. (2005). Learning objects: Conditions for viability. *Journal of Computer Assisted Learning*, *21*(5), 366-373.
- LITRE. (2007). *Learning in a Technology-Rich Environment.* Retrieved March 16, 2007, from http://litre.ncsu.edu/