Digital Marketplace Pilot Testing Report

Office of the Distributed Learning (ODL) Research Team
California State University San Bernardino (CSUSB)

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December 2008

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Purpose

The purpose of pilot test sessions was to gauge the functionality of the Digital Marketplace (DM) for a specific target audience, biology university faculty at the California State University San Bernardino (CSUSB). The test was conducted during the weeks of November 21 and December 1, 2008.

In order to provide recommendations grounded in a comprehensive picture of users' perspectives, findings from two other studies on the DM, conducted by the Office of Distributed Learning (ODL) research team at CSUSB, have been incorporated and merged into the findings from this pilot testing when they are relevant. [1]The first one is the expert reviews (three Instructional Technology (IT) Professors and one Business professor) conducted in the summer of 2008, and the second is the needs assessment study administered during the fall quarter of 2008.

A principal investigator facilitated each of the pilot test sessions, which included one test participant and two instructional designers (serving as co-investigators). Users were asked to generate a resource list for a Bio100 course they will teach.

The goal was to determine what is or is not working successfully on the DM from the users' perspective. We looked for information such as:

- Does the overall sequence of developing a resource list fit users typical workflow?
    - What paths do they take? Do those paths seem efficient to them?
- Do users use federated searches successfully?
    - If so, how fast and effectively do they perform?
    - What are key search parameters they look for?
    - Do users consider videos and images as viable instructional resources?
- How did they organize the search results? How do they want to manage/organize them?
- In what ways do users want to connect their resource list into their Blackboard site?
- Where do they stumble? What problems do they have? Where do they get confused?
    - What is missing when compared to Merlot and Google?

After each session of the pilot testing we conducted an open-ended general discussion period where users could share their thoughts on any aspects of the site or testing with us.

[1] For the detailed reports from the expert review and the needs assessment study, please contact the Office of Distributed Learning at CSUSB and/or Eun-Ok Baek at ebaek@csusb.edu.

Description of Methodology

Pilot Test environments:

- A studio at the Office of Distributed Learning (ODL) at CSUSB
- All users used a Laptop running on Window Vista.
- Brower: Internet Explorer version 7.0.5730.11
- Screen Resolution: 1024 X 768

Data Collection & Analysis Procedure:

- The principal investigator led the testing sessions and the two instructional designers observed each session and shared their impressions about users' comments and reactions to the DM.
- Entrance and exit surveys were administered before and after each pilot test session. Users were asked to sign a release form giving their permission for videos, audios, and notes to be taken and used for data-gathering purposes.
- Think-Aloud Protocol: The testing with Biology faculty members utilized a think-aloud protocol in which users were asked to verbalize their thought processes and the paths they took. They were asked what questions they had and where they were confused. Their body language and facial expressions were observed as well. When users identified a problem, the main researcher asked how it could be fixed.
- As a way to ensure credibility (Lincoln & Guba, 1985), peer examination and the disclosure of researcher bias were used. Peer reviews involved discussing emerging findings with the Director of the ODL, the two designers, and the DM project leaders.

Participants:

Status	**Web/Computer Experience**	**Teaching Experience**	**Experience of Using Search Engines to Locate Instructional Resources**	**Experience of Using Web Portals to Locate Instructional Resources**
Biology Faculty1	Experienced	41 years	Yes	Yes
Biology Faculty2	Experienced	26 years	Yes	Yes
Biology Faculty3	Beginner	12 years	No	No
Instructional Tech Faculty1	Proficient	36 years	Yes	Yes
Instructional Tech Faculty2	Proficient	17 years	Yes	Yes
Instructional Tech Faculty3	Proficient	15 years	Yes	Yes
Business Faculty	Proficient		Yes	Yes

Findings

Strengths

Overall, users felt the DM could be very useful in locating instructional resources. They greatly appreciated the opportunity to have a one stop shopping place to locate and organize instructional resources. Specifically, all three Biology professors who participated in the pilot testing made the following positive comments on the DM:

- It's great to have this tool. It provides more sources for my students.
- I like that it allows users to narrow down the search topics and areas compared to Google.
- I like about the site that it allows me to do a more focused search.

Weaknesses

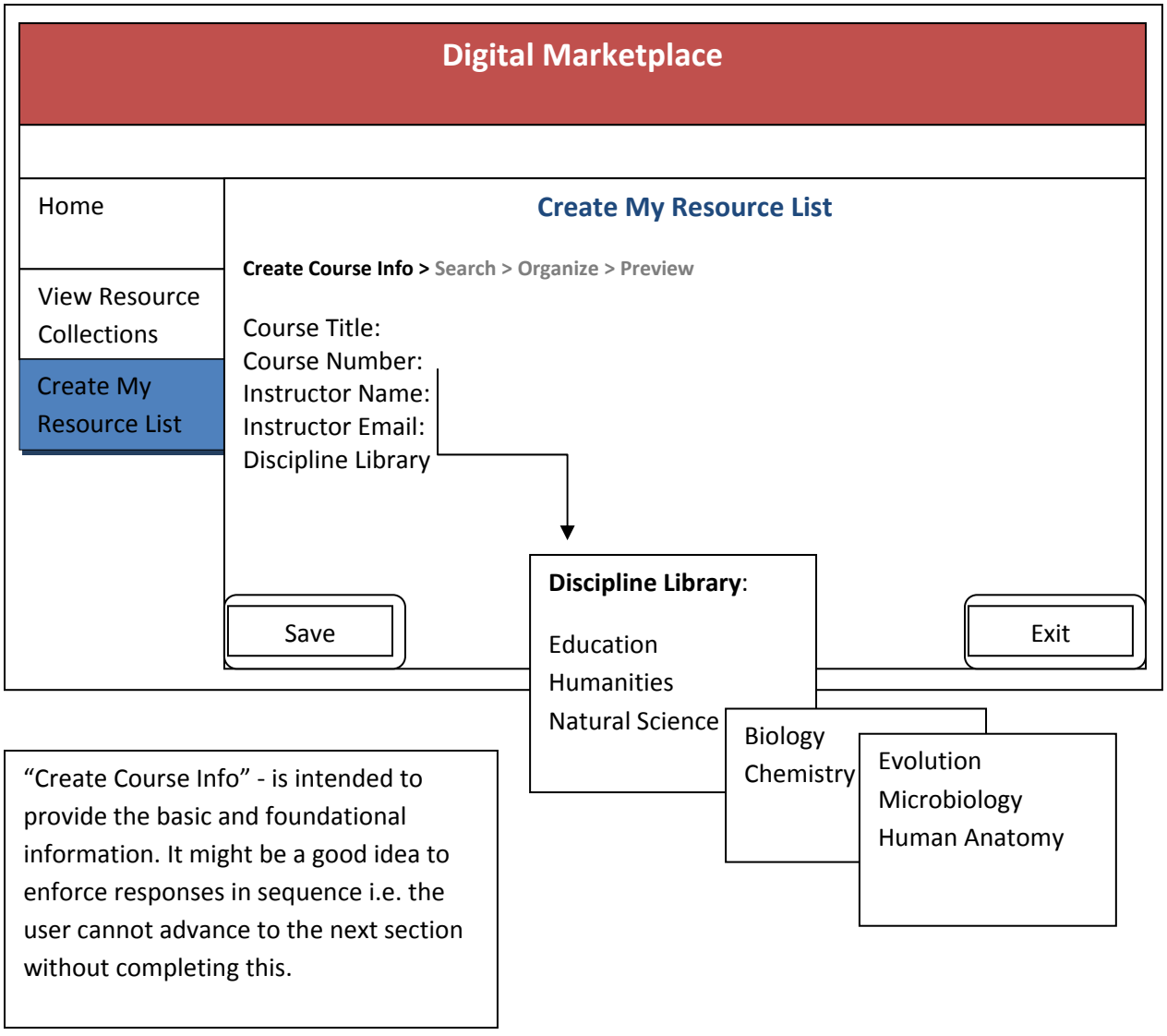
Both Biology professors and IT experts provided essential feedback for improving the DM. The comments they made have a great deal of commonalities. The following items highlight their feedback. The recommendations to improve them follow in the next section.

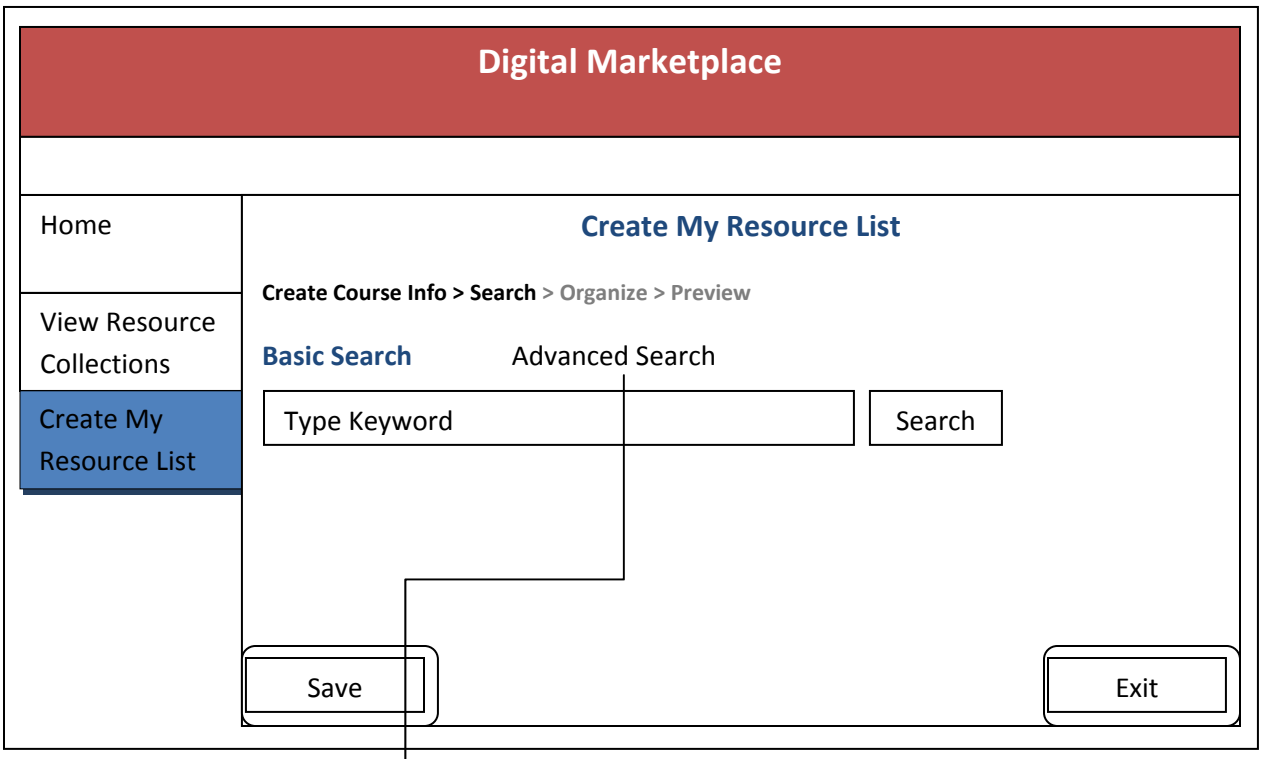
- Some users were frustrated by the navigation. They wanted the ability to navigate in a way that was more obvious and straightforward allowing them to immediately find the information they were looking for.
- A few users felt that some labels/vocabularies were not written for the target audience. Some vocabularies seem to have very different meanings to a person who is experienced in design vs. one who is novice to design – this was dependant on users' experiences (novice & expert users).
- All of the users had a hard time finding how to incorporate the resources they found into their resource list.
- The resources in the databases are not comprehensive enough compared to existing similar tools such as MIT OpenCourseWare.
- Some resources (e.g. Metalib- San Marcos Library) required users to provide their username and password in order to access them. A universal access code to the CSU libraries may be needed.

High Priority Recommendations

Items in this section significantly improve the functionality of the DM. The items addressed here were ones that stood in the way of the pilot testing. Considering the importance of designing the sequence of tasks based on users' mental model or task flow, the first recommendation will illustrate a suggested sequence of storyboards. Specific explanations and justifications for how the storyboards were created are detailed in the recommendations that follow immediately after the storyboard in this section.

The sequence of creating a unit list more congruent to a user's workflow. Some of the users created a Unit first and others searched the resources first. Users who searched resources first were confused with the sequence of the tasks. Users who started with the Unit creation seem to have had a bit easier time in the navigation, but they suggested a simplification of what they have to fill out in the Unit Information. When users click "Create a new Unit List," a window has to follow that allows users to create course information. Suggested solutions:





Advanced Search

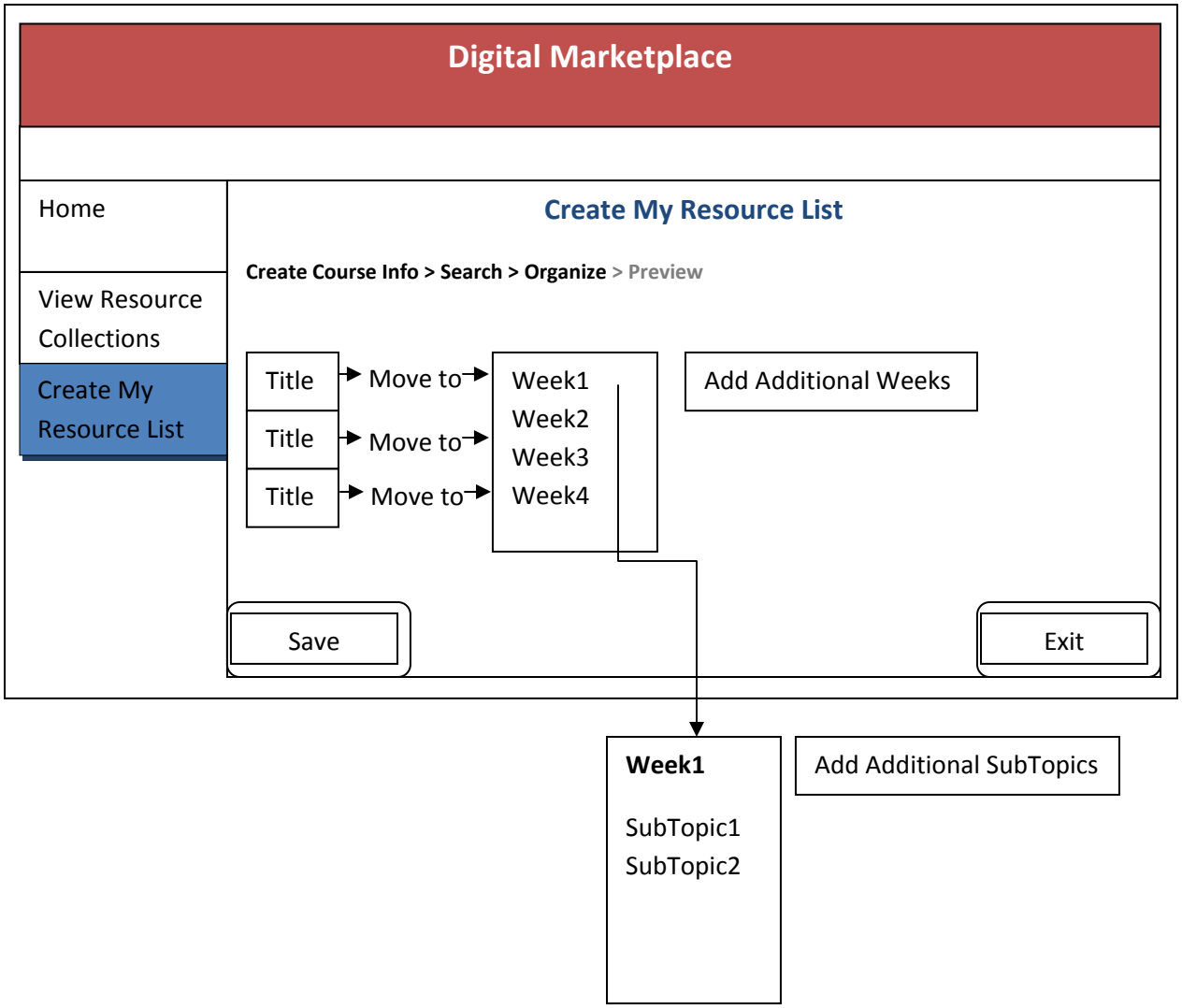
		in	Select a field
in		in	Select a field
or		in	Select a field

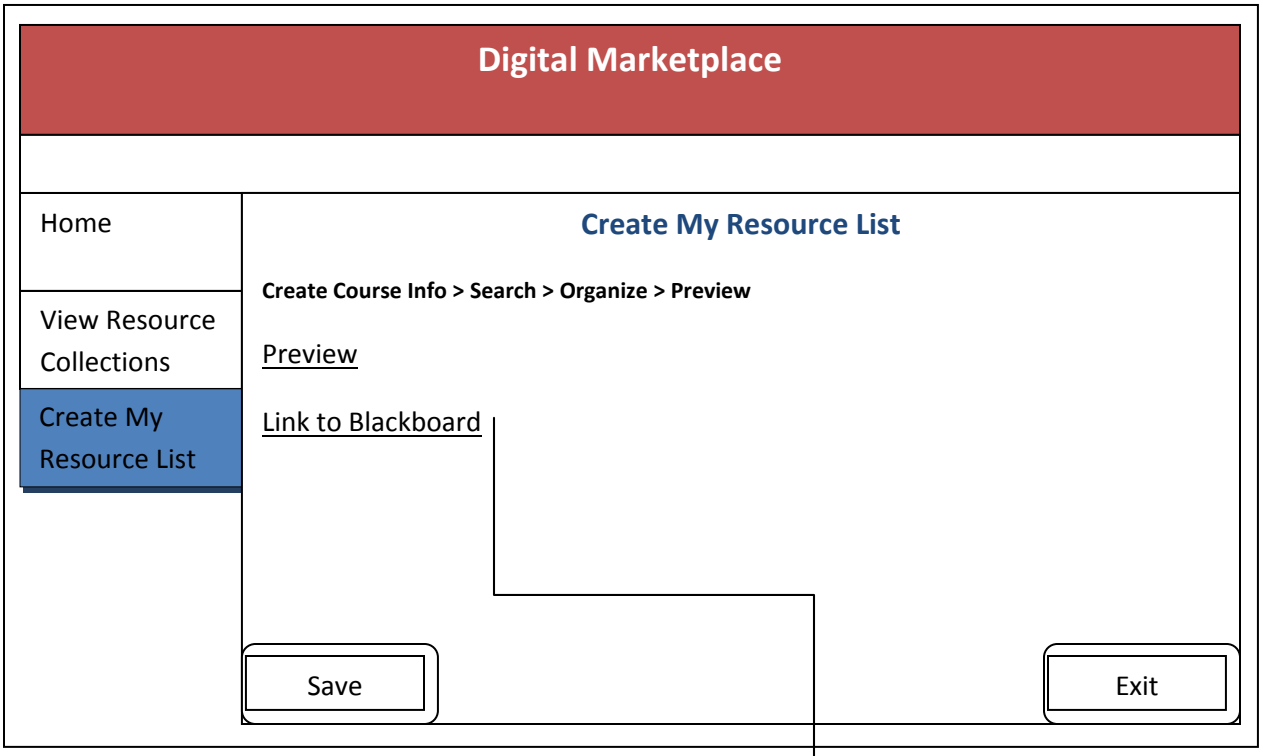
Peer Review

Submit Your Own Review

Search Results

Select to Incorporate	Title	Author	Publication Year	Source	Resource Type	Price	Accessibility	Peer Review
☑	Hyper linked							
☑	Hyper linked							
☐	Hyper linked							


Digital Marketplace
Home
View Resource Collections
Create My Resource List
Create My Resource List
Create Course Info > Search > Organize > Preview
Title
Title
Title
Move to
Move to
Move to
Week1
Week2
Week3
Week4
Add Additional Weeks
Save
Exit
Week1
SubTopic1
SubTopic2
Add Additional SubTopics



Blackboard

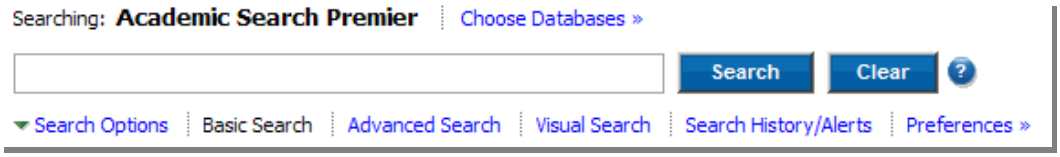
(The link may fit in Course Document and/or Assignments. Users should be able to copy and paste the URL of their resource list on the DM)

Course Document

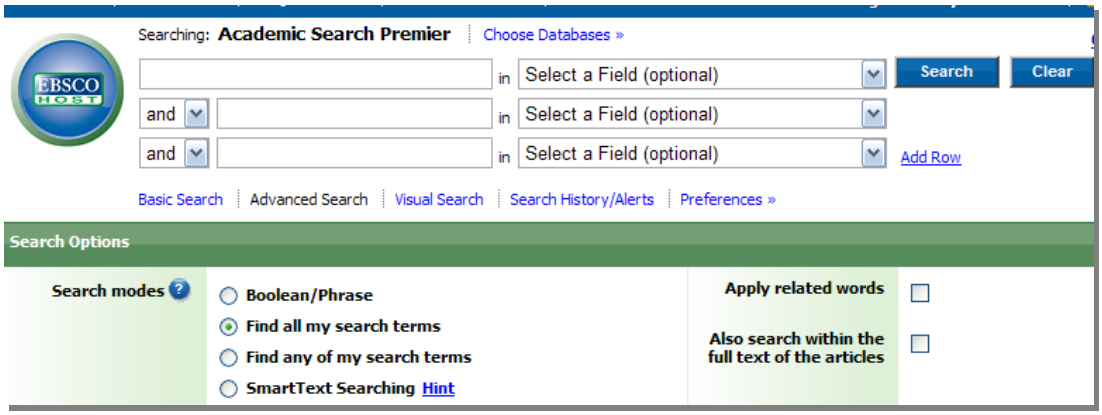
Assignments

Federated Search Page.

- Search fields: “author, title, any field” in “Find where” were clear to users. They did not know what “bib record #” and “call number” were in this context. Users suggested using a typical library search interface would be clearer. Suggested solutions:
    - Provide two options: Basic Search and Advanced Search.
    - Basic Search: One simple box that allows users to type any words



    - Advanced Search: Multiple boxes that allow users to choose multiple search parameters. It also provides Search Modes (Boolean searches).



- Add “Help”: Users wanted to have some support to use the search tool.
    - Provide “Help” page for the search page that explains 1) Basic Search, 2) Advanced Search, 3) How to improve search results, and 4) Booleans.
    - Template, manual, or road map to make it functional and to show the sequence.
- OSIDs: Users did not know what this word meant.
- Results per page: For the Default, users want to see 20 per page.

- Search Parameters: Users liked the current parameters (Title, Source, Resource Type, Price, Accessibility) included. They want to have the following additional ones.
    - Publication Year: The Biology professors emphasized the importance of knowing when the resources were published and updated with new information.
    - Target Audience: it could tell whether a resource is geared toward
        - College General Ed
        - College Lower Division
        - College Upper Division
        - Graduate School
    - Reviews from peers: social tagging
    - Resource Type: Specify it as Animation, Case Study, Journal, Lecture Notes, Photos, Simulation, Textbook (Open), Textbook (Publisher), Tutorial, Quiz, Video etc. In the case of videos add the length of the video (playing time).
    - Author Names
- Databases:
    - By default all of the databases available must be selected. Users in general did not know the DM allowed them to select all of the databases listed at once. The novice and advanced computer users did not know how to select all even after the facilitator told them that the option was available.
    - Add a button to allow users to select all of the databases available until users become familiar with what is available in each database.
- "View" puts the item in the unit list and closes the page of search results. Users had to start the search all over again when this occurred.
    - They want to be able to stay on the search result so they could examine the rest of the resources. Add a frame to the resource viewing popup window that includes a button that would allow user to send that resource to the Unit List, while leaving the search window untouched.
    - Add a check box in front of each result that allows users to select titles they want to incorporate in their review of the sources and later would allow them to add the selected items into their resource list simultaneously.

- Buttons
    - “Cancel all and Exit” button: One of the users accidently clicked this button which discarded the entire unit he created over a two-hour period. A popup window said “Are you sure you want to discard all the changes you have made in the unit list?” It was too easy for the user to select the button and delete their work mistakenly.
        - The popup warning message must be made stronger and clearer.
        - A two-step procedure should be set-up to execute the deletion.
        - Do not place “Cancel all and Exit” right next to the Save button. Put it in a place that is more difficult and deliberate to find.
    - “Done” & “Save all and Exit”: Users did not know the difference between the two. Keep only “Save”

- Font size & color
    - Users were favorable about the size of the font. They were unfavorable toward the blue text of titles in the search result. There should be more color contrast between the white background and blue text color.

Add or edit groups Page:

- Add subtopic groups within each week's topic. Usually a few topics are covered in each week. Users wanted:
    - Week 1
        - Subtopics
        - Subtopics
    - Link the resource list page to the edit group page – that way users do not need to leave the resource list page and can organize the list by weekly topics.
    - By Default, provide a collapsed view of Weeks, Assignments, Course Materials, and Examination Papers. Some users never viewed the categories below Weeks that would take them to the assignments and so on.

Linking to Blackboard or the Instructors Website

- Add the Link to the DM in Blackboard under Course Documents and Assignments.
    - Users thought that the placement of the link would depend on the purpose of assigning the resources to students. If they wanted their students to do something (presentation and/or writing a report), they would put in the link under Assignments. If they wanted students to read before the class, they would put the link in Course Documents.
- This functionality should be tested in the next round of pilot testing.

Unit Information Page:

- Allow same Unit code name: Two Biology professors wanted to create a unit entitled Bio100. When the second professor attempted to do that, the DM did not allow it and forced him to name the Unit differently.
- Subject library: One user told us that she did not know what this means. Change it to "Discipline Library"
- Teaching period:
    - What if they will teach a course all year around?
    - Add "quarter" as an additional option
- Simplify the page by keeping only must haves. The following was suggested:
    - Course Title
    - Course Number
    - Course Instructor (Name, email, institution)
    - Discipline Library: After selecting the general discipline area, allow users to select the more specific discipline areas that are related to their materials.
        - Business & Public Administration
        - Education
        - Humanities
        - Natural Science & Technology (Biology-> Evolution, Microbiology, Human Anatomy)
        - Social Studies

Terminology should be more intuitive. Users in general found that the terminologies used need to be clarified and reflective of what is typically addressed by users. In addition, users mentioned having users provide the vocabularies. The following show the suggested vocabularies from the participants.

Current Terminology	Suggested Terminology
Unit	Course
Code	Number
Group	Topic
View	Incorporate into My Resource List Import to My Resource List
Add new citation	Add new resource Add new website

Text Links with icons. Users preferred to have both icons and text together for links. This is congruent with studies supported by dual coding theory.

- Make sure the text links are combined with relevant graphics or icons.

Back Button should be more intuitive. Novice and experienced computer users did not know how to go back to the previous page, and clicked the back button on the browser without confidence. Suggested solutions:

- Add Back Buttons to each page of the suggested sequence.
- Make the back button just go back to the true previous screen.

Second Priority Recommendations

These recommendations do not greatly enhance the functinality of the DM for this pilot. They can be considered if there is time, otherwise they should be reviewed prior to any future DM projects.

- Provide easy ways to contribute users' resource lists to the DM. Refer to Merlot's "Contribute A Material" section.

Step1	Step2	Step3	Step4	Step5
Title & URL	Description	Category	Author	Optional Information

- Page Title Suggestions: Some pages are missing their page titles. Suggestion:
    - Assign titles at top of each page. Make sure they are intuitive and accurate.
- Add something on the home page to connect all the pieces in the DM with the subject categories (Business, Education, Humanities etc).
- Add help link/mini tutorial at the beginning.
- Bookmarks. Add the ability to bookmark pieces and do further in-depth review/research of instructional materials from the federated search results later.
- Add bread crumbs to the show Browse Path users take.
  e.g. All > Science and Technology > Biology > Evolution

Conclusion & Recommendations for Future Development

In summary, there are essentially three distinct areas that have been identified as being problematic in some way: 1) Design issues, 2) Content Issues, and 3) Language issues.

Design issues have been discussed in detail in the earlier section, from button placement and design to navigation schema, the task sequence that fits users' workflow, the need for a "help" area complete with tutorial, and a greater selection of search parameters. It might be a good idea to combine forced and free navigation depending on the necessity of the information. For example, in the suggested sequence of "Create Course Info," it might be necessary to enforce responses in sequence, i.e. the user cannot advance to the next section without having completed this one as it is intended to provide the basic and foundational information.

The content issue is straight-forward. At this very initial pilot testing stage, there is not sufficient breadth or depth in the sample content to convincingly demonstrate that the final product will in fact be a superior tool to what is already available. The promise of extensive databases, "in-house" resources, repositories and archives is only partially demonstrated. What is more, the real "value-added" of this aspect of the tool is supposed to be the publishers' content that will be made available. It seems crucial that the DM get official buy-in from at least some publishers at this point and that they immediately provide some "demonstration content". This can also provide a demonstration/example of specific cost savings for students as opposed to merely being told that the savings will be substantial.

The language issues in the prototype are – in a word – huge. There are terms that are unfamiliar and bewildering, and ignore all established nomenclature conventions, e.g. "bib record #". There are terms that lead to unwanted response, e.g. "view", to add an item to the list and then to make matters worse closes the page. There are terms that are ambiguous and/or are used in ways that are not identical to those of the viewer, e.g. "citation", when what is intended is to add a resource or an URL. These can be easily fixed by going through the entire site and doing a language edit that identifies and replaces problem terminology or language use and uses "common" convention for additional terms.

It is strongly recommended that iterative testing and design revision be done, using actual users to test the system and help identify functionality problems. Interface and functionalities go hand in hand. An interface designer should use an engineering model to find the usability/functionality problems after examining a task analysis of potential users. With such information, a first interface design can be proposed and the interface designer would then use an engineering model to find the functionality problems in the interface. Design problems revealed by the engineering model may be further tested in the actual testing with users.

Using GOMS (Goals, Operations, Methods, Selection Rules) engineering models for usability/functionality prior to conducting actual empirical testing can be beneficial (Kieras, 2006). In general GOMS is very much a traditional "engineering" modality that sees projects as engineering problems first and foremost. GOMS engineering models have gone through many generations and there are variants of GOMS evolved with development in software engineering (Natural GOMS Language (LGOMSL), Cognitive-Perceptual-Motor GOMS (CPM-GOMS). The thrust is on having a "working" proto-type that shows the projects' functionalities and that can be made to "look nice" and more sophisticated later on. The emphasis is on a demonstration of function. Refining the design and accommodating it to user input should be a priority of the DM team.

The future development of the DM can benefit from instructional designers and faculty as essential full-time members. Their input is as necessary as that of the programmers and software engineers. It would be an extremely daunting task to fully utilize the participatory design approach with limits of time and resources. Nonetheless a broad framework of participation in transverse as well as long-term collaboration that would facilitate users' ownership and leadership roles (so as to eventually support a systemic change in education) should be considered. Participatory design, or "cooperative design," starts with the creation of shared visions, design goals, and a development prototype that reflects the needs of both users and user representatives.

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