

NEEDS User Study - June 2000
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Summary

During the American Society for Engineering Education's (ASEE) annual meeting held in St. Louis, MO. The NEEDS evaluation staff undertook a user study. The purpose of this study was to identify how currently registered users and new users approach and use the site. Fifty registered users were invited to participate in the study via an email invitation. Additional participants agreed to participate in the observation study.

The study took place at the NEEDS booth on the exhibition floor of the conference center. Participants were asked to work at the site in much the same way they would if they were at home or in their office. A 'movie' of their work was made using Snap Z 2.0. This software was programmed to record a screen shot of the computer screen every two seconds. Additionally, it recorded participant comments. Participants were asked to talk out loud and explain what they were doing and why. An evaluation staff member sat with the participant throughout the observation and prompted the participant to talk out loud with questions that encouraged them to speak. The participants worked at the site for 15 to 20 minutes, after which they complete a survey and a short informal interview with the observer regarding their experience. Four very diverse types of users participated in the study - two new to the site and two users who frequently visited the site, and each represented a different member of the engineering education community.

The results of this study are reported in profiles of the users. These profiles have been built by combining user observations, a summary of the informal interviews, and survey results. Because of technical problems with the software, no verbal recordings or 'movies' were recorded. Each participant has been assigned a pseudonym in order to protect his or her identity.

Results

Participant A:

Education Technology Coordinator for K-12 Engineering Education (Kate)

Kate coordinates educational technology for a K-12 engineering education program in a private, relatively small (between 2,000 to 5,000 undergraduates) institution. This institution's mission centers around both teaching and research. Kate is a regular user of the Web. She reports that she uses the Web weekly to find learning materials and visits NEEDS about two times per month for the same purpose. As a regular user, Kate reports using the Web to do the following:

- locate information associated with my profession

- communicate with my professional colleagues
- be an instructional resource for my students
- browse for recreational purposes
- collect course information for my students
- learn more about teaching

With regards to teaching, Kate uses the Web as a means for students to submit their work and as a way for her to disseminate information. She describes herself as a frequent developer of computer-based instructional materials, and occasionally uses materials developed by others 'as-is' or she modifies them to meet her needs.

Potential services offered by digital libraries for educators are diverse and possibly unique to that library. The following table summarizes how Kate felt about the digital library services that NEEDS currently offers or is considering implementing.

Extremely Useful	Useful	Not at all useful
<ul style="list-style-type: none"> • provide instructor's manuals or directions • highlight award winning materials • ability to download software/courseware 	<ul style="list-style-type: none"> • comment or user reviews • a personal profile system • ability to communicate with peers via moderated discussions • ability to search by subject heading • ability communicate with peers via asynchronous discussions • ability to browse by subject heading • expert/peer reviews • keyword search and recursive search headings. 	<ul style="list-style-type: none"> • ability to communicate with peers via live chat

Kate's description of her experience using NEEDS was positive. For the most part she found it easy to navigate, the search function was easy to use, she felt she would return to NEEDS to look for engineering learning materials, and she reported that she would bookmark the site on her computer. She commented that she: "easily found topic matter, but it wasn't always as helpful as I thought." With regards to the information describing the results of her search she commented that she would like more information on the type of learning object, for instance is it a Website or software? Kate noted that she would recommend NEEDS to her colleagues, however, she comments that they have already begun to use it because they are "looking for a basis for our on-line learning."

Kate's specific comments regarding the importance of methods for sorting search methods revealed that she did not find it important to know the author or publisher of

the materials. She thought that title, score, publication date and modification date were all very important searching methods by giving them a rating of '4'. Please note that these methods of searching were rated on a scale from '1' = not at all important to '5' = extremely important. She felt that the author's name and publisher were not important at all. While working at the sight, the observer noted that she was particularly interested in knowing more about the platform associated with the learning object. Kate felt that this information should be given in the results. The observer noted that she talked about the need to be able to search by platform. The observer suggested going to the advanced search to do so. With regards to the results of her searches, she felt that when you click on 'resource' to get more information, you should be able to link to applications such as acrobat.

Kate, unlike others in the field found NEEDS rather serendipitously through a search engine. In general, she things that NEEDS is 'great.'" She goes on to say, "I would love to see more k - 12 Engineering Activities and information. And, I'm dying for the pedagogy portion to be implemented." In particular, she noted to the observer that she would like to see lesson plans, quizzes, and examples of how the learning object was used.

In summary, Kate's comments show that as a regular user she knows how to use NEEDS efficiently and effectively. Her comments regarding NEEDS content and her desire for more information regarding pedagogy, reflect the need for NEEDS to diversify its contents and broaden its audience. Her comments also reflect the need to introduce services designed more specifically around the issues associated with engineering pedagogy and learning.

Participant B:

Associate Professor of Engineering, Materials Science (Sarah)

Sarah is a Materials Science professor in a large (over 10,000 undergraduates enrolled) public institution. The institution's mission centers around teaching. While Sarah uses the Web frequently, she does not use it frequently to find learning materials, visiting it only once a month or so for that purpose. She has never used or visited the NEEDS site. She reports using the Web mainly to do the following:

- locate information associated with my profession
- be an instructional resource for my students
- browse for recreational purposes (She noted that she looks for information on recreational resources.)
- collect course information for my students

Sarah might be considered more of a novice when it comes to using computer based learning materials. For the most part, she reports she has not developed her own

materials, instead relying upon materials developed by others that she uses as is, making not modifications.

Sarah’s view of the usefulness of potential digital library services or programs reflect her lack of knowledge about computer based learning materials, as can be seen by her desire for services that provide a user with information about how to use a particular learning object. She also noted that she did not know what a personal profile system was, or what recursive searching meant. The following table summarizes how Sarah felt about the digital library services that NEEDS currently offers or is considering implementing.

Extremely Useful	Useful	Not at all useful
<ul style="list-style-type: none"> • comment or user reviews • provide instructor’s manuals or directions • ability to search by subject heading • browse by subject heading • expert/peer review • keyword search • ability to download software/courseware 	<ul style="list-style-type: none"> • highlight award winning materials • ability to communicate with peers via moderated discussions • ability communicate with peers via asynchronous discussions 	<ul style="list-style-type: none"> • ability to communicate with peers via live chat

Sarah’s description of her experience using NEEDS was positive. For the most part she believed that she could find what she was looking for - she noted also that ‘a lot of non-useful stuff also showed up.’ She felt the search function was easy to use, that the results of the search gave her enough information from with to make decisions about more closely examining a learning object. She found the site easy to navigate and had not problems figuring out how to use the site. In comparison to NEEDS, she did not find commercial sites easier to navigate. She indicated that she would return to NEEDS to look for engineering materials and will bookmark the site on her computer.

As a newcomer to the site however, she did have some misgivings. She was hesitant about recommending NEEDS to her colleagues because of the lack of content regarding materials science. She did not get far enough into the site to be asked to register, so she indicated no strong opinions regarding the NEEDS registration system. She did indicate that she did not wish to register before using a site. Lastly, with regards searches, she had no opinion regarding the ability to search using a subject thesaurus. This again, may be a reflection of her lack of knowledge about using the site.

Sarah’s ratings regarding the importance of search methods revealed that she found the most important methods to be by title and author. Those methods that were not important to her were publication date, modification date and publisher. These methods were ranked as either a ‘1’ or ‘2’. (Rating scale from ‘1’ = not at all important to ‘5’ = extremely important.)

Sara had heard about NEEDs from multiple sources, most likely the Frontiers in Education conference and as a meeting sponsored by NSF regarding technology and science, math, and engineering education held in July 1999. It should be noted that neither of these sources of information piqued her interest enough to visit the site. The first time she had visited the site was during the observation study.

As a result of her first visit, she found the site to be moderately useful. She noted that this would change if: "it contains more and more links, it will become more and more useful. There should be one repository. Peer reviews are very important." As a new user she commented to the observer that she felt she needed more tips on how to use the sight. She recommended including some sort of 'button' that new users could click on to get information on how to use the site. When the help site was pointed out to her, she was 'luke-warm' to it. She definitely preferred something she could 'connect' to, that indicated to her more of a personal connection.

Sarah's experience as a new user illustrates the need to spend time with a sight to learn how to use it to meet one's own needs. It points out however, the need for the sight to keep the new or novice user in mind by making 'help' information extremely visible and easy to find. Sarah's experience also highlights the impact of content (or lack of content) may impact a user's desire to return to a site, or to find it useful. Interestingly, Sarah did not discuss or did not seem concerned with needs to connect with others via the site. This too may reflect her general inexperience with using this site (or other web sites) for this purpose.

Participant C:

Engineering Graduate Student (Chen)

Chen is a graduate student in mechanical engineering at a large (over 10,000 undergraduates enrolled) public institution. The mission of this institution focuses on both research and teaching. Chen is a regular user of the web visiting it weekly to search for learning materials. He has never visited NEEDs. When he uses the web to do the following:

- locate information associated with profession
- communicate with professional colleagues
- be an instructional resource for students
- browse for recreational purposes
- collect course information for students
- learn more about teaching

As a user of computer based learning materials, Chen can be described as an expert since he designed and uses his own materials as well as occasionally using those developed by others as is. Interestingly, he reports creating his own materials or only using others as is, he does not modify other's materials. He reports that the site www.emet.ou.edu has been useful in providing him materials.

Chen's view of useful digital library services or programs varies. He noted that three diverse services would be extremely useful to him: highlighted award winning materials, the ability to communicate with his peers via moderated discussions and the ability to search by subject heading. He, perhaps more than other's in the observation study see the site as a place that has multiple purposes, i.e., as a repository of all levels of quality materials and as a community. Chen had no opinion regarding the ability to download materials, and did not understand what 'recursive search' meant. The following table summarizes how Chen's opinions regarding the kinds of digital library services NEEDS currently offers or is considering implementing.

Extremely Useful	Useful	Not at all useful
<ul style="list-style-type: none"> • highlight award winning materials • ability to communicate with peers via moderated discussions • ability to search by subject heading 	<ul style="list-style-type: none"> • comment or user reviews • provide instructor's manuals or directions • personal profile system • ability to communicate with peers via live chat • browse by subject heading • expert/peer review 	<ul style="list-style-type: none"> • ability communicate with peers via asynchronous discussions • keyword search

Chen's experience using NEEDS seemed to be mixed. While he tended to have a positive experience, he found what he was looking forward, thought the search function was easy, thought it was easy to navigate, will bookmark the site on his computer and will return to NEEDS to look for engineering learning materials, he also had some mixed opinions about other aspects. He felt for example that the search results did not give him enough information about the courseware. He suggested adding pictures to the description. He also indicated that he does not prefer free text queries. The registration requirement also hindered his use, though he did not explain why. He was consistent in his dislike of registration by his strong opinion that registering prior to using a website hindered his use. He had no opinion regarding recommending the site to his colleagues, the use of subject thesaurus in searching or whether commercial search engines are easier to use than NEEDS.

Chen's ratings regarding the importance of search methods revealed that he found the most important method was to sort by title. In contrast, he rated author and publisher as a '2', very close to being not at all important. (Rating scale from '1' = not at all important to '5' = extremely important.) He felt that the score, publication date, and modification date were all very important methods for sorting results.

Chen had heard about NEEDS by visiting an ASEE showcase. He had no opinion regarding the usefulness of NEEDS.

Chen's experience may be illustrative of many student users, regardless of status, i.e., undergraduate or graduate. His responses to the overall usefulness of NEEDS and services indicate that he has a sophisticated understanding of how search engines work, but does not seem to have as strong an understanding of how he might use the materials found within the site. This may be an indication that the materials are not, to date, user friendly to students, or that he has not been in a situation where he is looking for materials to help students learn.

Participant D:

Engineering Professor (Chiang)

Chen is an associate professor of Mechanical Engineering at a large (over 10,000 undergraduates enrolled) public institution. The mission of this institution focuses on both research and teaching. Chiang uses the web fairly frequently, but only uses it to find learning materials one a month or so. He had only used NEEDS one or two times before volunteering to participate in this study. He uses the web to do the following:

- locate information associated with profession
- communicate with professional colleagues
- be an instructional resource for students
- collect course information for students

Chiang can be described as an expert in using computer based learning materials since he reports that he has frequently designed his own computer based learning materials as well as using others frequently, as is. He occasionally uses other's materials after modifying them. He uses them primarily to "demonstrate real-world applications and state of the art technology". He finds it helpful to use computer learning materials to enhance visualization of lectures and as a way to simulate what he's talking about.

Chiang view of useful digital library services or programs are diverse. Those that he believes would be extremely useful include pedagogical as well as searching aids. He does not think a personal profile system would benefit him as all, and he had no opinion regarding the ability to communicate with peers via a live chat. He added that once search that he feels is important is archiving data. The following table summarizes how Chiang's opinions regarding the kinds of digital library services NEEDS currently offers or is considering implementing.

Extremely Useful	Useful	Not at all useful
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- comment or user reviews
- provide instructor's manuals or directions
- ability to search by subject heading
- browse by subject heading
- keyword search
- ability to download software
- highlight award winning materials
- ability to communicate with peers via moderated discussions
- ability communicate with peers via asynchronous discussions
- expert/peer review
- recursive search of subject headings
- personal profile system
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Chiang's experience using NEEDS is positive overall. He felt strongly that he would return to NEEDS to look for engineering learning materials. While he did not rank any other aspects of his experience in working with NEEDS as highly, he did indicate that he thought it was easy to find what he was looking for, the site was easy to navigate and he will bookmark NEEDS on his computer as well as recommend it to his colleagues. With regards to the results from his searches, he noted that he felt the summary of results did not 'necessarily provide enough information about whether the software was useful or not.' He indicated that in his searching he preferred to use free text queries and that the current registration requirement did not hinder his use. He did indicate that he did not prefer to register prior to using a service. In fact, he seemed very willing to register and commented to the observer that it was difficult to find out how to register to use NEEDS. He felt this should be more 'up front' and perhaps included in an information section. That's where he would go first to learn about using the site. When comparing the NEEDS site to those of commercial Web search engines he felt they were about the same.

Chiang rated the importance of search methods in the following order. The title was extremely important while publication and modification dates were next. He commented to the observer that the materials on thermo and fluids were out of date. The first filter (after topic) he used in sorting materials was it's date. He felt it would be helpful to note the cataloging date. Of least importance was the author. He questioned the importance of the score because he wasn't sure what it reflected. He wondered if it was in reference to the quality of the material. He also felt the publisher was not very important. (Rating scale from '1' = not at all important to '5' = extremely important.) He suggested that NEEDS add some sort of preview feature that users could look at before making a decision to download a learning object.

Chiang had heard about NEEDS by visiting an ASEE showcase and from NSF. He is a member of one of the engineering Coalition, SUCCEED. He reported that he felt that most faculty don't know about NEEDS, that you have to search to find it and find out about it. He felt that NEEDS should be more aggressive in promoting itself and demonstrating to faculty how to use it. In general he thought NEEDS was very useful.

Chiang may reflect many faculty user's experiences. They find it useful, and would like it to be more helpful. Much of this feeling is based on the desire for more content. As a frequent user of computer based learning materials, he was patient with some of the problems associated with the site (during the observation study, the network was very slow, making searches difficult and time consuming.)

Discussion

While each of the profiles described in this report reflect different types of users - they do report some common opinions and experiences in using NEEDS. The small sample size makes it impossible to interpret these findings with any certainty, but they may give us some insight into our user base. It seems clear that those people who will use NEEDS are also those who go to the Web to search for courseware or computer based learning objects on a fairly regular basis. The two faculty members who participated searched for learning materials on a monthly basis. The other two searched the web weekly. The frequency of searching may reflect the different purposes of the search. For example, faculty plan courses in advance of offering them. It requires time to learn new computer based learning materials. This is not something that a faculty member can 'spring' on a class. However, they might make resources available to students as supplements or tutorials. One of the other users reported working on a specific project to identify useful resources. Here too, her frequency of use shifts with need.

Overall, no one reported a bad experience in using NEEDS. They had suggestions for improving the sight, which for the most part had to do with providing more information in the description of the learning objects in the search results, and increasing the number of holdings. There is no consistent result regarding the impact of the registration requirement. This may be a result of the method used in this study. Users were simply not given enough time to actually download something and examine it. Impressively, all participants said they would bookmark the site and almost all noted they would recommend it to their colleagues.

The 'language of search' being the descriptors commonly used by site designers and digital library researchers confused the participants. Most participants did not know what 'recursive search' meant, and once explained did not feel it important. For the most part, participants simply searched for a topic related to their field or discipline. The results of this search tended to be broad and lacked focus. There is no reason to believe that in other situations they would search any differently. Three of the participants had no opinion about the value or usefulness of a subject thesaurus to their search efforts. The most common and important elements to sorting a search were in order of importance: title, publication date, modification date, and score. Surprisingly, and in contrast to results reported in focus groups, author was not rated highly. This again, may be a result of the small sample, as well as the type of user. (The focus group participants were mainly faculty who may put more weight on the author with regards to establishing status or expertise in a particular field.)

The interpretation of the results of this study is somewhat hampered by the failure of the software to record the actions of the participants. These data, had they been recorded would have given us a record of actual behavior with regards to the participants' actions, and comments regarding their experience. The survey results summarize their opinions, but do not provide the rich record of their actual actions. Further observational studies should be implemented to explore specific aspects of the site. These studies should also be longer and more structured. For example, novice users should spend more time learning about the site and then attempt a specific download and register. More experienced users should be observed to see what services they use most frequently and where they have trouble. The profiles developed in this study can be used as a template for future observational studies and more profiles should be developed and used as a source for design and site review.