

Phase I - Volume II - Appendices

Increasing Effective Student Use of the Scientific Journal Literature

National STEM Educational
Digital Library Program

Sponsored by the National Science Foundation
As part of the National Science Digital Library

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1. Samples of Participant Email Contact

1.1. Email #1: Faculty Previously Contacted

You may recall in Spring 2000 we discussed by email your participation in focus groups for a National Science Foundation research project for which I was submitting a proposal.

I am pleased to let you know that NSF has funded my two-year project " Increasing Effective Student Use of the Scientific Journal Literature". The NSF project is part of the National Science Digital Library (NSDL) Science, Mathematics, Engineering and Technology Education (SMET) initiative. The project is working to identify software features and instructional content that will encourage undergraduate students to use electronic scholarly journals. Phase 1 will consist of focus groups in Chemistry, Engineering and Physics to identify what students value in journals, how they use journals and what features of electronic journals they value or would like to have. Phase 2 of the project is to program and test some of those features. Staff from the Office of Scientific and Technical Information (OSTI) will be working with us.

I hope you are still available to participate in the focus group meetings. Your commitment would consist of attending a maximum of two focus group meetings this semester and 2 or 3 meetings next academic year.

Each meeting will include faculty participants from Physics, Engineering, Chemistry, and the Library, and will last approximately 1 ½ hrs.

In addition, I also ask you to recommend 2-3 lower division undergraduate students and 2 graduate teaching assistants who may enjoy participation in separate student-only focus groups. All focus group participants will receive a \$50.00 gift certificate at each meeting they attend.

When all participants are confirmed, I will send you more information and will begin the process of scheduling the meetings, most likely at the University Center.

Thank you for your consideration.

Carol Tenopir

1.2. Email #2: New Faculty To Contact

[Name] of [Name of College] has given me your name as a possible focus group participant in a National Science Foundation research project.

I am pleased to let you know that NSF has funded my two-year project "Increasing Effective Student Use of the Scientific Journal Literature". The NSF project is part of the National Science Digital Library (NSDL) Science, Mathematics, Engineering and Technology Education (SMET) initiative. The project is working to identify software features and instructional content that will encourage undergraduate students to use electronic scholarly journals. Phase 1 will consist of focus groups in Chemistry, Engineering and Physics to identify what students value in journals, how they use journals and what features of electronic journals they value or would like to have. Phase 2 of the project is to program and test some of those features. Staff from the Office of Scientific and Technical Information (OSTI) will be working with us.

I hope you will be willing to participate in the focus group meetings. Your commitment would consist of attending a maximum of two focus group meetings this semester and 2 or 3 meetings next academic year.

Each meeting will include faculty participants from Physics, Engineering, Chemistry, and the Library, and will last approximately 1 ½ hrs.

In addition, I also ask you to recommend 2-3 lower division undergraduate students and 2 graduate teaching assistants who may enjoy participation in separate student-only focus groups. All focus group participants will receive a \$50.00 gift certificate at each meeting they attend.

When all participants are confirmed, I will send you more information and will begin the process of scheduling the meetings, most likely at the University Center.

Thank you for your consideration.

Carol Tenopir

1.3. Email #3: Faculty Who Has Agreed To Participate

Thank you again for agreeing to participate in the NSF scheduled focus group investigating "Increasing Effective Use of the Scientific Journal Literature". We have commitments from faculty in Chemistry, Physics and Engineering to participate and we would now like to schedule the first focus group.

Please indicate which of these times would be best: Tuesday and Friday, 11:30-12:30, 1:00-2:00, 2:00-3:00, 3:00-4:00.

I have also attached the consent form for Human Subjects research for your review. You will receive one at the focus group, which will require your signature.

Sample questions relate to demographic information, percentage of time students are expected to devote to the use of electronic journals, how students choose which electronic journals to use, what features you believe appeal to students, what features you feel especially facilitate student use of electronic journals.

In your reply, if you have not already done so, please include the names of 2-3 lower division undergraduate students and 2 graduate teaching assistants who might enjoy participating in separate student-only focus groups. These participants will receive a \$50.00 gift certificate at each meeting they attend.

Thank you again and we look forward to getting this off the ground.

1.4. Email #4: Undergrad Students

You have been nominated by [Faculty Name] as a possible participant in focus groups for a National Science Foundation research project.

We plan to hold 2 focus groups meetings this Spring semester and 2 will be planned for 2003. Each meeting will last approximately 1 ½ hrs. and be held in the University Center. Refreshments will be served. A \$50.00 gift certificate to West Town Mall will be presented to each student at the conclusion of each meeting.

I am a Professor at the School of Information Sciences. My c.v. and personal information are available on my website at web.utk.edu/~tenopir. The project is working to identify software features and instructional content that will make electronic journals more useful for students.

This is an opportunity for you to actively participate in important research. Please let me know of your interest by the end of this week and which of the following times are best for you. Tuesday and Friday, 11:30-12:30, 1:00-2:00, 2:00-3:00, 3:00-4:00.

Thank you.

Carol Tenopir

1.5. Email #5: GTA Graduate Students

You have been nominated by [Faculty Name] as a possible participant in focus groups for a National Science Foundation research project.

We plan to hold 2 focus group meetings this Spring semester and 2 will be planned for 2003. Each meeting will last approximately 1 ½ hrs. and be held in the University Center. A \$50.00 gift certificate to West Town Mall will be presented to each participant at the conclusion of each meeting.

I am a Professor at the School of Information Sciences. My c.v. and personal information are available on my website at web.utk.edu/~tenopir. I have been awarded an NSF grant for a two-year project "Increasing Effective Student Use of the Scientific Journal Literature". The project is working to identify software features and instructional content that will encourage undergraduate students to use electronic scholarly journals.

This is an opportunity for you to actively participate in important research. Please let me know of your interest by the end of this week and which of the following times are best for you. Tuesday and Friday, 11:30-12:30, 1:00-2:00, 2:00-3:00, 3:00-4:00.

Thank you.

Carol Tenopir

2. Planning Information

2.1. Sample Participant Contact Table

College	Name/Title	Email	Contact Date	Agree/Disagree
xxx	xxx	xxx	mm/dd/yy	Yes/No
Notes:				
xxx	xxx	xxx	mm/dd/yy	Yes/No
Notes:				
xxx	xxx	xxx	mm/dd/yy	Yes/No
Notes:				
xxx	xxx	xxx	mm/dd/yy	Yes/no
Notes:				
xxx	xxx	xxx	mm/dd/yy	Yes/no

*The table has been left blank due to anonymity.

2.2. Sample Human Subject Consent Form

**The University of Tennessee
Office of Research
Research Compliance Services**

INFORMED CONSENT STATEMENT Increasing Effective Student Use of the Scientific Journal Literature

INTRODUCTION

You are invited to participate in a research study, the purpose of which is to gain an understanding of what features make a science journal article digital collection an important and interactive tool for sustained use by undergraduate and graduate students and faculty in the sciences.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

Consent forms are needed for focus group participation. An informed consent form is to participate in a single meeting. It does not obligate participants to participate again, or obligate the research team to extend another invitation.

The meetings will be tape-recorded and a graduate student will take notes. The purpose of the audiotapes, notes, and questionnaires are to gather insight of desirable and non-desirable features of scholarly science journals. To ensure anonymity, the transcription and note taking will **not** identify individuals by name. Instead, participants will be documented as speaker 1,2,3, etc. Confidentiality cannot be guaranteed in a focus group setting. However, confidentiality will be maintained to the best of our ability, but cannot be guaranteed.

All focus groups meetings will be held in U.T. meeting rooms. The length of time for each meeting is estimated between 1-1.5 hours but not to exceed 2 hours.

RISKS

There are no physical or mental risks involved to participants of the research project.

BENEFITS

Benefits include a better understanding of how faculty and students currently use scholarly journals in classroom and identification of features that encourage the effective use of scholarly materials in the future. Features identified in focus group meetings maybe added to electronic journal systems as part of the National Science Digital Library (NSDL).

_____ Participant's initials

CONFIDENTIALITY

Audiotapes, notes, and questionnaires will be in the safe keeping of the P.I.'s files in her work office. Access will be limited to those directly involved in the project and only granted for transcription or data analysis. They include: the P.I., two faculty co-investigators, and graduate students. All information in the study records will be kept confidential. In addition, consent forms will be stored for three years past the completion of the study at a UT location.

COMPENSATION

At the conclusion of each focus group meeting, all U.T. participants will be rewarded with a \$50 gift certificate to a local mall.

CONTACT INFORMATION

If you have questions at any time about the study or the procedures, (or you experience adverse effects as a result of participating in this study,) you may contact the researcher, Carol Tenopir, School of Information Sciences, 804 Volunteer Blvd. Knoxville TN, 37996, or reach her at 974-7911, or ctenopir@utk.edu. If you have questions about your rights as a participant, contact Research Compliance Services of the Office of Research at (865) 974-3466.

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at anytime without penalty and without loss of benefits to which you are otherwise entitled.

CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

2.3. Sample Focus Group Agenda

Total time: 90 min.

I. Introduction by Principal Investigator 5 min.

II. Consent Forms by Facilitator 5 min.

III. Ground Rules by Facilitator 5 min.

- Participants are not required to reach consensus on any of the issues raised during the focus group.
- If you want to agree, disagree, or give an example to follow up on something that someone has said, feel free to do that.
- There are no right or wrong answers. We will expect that you have different points of view. Please feel free to share your point of view even if it differs from what others have said.
- You need not only respond to the facilitator, you may have a conversation directly with another participant.
- I am here to ask questions, listen, and make sure everyone has a chance to share. If you are talking a lot, I may ask you to give others a chance. If you are not saying much, I may call on you. We just want to make sure we hear from all of you.

IV. Participants introduce themselves 5 min.

1. At the last meeting, several of you mentioned your favorite web search engines (for example, Google or Vivissimo). Starting where we ended:
 - a. What are your favorite search engines?
 - b. Why or what do you especially like about them?
 - c. What don't you like about them?
 - d. What could be improved?
2. What online database systems through the library do you use? For example, SciFinder, Web of Science?
 - a. What do you like about these systems?
 - b. What don't you like?
 - c. How would you improve them?
3. When you search these systems that only give you a citation to an article, how do you get the full articles?
 - a. Do you use linking features that take you to full texts of articles?
 - b. Do you use Interlibrary Loan?
 - c. Do you go to the periodicals and get paper copies?
 - d. Other?
 - e. What percentage of the time do you find the full text of articles is available online?

4. What electronic journals or electronic journal systems do you use?
 - a. Are they direct from the publisher?
 - b. From secondary information distributors?
 - c. When you search electronic journals, do you find articles relevant to your needs?
 - d. What do you like about electronic journals?
 - e. What don't you like about them?
 - f. What could be improved?
 - g. Are there search features, etc. that you would like to see offered? What?
5. What about the quality of content in electronic journals?
 - a. Is peer-review important for your area(s) of interest?
 - b. Compare the quality of content in online vs. print
6. Do you access eprints or preprints of journal articles?
 - a. Routinely?
 - b. Which servers do you use?
7. Do you use alert systems to notify you of new publications?
 - a. If so, which ones?

If there is time:

How important to you are the following features:

- Browsing
- Future citations
- Links to citations
- Links to future citations
- Links to references
- Machine readable data files
- Inclusion of color graphics and photographs
- Inclusion of video and/or sound files

VI. Thank yous and distribute gift certificates

5 min.

3. Focus Group Summaries

Focus Group #1: Pilot Focus Group

Date: February 19, 2002

Time: 1:00-3:00 pm

Place: University of Tennessee, University Center, Room 220

This meeting was a pilot group to test the logistics, agenda, questionnaire, timing, planning and scheduling so that any modifications could be made in a timely manner before the first formal focus group was held.

In attendance were: 3 Hodges Library/Faculty
(One from each of the field concentrations: Physics,
Chemistry, Engineering)
1 Principal Investigator
3 Members of the project team
3 School of Information Sciences observers
1 OSTI observer

11 Total

After discussions were held, comments and suggestions were collected from the observers for improvements and modifications to the focus group.

Focus Group #2: Faculty Focus Group

Date: March 12, 2002

Time: 2:30 p.m. – 4:00 p.m.

Place: University of Tennessee, University Center, Room 217

In attendance were: 4 Chemistry faculty
2 Physics faculty
2 Engineering faculty
1 Hodges Library Associate Professor
1 Principal Investigator
1 Consultant
3 Members of the project team
2 OSTI observers

16 Total

Focus Group #3: Graduate Teaching Associate Focus Group
Date: April 2, 2002
Time: 2:30 p.m. – 4:00 p.m.
Place: University of Tennessee, Temple Court, Room 101

In attendance were: 2 Physics
2 Chemistry
1 Principal Investigator
3 NSF Research Team

8 Total

Focus Group #4: Undergraduate Students
Date: Tuesday, April 30, 2002
Time: 2:00 p.m. – 3:30 p.m.
Place: University of Tennessee, University Center, Room 217

In attendance were: 3 Chemistry
2 Engineering
2 Physics
1 Principal Investigator
3 NSF Research Team
1 OSTI Observer

12 Total

Focus Group #5: Graduate Teaching Associates and Undergraduate Students
Date: May 21, 2002
Time: 10:00 p.m. – 11:30 p.m.
Place: University of Tennessee, University Center, Room 315D

In attendance were: 2 Chemistry
1 Engineering
3 Physics
1 Principal Investigator
1 Consultant
2 NSF Research Team
1 OSTI Observer

11 Total

Focus Group #6: Faculty
Date: May 21, 2002
Time: 2:00 p.m. – 3:30 p.m.
Place: University of Tennessee, University Center, Room 315D

In attendance were:

3	Chemistry
2	Physics
3	Hodges Library
1	Principal Investigator
1	Consultant
2	NSF Research Team
1	OSTI Observer
13	Total

4. Original Focus Group Transcripts

4.1. Focus Group #1: Pilot

Focus Group #1
Pilot Group
February 19, 2002

F Facilitator
P Participant
Q Question
A Answer
*** Unknown; needs clarification

F. The first thing I want to do is thank everybody for agreeing to participate in the project. The ultimate goal is to make electronic scholarly journals more useful for undergraduates, faculty and graduate students. In particular to classroom but also for research. We are going to be identifying how students and faculty use journals, the problems they have using print and electronic journals and then identify some features that can be added to electronic journal systems to make them more useful.

In the second year of the project, we are actually going to be implementing some of those features and test them. I hope you will stick with us for the two years and have a chance to test some of the features we identifying the focus groups.

The project is funded by the National Science Foundation and is part of the National Science Digital Libraries Scientific Technical Engineering and Mathematics Education Project. It is a division of undergraduate education at NSF. It is a two-year project and, as I said, we are going to be having focus groups the first year and then they will transform into usability testing as we actually look at some electronic journal features.

In conjunction with the Department of Energy Office of Technical Information (OSTI), they will actually provide test beds and programming staff. We are going to be working with them to implement some of the features.

[Introductions and explanation of each person's role]

As part of the Office of Research Human Subject Permission, all of the participants here have signed confidentiality agreements and so anything that is said within this room does not get identified but will remain confidential. We need to record it and take notes, but the names will not be reflected in the notes.

Before I turn this over for an explanation of what we are going to do today, we do have to ask each of you to sign an informed consent statement as part of the human subject procedure. Again, this is something we keep on file. It is part of the requirement from the

Office of Research. One of the things I need to point out to you is that you can decide not to participate at any time; you are not obligated. I hope you will stay with us and other focus groups.

[Confidential papers signed]

Before we begin, I want to give you some ground rules to keep in mind. There will be no right or wrong answers. We expect you will have different points of views, so please feel free to share whatever is on your mind. We will record the session because we don't want to lose any comments. Everything you say will be confidential. I don't want you to feel that you have to respond all the time. Please feel free to converse among yourselves. I am here to answer questions, listen and be sure everyone has a chance to talk. We want to hear from everybody, so if you are talking too much, I may ask you to let somebody else talk, or if you are not talking, I might ask you to give some input. I will go around the room and ask everyone to state their name and department or field.

[Personal introductions]

F. Do you require your undergraduates to read journal articles?

A. Depends on what level of class. Freshmen – no. I am just glad they read the textbook.

I make them read the articles that I write.

Juniors and Seniors – when appropriate.

F. Do you assign specific articles? General articles to read?

A. It depends on the type of class. For Seniors, it might allow people to choose their own topic to do their research. On the other hand, if we are talking about a Junior/Senior class in a certain area such as Chemistry, I might assign some articles for them to read and come back and discuss.

I know some professors that will hand them the articles, whether they require them to read it – probably not.

F. Do you have discussions in class that would be based on the reading?

A. No.

F. So most of these are just for term projects?

A. No. I was sitting in a Physics class and he handed them the articles, "Here's the article – there it is."

F. Was there any explanation behind why he was giving them the article?

A. It had to do with the history of the neutron. This was the first basic paper dealing with that.

F. So this was background?

A. Yes.

Depends on the class. I know one Engineering professor who assigned us to go find a research article and report on it and analyze it. In a History type class in Civil Engineering a professor required them to go out and find information.

I recall helping some students on failures of bridges. Sometimes the first accounts are of newspaper articles of the bridges collapsing or something like that. Only years later did the papers come out where they had computer models about how the bridge was swaying.

It's like the World Trade Center. When is that literature going to come out?

F. Is there any core body of journals your Undergrads need to know about or be familiar with?

A. Society publications. American Chemical Society. Various Engineering societies. They would probably already know the names of the societies. They might not know the names of particular journals, just that ASE is important, or they will be part of the student chapters.

F. Do you try to present any body of journals to them? Do you just expect them to know the ones in their fields?

A. I think I would not expect them to know particular journals. A real professor would, but as a Librarian I don't require them to know the names of any journals.

One way that might be worded would be to ask them if it was "bodies of journals". They might respond they needed to know a society and things like that. Maybe a little more open-ended – How do students find out about the societies? One way is through the chapters. But, if they are in the Library, how do they find the information?

Many times they come with textbooks and in the back they have a list of papers given by a professor, and they are looking up references. That is one of the thing I commonly see.

Yes, they do a lot of citations. They go by what is given to them, not really looking for it.

F. What problems do you think students have as they search for relevant journal articles?

A. There is always the problem of acronyms – not really knowing what they stand for. Many times when they search for articles, they expect to get full-text returns not realizing they are searching in the citation database.

Some of the older literature may really be better and not be available electronically.

I was thinking what problems they have with the literature. A lot of it is just over their heads. They don't have the background to absorb what is published in a journal. They can get some ideas from it, but ...

If we ask you to read, most times they say No because it's too hard for them. Already one Engineering professor said they have so much new to learn in their first couple of years, we can't expect them to understand journals.

Or even in the research process, the cycle of the literature, the difference a patent and a journal article on a process or something like that.

I had a Senior ask me today, What is a thesis? What is a dissertation? They didn't have a clue about what it was that got them to that point. It's not something you see in Undergraduate curriculum.

Another thing is some subject area – Chemistry especially – knowing all the different synonyms needed in searching for a chemical compound are just beyond some of the librarians even. I think that not knowing about the various forms or synonyms can be a real deterrent to finding the information you are looking for, if you are not using the right term.

F. Do you think that the right identifying articles in journals are clearly relevant and appropriate to their topic?

A. First you get to choose the right database and sometimes that can be problematic.

I think they go for whatever is easiest for them to try. If they find a database that doesn't have much in it, they may think, That's it! And stop there.

There are so many to choose from anymore I think that adds to the confusion.

We have a logical flaw here as if all the faculty says No and Undergraduates don't use journals. Then we ask, Do they find what they need? Do you have Undergraduates come in with topics? Are they looking for journals? Do they use them?

Primarily because they have heard the magic word from the faculty mouth, I am looking for journal articles. I am not sure they understand what that means. But that's the assignment, journal articles.

F. Do you ever have to do any educating about the difference between magazines and journals?

A. Yes. They will come in and say, I'm supposed to find "referee" – what does that mean? Newsweek may not be appropriate.

When I had my Undergraduates in Chemistry, I sat and did math all the time. There was no reading. Every day was a math problem.

You don't teach. The literature is not even taught until the Senior year, the very end, in Chemistry here.

I may be sidetracked, but should it be?

I think there is a mature factor that has to be there. Maturity. Probably not at the end, but I would not say hit them in the face with it the minute they walk in the door.

There are not that many real Chemistry majors. They are just taking Chemistry classes.

A lot of engineering, a lot of pre-med. When they hit the Junior level, the last semester might be a good time.

Everyone knows how to do literary criticism, but in a year or so, that is not very helpful to them.

I think they do have some situations where they do have to go out and hunt for information. Certainly not in every class, but just remembering when I was a major in Humanities, we were pretty much given the citations we were supposed to look up until about Senior year. From what I remember, when I was in the Engineering Library at another place, there are Senior design classes where you have a problem and there you have to go out and look at the literature.

They are also looking for standards and patents. It does not mean necessarily journal articles. Sometimes they are encouraged to do journal articles if they have a *** on it or if the professor thinks it's important for whatever reason. It seems to me the design classes often go for patents and standards.

These kinds of comments you might want to follow-up on with somebody. The question we really didn't get to was, What do you require of a student to do with a journal. Here we are beginning to get to if we are given a citation. What is the student expected to do with that citation? Read it? Are they having a test on it? Comment?

F. What would you say works well with the student?

A. In what way? To help them? Don't we struggle with that every day?

F. What problems do you think students have as they search for journal articles?

A. I liked the direction you guys were going. I am sorry I put a kibosh on it. It was kind of natural that we were beginning to talk about, well, in these fields they really need patents and they are looking for a piece of data. If I want them to read something they are given in a citation, it's pretty hard to make a segue from that right into searching when they basically said they were not asking them to search. We need to think about that.

F. Are there specific websites, indexes, databases you expect your students to use?

A. Yes. They will give websites because I have seen them do that. In a Physics class, they gave the particle data group site and a couple of others where they can find data. Not journal articles, but data.

I think if you have a course website, it is a logical thing to put other sites that you find useful for the students.

F. Are there any databases you think, like the UT systems?

A. Medline for biomedical engineering. Esonal*** for nursing. That is drilled into their heads. I think SciFinder, Scholar *** is another. It's hard to gauge the use, as I don't see them using it as they do it from home or the lab. They don't come to the Library for that.

I think that the chemistry and materials people are using SciFinder, Scholar because it made it 24 hrs. a day. They didn't care for the after 5:00 access. We paid gazillion dollars more to get this.

Try EEE Explorer*** for the electrical engineers. They use that.

We all seem to know about Web of Science. The students do. It's like a grade tutorial.

I want to take advantage of having you all here. When you do a BI class for a science class, you talk about specific resources in that field, but do you think that if you don't do that, that will be talked about? Specific research?

Many times they tell you what they want to talk about. You will talk about Web of Science. I want a session on "this".

I had a couple of people say, I want to know about Science Direct online ejournals. There is not much you can do with 50 minutes or 30 minutes.

F. Do you use cross *** to compile photocopies in your classes? Like graphic designs, Hodges Reserve ***?

A. In really old articles, you use Hodges Reserves. The person that I knew in chemistry has his own webpage and puts his own notes up. He has a password and website. He scans in the articles himself and puts it out. It is not available to everyone. I know there are a few others who use Hodges Reserves.

All I can think of is the tests. The tests are the big thing. A lot of Hodges Reserves just put the stuff up on the web themselves. Yes, part of the course website. It will be PostScript.

They put it up on the website? Not linking? Not going black? Who wants to sit there for 2 hours? I am not the only person who has heard it, we all have. They don't have the time to sit through this or they say they don't. A lot of them are doing things at the last minute. If they cannot be guaranteed that, No, I cannot say that this will be out tomorrow, they will go out

and buy their own scanner, put it up themselves and not worry about it. They have the expertise and the help. They can do it.

F. In *** do they exhibit the knowledge you require through journaling?

A. I would imagine they have to discuss it in class or a lab or something.

You can pick up on something said earlier – something about the history article. What did you do with that article? For class discussion, was it part of a paper? They were writing a paper.

A report or an introduction to Civil Engineering as a profession type thing. It wasn't really a technical course, but it was learning how to write a technical paper.

That's the thing. How much writing is in the class? There is not much writing. Do you think it follows that there will not be much journal reading if there was not much writing?

I don't think there is a lot of journal reading among Undergraduates. I really don't. You were doing hands-on while others were doing math problems in Chemistry. Everything was math – writing equations and doing reactions.

Unless they were required to do so as an introduction to research skills or something like that. I don't think they would do it.

F. Do you think it should be required?

A. As a Librarian, I have entirely different views. As a Librarian, I think they should learn how to do it and I always try to stress the importance of the eyes. I don't know how much that is accepted among the culture.

That is interesting. I had one Engineering professor who turned us down because he said I had been here too long and had become cynical about the reading and writing department at UTK. That's just an aside here to look at how much is specific to this environment.

I have one question. Are you directing the question to the Graduate students or are you primarily interested in the Undergraduate students?

F. Undergraduates. When we have the Graduate students focus group, we will ask them some of their use of journals, and at what point does someone become a Chemist. About the literature of it. We are also going to ask them because they are the ones that teach more of the Undergraduates. It will be interesting to see if the faculty and the Undergraduates agree.

P. Should we tell them about the assignment from Biology? That was an attempt at getting a literature at the very earliest. What the person who was coordinating this did, was to pull out journal articles at his fingertips and came up with the topics such as Parenting Habits of Frogs was one. How many articles did we really have on this campus? I mean not looking at it from the availability of appropriate literature or even is it appropriate for an Undergraduate

to go through zoological records or something like that when BioAg*** Index would have been nice. Get a few things on acid rain or something like that might have been a little more meaningful experience. Creating contrived assignments can be disastrous.

F. The point of that was just to get some literature?

A. Sure – define 10 articles on a topic. Is that possible? No. Not on all of them. We both got hit with it. We did not have a database freely available, so we sat down one time, got on Dialog, did all the searches and whipped them out. It was the only way.

F. They don't do that anymore do they? What made him stop doing that?

A. I think he retired.

F. Do you think there is a particular level that should be assigned for the reading?

A. Grade level? Yes. Once they get into their Major, it is probably required.

Q. Have you noticed any differences in the way students use journals in the last five years?

A. They want what they can print out. Immediate gratification. They don't want to go upstairs to get a print journal if they are in the Library.

F. Will they order a Library loan article over going upstairs?

A. They will print it out if they can. Not if they need it tonight. Quick and easy. They don't recognize the fact that it is not in English.

They get discouraged. They find 3-4 articles. It's what they want but we don't have them or they're not in English. Then they go to ProQuest after their initial experience in a good database.

From their BI session maybe? I don't think they remember anything from the BIs. I think they come and ask at the Reference Desk and then the Librarian tells them, You should look at Compendex or Science.

That's probably it. Then they go off and come back and know how to find these.

That's when they go to ProQuest or the web. They will start on the web and see if they can find something using Google or AltaVista or whatever. If they can't find something after several hours, they come to the Reference Desk and get directed to a database.

Part of it could be my fault because this is not science but an area of criticism. A lot of this stuff is checked out. It's just off the shelf all the time. I do push them to ProQuest or some other context. They just need to have something.

F. Are students using more electronic resources than in the past?

A. Because of accessibility. We have more and you don't have to come to the Library to get into them. I guess we see more of them using the journal literature than before because electronic, we just saw the index use and they left the room. We don't know what happened beyond those doors. We see them now pooling the journals. There is a difference in perspective these days.

Just an aside – the full-text databases are the highest used compared to the other general ones.

It's not like you can make an easy link on a webpage to something full-text either.

Some are easier than others. We are hoping that with setbacks and other open URLs that we can at least get at the journal title if not the article. Find Volume so-and-so, page so-and-so. Then you give them the link of that journal title and they navigate through and get the article. I think that is what we are headed towards.

They have lost enough of their physical perspective. Everything is the same. They don't know the difference between the catalog and the databases because it's all on the computer. It's all of the computer – all on the web – they don't know the difference because they never saw it physically.

ITC wants us to help. They were ready to sign up with Xanadu*** and let the students pay a second time for the databases. The electronic course-pack. They wanted to let the students pay for that even though the articles were already in ProQuest. I think we told them that would not be wise and now we are looking at some of the databases like the Gale ones that have a static URL, what they call the Infomark, that you can set up and there were a few others. Getting at the article level, you can't get it on all of them. If we can get to the title level, that would be helpful. We are getting some gentle pressure to try to help with instructors to create some webpages for these types of links. We are hoping that SFX or someone will come along with a tool that will magically do this but I am not convinced yet.

It will be interesting when they get to the title element; they are still going to have to search.

Or still have to get into the volume, issue, page number. Even SFX will only go to the title level. It may not go down into the article.

There's no telling where you will end up. I will be in a database, I link, suddenly I am in a catalog, suddenly I am in annual reviews. I link, there's the article. Suddenly I link here, related articles. I am in Web of Science. Where am I?

Meanwhile, you are tying up ten simultaneous users. More and more of our databases are site licensed, thank goodness. But some of the costly ones like Web of Science are still for the simultaneous users and that can be bothersome. Once you lose all of your marked records, you do that one and learn not to stray too far.

F. How were you first introduced to the scholarly journals?

A. Graduate school. One of the Classics professors included some citations and photocopies in an Undergraduate course, Ancient History. I may have had an article or two in Undergrad, but it was a photocopy. I had no clue as to where it came from, of what was behind it.

We didn't have photocopies when I was in school. I'm trying to be realistic.

F. If you audited in Graduate school, is that where it belongs? Does it do any good for an Engineering student or Chemistry student or Physics student to read?

A. I think Engineering students should at least know how to find them because they will be practicing engineers. A lot of them are not going to Graduate school and they need to know how to find information at the very least so they can do a better job when they graduate. I don't know how the Engineering faculty would feel about that.

I think there is a thought that they already have so much in their curriculum to cover, where would they put that? We might add a question because this sort of segues into the next focus group. If there were something in the electronic journal system that tied the specific articles to the course content, would that be of interest to you? Would you assign it?

F. Who would assign that? Would I have to go out and find it or would there be a service that would do this for me?

P. A little background on that question. One of the things that was in the original NSF proposal was to actually do modules for the faculty. NSF downplayed that but said they wanted to have some recommendations about that should it happen. This is a journal. This is a magazine.

A. Wouldn't you have to tie that in with the cycle of scientific literature? Because how things progress. You write, do research, do this or that, write an article but then you may do something else on the side and it goes off and becomes a patent. That sort of thing. Wouldn't you want to show that cycle?

F. Is there any place in Undergraduate studies where they get the cycle of science and communications?

A. I think their professors would tell them that because I think they would be aware that some things are found in patents or standards instead of ***. I think they have more direction in that kind of literature than in journal article literature. In Engineering at least.

But the cycle of how it evolves, is it useful? We all think it is useful but that's what we study. I don't know if it's all that useful. I would rather they have just a knowledge of the different types of publications. The cycle thing doesn't seem that useful.

I guess I had more than 50 minutes at the other place I was in. I had about 4 sessions with design classes. They had to write.

F. Usually you think that Chemists use literature more than Engineers. Does that happen only at the Graduate level or Undergraduate?

A. I don't think they use it much at the Undergraduate level until the Senior year. There is just so much basic. The difference between here and some other institutions is that there are no courses for majors, like there is no Majors Organic as opposed to Organic. Where we were before, there was a Majors Organic, Organics for Pre-Meds, and Engineers. In the Majors Organic, you got a little more into the literature because they were trying to bring you up into the profession. They don't do that here.

F. Don't you do repeated BIs? Is that Grad students?

A. No, it's Senior. Maybe 10 people in the class.

They do really involved searching. They get back to the old German.

He makes them.

Is that just one professor? One professor at the expense of the new? It was a struggle to put in the online component.

He will have a lot to say about the journal literature. It won't be helpful for us because we need to be able to sort through what you need to hear and what you need to envision. Considering what's on his reserve list, all books. That's very unusual. I mean, 20 pages of reserved books. When you look at – other schools have Chem Lit classes. They don't do that here. I guess they talk about something in every class it covers.

F. What kinds of things? You know these individuals and you deal with them. What kind of questions do you think we need to ask to get at what they are doing? We also want to get at the idea of what could be done to help you help the students. Are there any other questions you can think of?

A. Why do you think it is important or not important to get at the journal literature?

F. I guess it is more, why not?

A. Why not? If they say it is not important, we just don't want to stop. If it is the difficulty or I don't have time – I think that's just the overriding. It's just the level.

At what level, if you had the time, would it be appropriate, given the best possible circumstances, would it be appropriate to introduce this?

It would be hard to find an article because everything is so cumulative. If you think about a specific reaction to learning about, you can go back to the original paper, but the state of the knowledge is so different from then, you can't rely on that.

You might get some background. Ask them what happens to their students when you get out usually. Do they immediately get jobs or do they go on to grad school? Which are they more prepared for?

There should be some difference in fields. The other thing too in Chemistry, they are more likely to deal with – I mean the large numbers are not Majors so it's not the ...

This is a dumb question, but do a lot of professors here teach both Graduate and Undergraduate classes in the departments at the same time?

Yes, because you don't have a Graduate Assistant teaching a class. They are doing the labs, but lectures are done by professors.

F. They are not just focused on Undergrads or just Graduates?

A. No. We had a couple of people decline and say they are not teaching Undergrads.

There will be someone teaching Organic, but he teaches Undergrads and Grads. He has no Grad program himself.

Some of those courses are huge. It is a full-time job to manage that one class. Thinking about when I was an Undergraduate, Chemistry 121 had 350 in it and it was taught twice a day. The whole job is one class. Coordinating the labs, the recitations. We are talking 30-40 lab sessions for one lecture section.

They would have multiple T.A.s doing labs. They didn't teach. They just kept you from blowing up.

F. This is Chemistry, Physics is different, isn't it?

A. They don't speak English. My Physics T.A. had been in the country 2 weeks and he was saying "woltage" which I thought was "wattage". It was "voltage".

When it's your first exposure to college and you have someone with an accent you've never heard in your life, it can throw you off, like those Hungarian articles.

You might want to ask what percentage of the Undergrads that you are teaching are taking this as a required course but they are not Majors. That makes a difference.

I expect we are going to find that the journal literature is what turns someone into a Chemist when they are familiar with that. Whereas the other is that your learning techniques ...

Some people identified in regular Organic class were called in after class and were given things and talked to them a little more and showed them CyberScholar*** but he wouldn't do that for the whole class.

Only the ones that showed initiative. The ones that want to know a little more and ask more questions. The rest just want an A and move on.

The purpose here is "How can you help that process". Not just teaching somebody one class in Chemistry but someone who is going to be a Chemistry or Chemistry professor. How can you get them initiated into the literature and how can they profit?

There is a larger number of Engineers than there are Physics Majors or Chemistry Majors. I don't even know a Physics Major, just Undergrads.

P. The Engineers have been doing a lot with the engineering information foundation so we have background on how they use the literature, but they are the opposite end of the spectrum in terms of when they are professionals in terms of use of literature. They read a lot. Engineers read a little in terms of journals. Engineers reach each article and spend a lot of time with it if they find one that is really good. Chemists read a lot. We know their behavior once they are a Chemist or an Engineer, but we don't know their behavior as to becoming that person and the educational process.

[General Discussion]

I was trying to think of the current awareness component. At what point do they develop their current awareness? The Graduate level? We are going to need some questions that get consequential. At what point do you think someone needs to know about or be able to do something?

With the Engineers, about keeping up with professional societies and getting the trade journals, plus the more involved ones, depending on what area of Engineering you are in.

There are several dozen groups throughout the country working on NSL projects. Some of them are building the collections, interfaces, learning modules, things we are talking about here. One of the things we are going to be doing is reporting on this. We meet once or twice a year where everybody shares their ideas and how does this fit. "What level are you aiming at" might work with High School as well as in trying to get the students using scientific literature.

It will be interesting to see because with things like TEL*** available in High Schools now, whether that filters. Although one of the TEL complaints that there is nothing in there, may change.

What we also want to do is find out ... we focused the conversation on how they are using journals in the classroom with students, but we also want to get information you may want to use. As I said, we are going to revise questions and I will send them to you. We do want to get specific insights from your perspective doing BI, from your perspective of watching people, helping people in the Library. This is a long-term project. We also want to get your reactions to what we get from the Faculty focus groups. Does it seem reasonable?

I am wondering if you might want to ask Faculty whether they have heard of the term Information Literacy and what does it mean to them?

Is it more than giving a Librarian 50 minutes to master because we are being talked to and becoming immersed in information literacy, but the reality is it means 30 min. or 50 min. What can you do?

They might call it critical thinking skills or something. They might use different jargon but it might be influencing their views on this sort of thing.

The Engineers in the new scanner there is supposed to be some focus on that. That was one of the reasons that the engineering information foundation funded the other study and yet it seems it is being interpreted many different ways too.

[Conclusion]

4.2. Focus Group #2: Faculty

Focus Group #2

Faculty

March 15, 2002

F Facilitator
P Participant
Q Question
A Answer
*** Unknown; needs clarification

[Welcoming remarks]

F. What we are looking for is how scholarly materials, particularly journals, are part of the educational process and how students use them and how you use them in particular in student work. It will narrow down eventually to how to make the best use of electronic journals.

P. Why do you focus on journals? Because there are a whole lot of things found by searching away from the journals.

F. That's exactly the kind of comment we want to get. We don't have to focus on journals. At our Pilot focus group we discovered that actually there were other kinds of things ...

P. Did you say it is to be limited to online or digital?

F. No, that's the ultimate focus.

[Introductions]

F. I would like to start the discussion by asking whether or not you do assign students projects to use different kinds of literature?

A. Undergraduates always think a scholarly journal is for higher-ups such as graduate students, faculty, etc. and they wouldn't understand. Each article is a short snapshot of the most recent discovery. There is not much preamble. They don't see where it is coming from, where it is going. They have to know the history that led to this particular report of the discovery. They have to jump right in the middle and sometimes they don't know how to use the information. First, they can't quite understand the theoretical content. I am talking about engineering and scientific journals, the content of the information reported. Even if they did, they don't know where it came from, the continuity, etc. It is very hard for them to use as is.

F. In their use of journals, are they assigned to use the journals or do you just have general assignments?

A. Undergraduate, there are two kinds. One is, you ask them to go look for, in journal articles, a certain paper relevant to something and make a report. Another kind is if they are doing literature review for a project, like an independent study, they have to learn very quickly from not much of something about whatever subject matter they have to gather information and complete in this semester. They will have to go to a pretty wide literature review on this subject matter. That means 15-20 articles and pull together a common theme and be able to evaluate, conflict, etc. etc. They are just now capable technically to evaluate and they feel the strain at times.

F. What kind of literature do they use in chemical engineering?

A. Chemical Engineering Communication, International Journal of Controls, Process Design and Simulation, Computers in Chemical Engineering, American Institute of Chemical Engineering Journal. An assortment of things.

F. Are you saying then that they do read those materials but don't ...

A. Unless you tell them they have to go.

F. Is this true in the other chemical disciplines?

A. Very few of them look at them for fun. Unless they get specific instruction. Even if you assign a paper, a lot of them will look at books first unless you say, "You must look at a journal article".

F. Textbooks?

A. Usually, there are scholarly books assigned. If you tell them to write a paper on analytical technique, they will usually go find scholarly books but the journal articles only force the issue.

I would emphasize what has been said here with regard to preparative, the highly specific character of journal articles. I find it necessary when I make an assignment (which I always do) in an undergraduate course to give them a route into the paper by allowing them first, many, many times to start with a simple encyclopedia. Then move from the encyclopedia to a more technical treatise, then perhaps from the treatise to a monograph, then review articles and then into the article. This is a process that is not restricted to undergraduates. This is a process you often have to do all along the line to ease a student into the background, as you pointed out, and bring some clarification so the journal article is meaningful.

You are absolutely right that even graduate students don't have a clear idea of actually how to approach the reading of an article and that, of course, is in general the failure of faculty throughout their educations. Learning to read is not something you do up to the fourth grade and then you know how to do it. Although we assume that a lot, helping students understand that there is a hierarchy and there are such things as reviews and introductory materials.

The other issue, which is a big one, particularly with the advent of the Internet, is that students think what you do to do a search is to type a word or phrase into the search engine and stuff comes up on the screen, and its true and complete. The other problem, I will say this because it just appeared to me, I asked my freshman students to write a paper and there were a variety of options. One of them was to read a book and one of my students said, "Where can I find the book?" I told them to try the library. This is a student in our honors program. The amount of ignorance, particularly or students coming from a small school, from unsophisticated backgrounds is really high. One of the dangers I see with digital is that students are not going to like it. I have a colleague who has been here about 3years as a faculty member and I don't think he has set foot in the library yet.

In physics as opposed to astronomy, core courses in physics basically as far as anybody is concerned, including the original literature. It isn't until their senior year they get a special topic or something. At least, from my point of view, the utilization of original literature by undergraduate physics majors in physics courses is minimal to negative. I mean it just doesn't happen.

I also do astronomy courses, one is astrophysics, and the other is Topics in Astronomy. In astrophysics, they have enough to do just trying to figure out what's going on. I continually revise Topics in Astronomy but it tends to be more topical – that's an oxymoron. I send them off to do searches more often than to do initial literature searches. There are some decent search engines. If you are still using Google, you are out of it. One is Vivissimo that is supported by NSF and actually knows how to impart things exceedingly well so that you get very little trash. I mean very little trash that looks relevant.

Let me give you an example. We are doing a bit of study on the search for extra solar planets. For the most part, it has gotten to the point where there is actually a webpage for extra solar planets, University of San Francisco, Cal Tech, etc., also Jeff Marcey. It is amazing how much material is out there, most of it pretty good. By reading some of that, they get to the point where essentially they begin to question themselves about how you do this or that. In many cases, it is at that point you can send them to original literature. As to things being out of context, you can pick up the Astrophysical Journal and pick out an article and start reading. How many are going to do that? I find the Web is a great introducer and stimulus for wanting to go to original literature or preprints. I send them to Los Alamos Preprint Library.

Elsevier has a search engine that focuses on original literature called Cyrus***. I looked at that and said, Why did they do that? and then began to tactually understand what it says. It is more selective and the ultimate in search engines. I think the context part is probably the most important.

I would like to give a counter-outlook here. Physics, Chemistry – many of these disciplines have what I want to call "intermediate journals" or even newsletters that attempt a semi-popular discussion of the research forefront in the various fields. The writing in them is brief, succinct and meant to be relatively simple. I have no misgivings in referring students to this. I will bring up a topic in class and they can e brief and say, I would like to read something a little further about this. Chemistry and Industry is another very nice intermediate journal. A

gateway to which I feel perfectly free in referring students and give them a view, quicken their interest, move them toward the research frontier.

It has always been a question in my mind, when is it too soon and when is it too late to attempt to give students a division of where the cutting edge is in the sciences?

Let me say there is an aspect of literature that is essential, at least in Undergraduate Chemistry and probably in Physics, and that is finding data. We do a lab experiment, we make a measurement of a certain thing and say, Well, compare your experimental measure with the accepted value or the value that is accepted in the literature? They have no idea of how to proceed.

Send them to a reference library and they will help.

Many do not understand there is such a thing as a library reference department. Even getting them a handbook, literature, tables of data, standard spectra collections – those are all literature. Not research but another form. They need the melting point of a compound – where do they find it? Those are thing you need in Chemistry all the time. That kind of thing we need to see. A lot is becoming available digitally.

Those are easy entrees actually or convenient. You could say all of Physics is old.

It is not necessarily incorporated into a class, but in Senior level courses it is basically out of the textbook. There is very little need to go back. There are things that could be done but I think on the basic topics like American Physics today, is going down ...

It does take handholding. There is the research experience for Undergraduates. They spend the summer and in 2 ½ months they get a project but that is 6 students and 2 people who work really full-time with the students to give them mentoring. You can't throw a student at the literature because they haven't been taught how to use it effectively. We spend a lot of time getting them started. After that, they go to the Astrophysics Data system which is the search engine of choice of all professional astronomers with full-text online.

It's perfect?

Yes. In terms of the core literature, particularly for what students needs, it is far better than Ginsbards Archive*** which only has about 60%. I look at it from, if you threw me into a random article from my subspecialty journal, even then there is a good chance that if I read it once, there is only a certain portion I am going to understand upfront. I don't think our students are going to be prepared to ingest the whole thing no matter what it is so I usually ask them to choose an article not as interesting to you and then find 2-3 concepts imbedded. I do not necessarily expect them to understand the whole thing but find some things they do know, maybe something as simple as Ph adjustment or a simple spectroscopic tool. Find something in there they can use.

Q. What level do you start doing this?

A. Junior and Senior.

Q. Isn't it exciting for the students to get away from the textbooks and into actual literature?

A. To do that with the literature and find concepts that are in there, but I don't expect them to understand the paper from front to back because I often don't either.

That is one of my educational prejudices. I think one of the things we ignore in science education is professional or intellectual skill development. We are all about contents and students have to see certain chemical reactions or certain physics. We somehow expect students to develop these skills like literature searching, ability to read, bibliographic skills, etc. magically. Or we send them to the reference library and you are supposed to teach them. I think it is possible within the context of an education to actually build it into the curriculum so that by the time they finish a 4-year degree; they can actually have entry-level skills for an industrial or Graduate program. I think we should pay attention to it. How do you actually go and get this stuff by introducing them to what is called that intermediate level, that simpler level, or literature.

Q. At which point do you start doing this? You mentioned as far as doing the information literacy times of things, would you do this as a Senior? Earlier?

A. You can do it with Freshmen if you are careful. Freshmen should be able to go to the Handbook of Chemistry and Physics, which is standard reference and literature. It's not primary literature but it is data literature and be able to use that book. They should be able to sift through and find something.

Q. In Humanities for example, you have to have required English courses. Perhaps it might be important to have an information literacy course like that for the scientists when they come in.

A. My feeling is that when you marginalize it, students this it is something not part of the group. It should be built into every course and reinforced in every course. Just like reading skills are built into every course, writing skills out to be, computational skills, speaking skills. That's my own prejudice.

Q. How do you go about doing that? Formally and procedurally, could you do that at the department level?

A. If you do it systematically, you would have to do it at the department level. Individually, you just do it.

Unless I am teaching a core course, I stopped 15 years ago giving examinations in non-core technical courses. No exams. I tell them I grade based on weight and sweat. I was doing a mathematical physics for Undergrads and I said, If you worked 1,000 problems in the course of a term (maybe I used 5,000) you would get an A. Somebody said, I can't work that many. I said, I didn't say you had to. Typically, I give them a project that's due around mid-term. They get to take it with my approval that is relevant to whatever it is we are doing in class.

They have to write a little paper and give a little talk. At the term level they can either expand on what they did or start something new. Then they do a major paper, talk for a longer duration, that sort of thing.

This term we are doing something bizarre. They got me to do a little cosmology, which I don't really like or understand, so we are having a symposium in a few weeks on general relativity. They chose a topic and want the entire department invited. I think it is disingenuous to invite everyone to something where we don't know what we are talking about. It gets them going.

It's a question of motivation. When we get into doing research with Undergrads, which we have neglected for a year, it's very individualized. I have worked with Undergrads for 30+ years because I like to do that sort of stuff. That's the motivator behind the literature. You say, Read these 2-3 papers and then we can talk. Maybe we can figure out what you want to do.

Q. Is there anything about the curriculum or the course in incorporating this into the educational process? Are there any infrastructural kinds of things that need to be done to do this?

A. Chemistry has a long tradition, going back 100 years, of having a course in Chemical Literature. It is one of the few disciplines that have sponsored such a course that has a corpus of textbooks dating way back, and even has literature specialists within the discipline. This was not relegated to the Library 20 years ago. We had people in stated Chemistry departments all over the country who were specialists in chemical literature. This emphasis had faded about 15 years ago, which was a bad thing.

Q. What precipitated that?

A. Too much emphasis on specialization. We didn't have room for this in the curriculum. Not having room is the biggest reason for the fading away of a lot of things.

I quite agree. In our curriculum at the moment, we have 1/3 of a course (which I am privileged to teach) in which we focus squarely upon chemical literature. We do it in conjunction with our Library people. We team and use the skills we have talked about, using handbooks, secondary reference material, Internet. We have projects on this. One series begin simply with the LC system, how one works in the Library with particular emphasis on Chemistry and we carry them through using magnificent search engines like SciFinder. I would defend it against any other thing.

Unfortunately, the comment I get from many of the students is, I wish I had this course earlier. We teach it as a Senior class. My own prejudice is that the course or something similar – it can be a 1-hr. course in one semester – should be available to students when they select a Major or shortly thereafter. Say, Alright, if you are interested, this is the gateway to the literature and this is how you go about doing it – it will be applicable to everything you are going to do.

Q. What is it that can be done to convince an array of disciplines that this thing is important and should be put in the curriculum? Is there evidence one could gather to demonstrate this? Because we might be able to make that part of this study.

A. I think the major effort needs to be made with regard to focus. I think an identification needs to be made of the deficiency students have in doing these things and the fact that no systematic development of it is in place. They get a scrap here, a scrap there. They try tiny bits in some courses. It's heterogeneous. There is no homogeneous, dedicated effort to make this a portion of the discipline. My optimistic genes lead me to believe that if the professionals in various fields are made focally aware, it is going to have some effect. What wonderful thing for a student to come into a Junior course that is beginning to go into the advanced arena knowing how to get into the literature without making this terrible effort to introduce them personally.

Q. Is that the kind of course where information is learnable from the Web? Would you put it up there and lead people through so that when they are ready individually, you can point them to it and say, This is something that could be done across disciplines. Its difficult but you certainly could have specific disciplines.

A. I have developed a series of projects. The students simply take these projects plus a bit of introductory lecture. They take the projects into the library, on the computer, and they answer all kinds of things. I have them go after a melting pot. This would work. If they were offered an hour credit for doing it, and if the department would require it.

Q. I want to play devils advocate. We have many things we require students to do now – to devote a course, even a one-hour course – may not be practical. I view the ability to search as part of the necessary tools to get a Bachelors Degree in Science Engineering, just like using a computer, whether or not it is a Microsoft or computational kind of platform. To devote a course to teach an element of how to do that may not be practical. Students should be able to pick this up with enough information given by faculty to learn this. By requiring in certain courses, You shall provide certain information that is only available by going out to search, if you don't, you will get an F. What is more important than not getting an F? This should be treated as a tool. When they have to learn it, they will.

A. No, they don't. I know faculty members that can't do this. I know faculty who do not know how to get into literature of their own theses.

I agree and disagree. I believe in integrating these into the curriculum rather than separate courses. I have come to conceive of teaching in a slightly different way over the years. This is where scientists and engineers again fail in that they tend to think of courses as being contents. I think of an education as consisting of at least 5 parts, only one part of which is content. Another is process, the kind of intellectual skills. There are tools and what we are talking about here is both process and tool areas. Teaching students how to use tools is part of what we do. Somehow we haven't brought this literature stuff into being one of the tools as context. All courses have context. There is a vague notion of "way of being" which has to do with, How does a chemist think differently from a physicist? How in fact does the profession approach what it does?

When you think of a course, you say, I'm teaching Organic Chemistry or Inorganic Chemistry. You think of some tent that the student is going to learn. We tend not to think about the processes except peripherally.

I was in a discussion once about setting up something called Cultural Studies at UT. I said, Well, if someone got a Cultural Studies Minor, is there something that person ought to be able to know or do to actually achieve that Minor? The question never occurred to them that you should have some ideas. That was a bad time. If we put these tools in explicitly and think about where they are best put in ... that's why I think it is better to integrate them. A separate course is fine too. We just have to do it.

We are all doomed with the utter volume of content we want to communicate and bring across to the students. This Utopian idea of education, which I love, is wonderful. But when you push most of us to these 4 other aspects, our content overwhelms us and we say, Good heavens, I am 5 lectures behind! Am I going to assign 9 chapters in the last week? We can't possibly get through this course without teaching this really deep thing, which happens to be my specialty ...

Just as an observation by a Librarian who at times has been asked to fill in. A faculty member is going on a trip and it is the 3rd class meeting of the semester and an Introduction to the Library. Eight weeks later they get an assignment and don't remember what the Librarian told them. I did not give them a test. I didn't have the power. If you are going to talk about tools and process, there also needs to be reinforcement. Constantly reinforcement. Absolutely.

With many Library assignments, the Librarian ends up doing the assignments. The student doesn't really learn the skills.

You can also say No after a while.

Yes, but Librarians carry guilt.

Q. Any insights about this kind of data?

A. I think we all agreed the technical papers are really designed for people to publish. It's not designed for Graduate students to learn. It's too difficult. I've always taught them to go out of the professional journals and get one or the other. Sometimes they find talk and they gain insight and it gets their interest. In many other ways, it's more interesting to go out of the journal and go inside a specific journal. The only problem is that the Internet is noisy. There are many things that are not true. It takes faculty to look and some do not feel competent to do that. I don't think even at UT our faculty in general is sufficiently trained. I think that most Graduate students, when they graduate, are part of the skill.

Q. Our Graduate students have not acquired the literature skills?

A. I am teaching a required course and they can't get it.

Then you see to it that they do? Our Graduate students come to some of us who have paid attention to these things, seeking help.

I have to help faculty ...

Help us understand the article or search?

Help search. I'm trying to get them to get the feeling toward what's important, not necessarily the search.

Q. You're talking about understanding the content once they search the article?

A. Not necessarily the content but to feel what is exciting. The content is very broad. I usually do not put some very specific content for them to do because it would be better to refer them to articles.

Often the journal articles, we have outlines we use a lot. Especially History Review. There is another thing we use called Spies***. They all seem interlinked which is nice. One thing missing in the journal articles is that they are insufficient. We don't even have textbooks. People write a textbook and by the time it's published, it's out of date. Many things we find aren't in the journals or textbooks and they end up often in conference proceedings.

And they are hard to find.

Not only the written texts of conferences are unpublished, but our conferences and workshops are now on slides and the Web. Sometimes those scanned images are just interesting to try to decipher. We have gotten, in some senses, beyond the journals themselves. We have conference proceedings but if you don't get them right away, you can't find them. I tried to find something from China a year ago and you couldn't get to the website anymore. I was able to get it from the Los Alamos site. You just all-of-a-sudden miss this stuff. Some of the bigger speakers don't bother to write-up their stuff.

Q. Can you rely on the trustworthiness of this?

A. What do you mean by trustworthiness?

Q. Is it bubble fusion? You know, what's reported at the conference may have only been done once by one investigator.

A. We are trying to find out some things we want to do and there is nothing in the literature itself about this analysis technique that has been used for 25 years.

This brings up a point about the peer review process. That is the Los Alamos preprint thing. People can submit it to them before they submit it to the journal. Theorists who do work submit it to the preprint and are never published. Never submitted to a journal for peer review.

Q. The point I want to make is that from the student perspective, do you attempt to let the students know you have to be careful about whether or not this information is accurate?

A. No. What we mainly do is experimental information. That is usually spelled out very carefully – the experimental technique and analysis. Once in a while, in this particular analysis, people will take it like it is. There is no hard and fast rule.

I think in Physics there are 2 kinds of Graduate students. One for the general education, and two, they are writing for thesis where we really have the broad themes and they are cut into many many pieces. By the time they are writing a thesis and trying to do research and trying to look at conference reports, they are almost like faculty. These two have different needs and requirements, different experiences. I think we need to separate the two.

I was going to make a joke about Chemical literature and say I don't trust it much ...

Neither do I. Especially when I try to use it and there are huge holes that I didn't notice when I skimmed it. One time we wasted a month or two. It was a Physics journal, not just Chemistry.

You must check for yourself because it never occurred to them they need to check. After I showed her my commentary, she said, Wouldn't this make the author mad? I said, You know, this is exactly how scientific truth and everything gets refined. We look at each other, peer review. I am not against this person; I am against what he has put right here which is scientifically irresponsible. I am telling her we all have a responsibility to point out blatant mistakes, not typos, etc. She was flabbergasted that there is such a mistake, yet the guy is from Carnegie Mellon. I said, You know, he made a mistake ...

This is the way the "literature filter" works ...

I am a professor at UTK and there to point out something that is published for the world to see. I hope this taught her a lesson that we are not going to be impressed the first round. We read it critically. When you see something wrong, you go about trying to right it. I think she learned a big lesson.

Q. We do read critically and see where the weaknesses are ...

A. One thing you can say about the Web is that the dot.com you take with a grain of salt. When it comes out of the University, it is usually attached to someone and you can find out. There are ways of determining this and, if it makes sense, it helps. Graduate students several years back started to come up on the website and I noticed one of them had Glass' Rule of Physics***. There were 3 of them, Trust No One, Do It Yourself, No Excuses.

The trouble is you have to trust Glass.

I would like to propose that actually dot.coms could be very interesting because we cannot wrap ourselves in that power in not looking at what people are doing. The main thing is that

whether there is a way to try to qualify the reliability of these things. I don't know if any network would say, This is a professional journal and you can trust it. Or, this is a con, do it at your own risk. Is there any way the regular student, not relying on their own judgment, would be able to see and find out to what extent you can trust. I don't know if that information will ever be possible.

May I observe that we have been talking in the last 10-12 minutes about what we are doing when we and the Graduate student reside on the cutting edge? I think it is probably in the context of this meeting far more important what we are doing to get them to the cutting edge. Intro the literature and leading to that cutting edge. We have been, it seems to me, supposing we are already there, and they are already acquiring the skills, maybe in infection or effusion, I think it is an important portion of a Graduate student's education to get them to that point. Whether by having them write a review article, having them write the first chapter of what they hope will be their dissertation, introductory material to review, criticize, what has preceded the cutting edge.

In my judgment, that is what the Ph.D. is about. You go through the process once and if you end up intelligently, you can go through it again and again, starting at different places. I emphasize to my students that there is some importance physiologically to what they do for their dissertation project. We are attempting a general training to allow them to be flexible and able to tackle anything their competency permits. This is a start. This is how you do it. If you go out into the industry and they want you to do something that is completely *** to what you have done, you know how to go about it.

This is well documented in Ph.D. Maybe 80% or more. In 10 years they end up in a completely different field from where they wrote their dissertation. It is commonplace and to be expected.

And the Ph.D. training if it is correct will prepare them for that.

That's what a Ph.D. is about.

I have something of a nonsequitur. I will say it at the risk of being labeled a 19th Century person. That is the power of digital technology and search engines, etc. It's really wonderful. There is enormous power in doing specific things, getting them quickly, getting stuff from all over the globe. I guess being a sort of idiosyncratic person, one thing I've always liked about Libraries is being in a building. I have always lamented the demise of the old-fashioned card catalogue. I liked the chance discoveries made by scanning shelves, picking up journals and actually finding an article that was interesting that you weren't looking for ...

Pages – tactile – that's what I go for.

Going to the Library and looking for a book and then finding one while scanning the shelves. Chance occurrences are less. I think whatever digital technology can come up with, that kind of thing is important.

There is no spontaneity anymore. It is part of the serendipitous discovery.

Maybe it's just a change in lifestyle. There is a cult of efficiency that has come up and digital technology emphasizes a sense of efficiency. I can go out and find the article I want and get it quickly. Since I can do that, it becomes my task. If it's a little slower or you have to work a little harder, maybe you discover things in that process you wouldn't have discovered otherwise. I also prefer fountain pens, paper and blackboards.

Not a quill?

I agree. At the same time, you may be wandering through Science, which is pretty far afield for me, but I will find new things. At the same time I was going through scientific citations by hand with a piece of paper, reading those little names, I didn't discover much and it took a lot of time.

I'm not suggesting visual technology isn't good for something and going through science citations is one of those things.

I remember a memo written to the Library by a colleague about the number of steps it took from one department to the Library and it was all wasted time ...

Somebody has undertaken an Undergraduate management course and decided to coalesce the whole thing ...

[Concluding remarks]

[After note]

The Chemical Engineering professor said she has her first year Graduate students find an article of interest to them, not in their area. She has them read it and try to understand as much as they can. They don't have to understand everything. They have to write a 1-1 ½ page analysis of the article to help them practice their English as well as see how much they understand. She corrects it and has them rewrite it.

4.3. Focus Group #3: Graduate Teaching Assistants

Focus Group #3
Graduate Teaching Assistants
April 2, 2002

- F Facilitator
P Participant
Q Question
A Answer
*** Unknown; needs clarification

[Introductions]

F. We are transcribing this but no names will be used. Those of you who have worked on a research project know that we have to have each of you sign confidentiality papers.

[Confidential papers signed]

F. Questions will be asked around the room so please give us your feedback.

The main goal of our project, we are working with the Office of Science and Technical Information in Oak Ridge, and are going to be using some of their collection. Our part of the project and main goal is to help develop electronic journals in particular, but it could be any kind of digital scholarly material that is particularly useful for undergraduate scientists. The areas they have asked us to focus on are chemistry and physics in particular, and engineering because we have done some research with engineers and their reading habits which are quite contrasting to chemistry and physics. It makes a nice comparison.

Q. Is this through the library?

A. No, the School of Information Sciences. No connection with the library. Our connection in terms of digital collections that we will be working with is those that are scientific and technical information. Having said that, several of the librarians have participated in the focus groups so they are actively involved in how do undergraduate students view library resources and the use of electronic resources in particular. They are helping us in the sense of participants, like you, but they are not involved.

It is a 2-year project. We are in the first semester. Some of you may be around for the whole two years and some of you may not, but we will continue to contact you. Each of you has been recommended and nominated by faculty members. We have had faculty members participating from all over the areas and they nominated graduate students and undergraduate students to participate. We are starting with general questions about the use of scholarly material and then we will get more specific and actually get to the point where we are doing

usability testing with features that come out of electronic journals. We are starting to find out how, in various disciplines, journals are used to make life easier.

You are a unique group in the sense that you are using the role of faculty instructors and the role of student. You are a kind of crossover group. When we ask questions, we would like you to tell us from both roles. Actually you have 3 roles: teaching, graduate student and remembering back as an undergraduate.

This focus group is an open kind of discussion. We just want to get your ideas. No questions will be directed at anyone, but we would appreciate all your comments.

We need to have you sign consent forms.

[Consent forms signed]

Q. How were you first introduced to scholarly literature?

A. Journal literature.

As an undergraduate, I started doing research about my 3rd year of undergraduate work and became involved in research and finding articles I could use. As a senior in undergraduate school, I had to take a chemical literature class which taught us how to find literature. The class I am taking now is in journal articles, so we read 2-3 every class meeting.

Q. Are those things that are assigned by the faculty or are you asked to find them?

A. The first half of the course, the instructor assigned them to us, and the last half we are doing them on our own. We discuss them in class.

Q. When you are looking for your own, are you looking in particular journals or how are you doing this?

A. One student leads the discussion in each lecture and so that student, if we are talking about infra-red spectroscopy, that student looks for a topic they would like to discuss in class. It has not been my turn yet, so I am not sure what the guidelines are. We do use journals, mainly spectroscopy and analytical chemistry. Those are the main things.

Most of my experience with journals did not happen until graduate school. As an undergrad, I seldom visited electronic journals or even databank journals, or go to the library and find them. Most of the articles we needed were presented to us and we didn't have to go too far to find them. In graduate school, it is an every day experience.

My first experience with doing scholarly journal research was when I was a college senior and I had to write a thesis to graduate. I worked on that for about 6 months on background research and used electronic search engines. I typed in topics and journal articles were used.

Q. But you didn't do this until your senior year?

A. I guess maybe the last part of my junior year I sort of got into it, or the intervening summer. I got seriously involved with that following the senior year.

I guess I started reading journals a couple of years ago when I was doing an independent study. I can't say that any of my undergraduate or even the first year of graduate courses required actual research in journals, although, just because I am interested in things that are not normally found in standard texts, I have learned to do research in my line of topics.

Q. Do you think that was an appropriate time to be introduced to journals? Do you think you would have liked to be introduced to them at an earlier time?

A. I think it would have been more beneficial to get into it a little earlier, knowing what's in there now. I am sure experience alone has taught me it would have made learning a lot easier, looking at it from different perspectives on different topics.

I think that for me the timing was appropriate because that class I took in chemical literature we actually learned where all the information was and how to find it. I am learning as a graduate student, with the journal articles you go more in depth maybe than an undergraduate would need to know if they were not pursuing a graduate level education, so I think it would be appropriate.

I think it would be appropriate somewhere in your junior or senior year to have a class. While it does not have to be specifically by research through some class you are writing papers for, but at least a few sessions on learning how to do research. The basic undergraduate I do not think has a clue and learns slowly but surely how to find things. No real effort has been made to teach students these things. I am not sure that's the best avenue of approach on that. I don't like handbooks and things like that. That's probably the biggest problem. You can cut down to 1% of what it takes to do the research in trying to figure out how to use whatever computer facilities or whatever. If you ask the right person, the answer comes in 10 seconds. Without a clue as to where to find it, it can take hours.

Q. That's the big question or debate in all fields. We are going to get more and more information available, but when does somebody learn how to use it?

A. We had a few undergraduate classes that required a paper to be written and for those type of classes proper research is needed.

In physics, general research is not used as heavily as in chemistry. People generally do not start reading journal articles, etc. until they have completed their course work; they have completed a bunch of exams, etc. For me, I didn't start trying to look up articles or whatever until after I had been in grad school about 2 terms.

Q. Were you expected, as a graduate student, to know how to find things and to know about the journals? Or was there some kind of comment in classes that helped you know how?

A. It was a more of a self-acquired characteristic because you are given a choice of research projects. They say, "Okay, here's your goal – go do it." The easiest way is to look at what previous people have done and model your experiments after those so that you are not reinventing the wheel every time. I knew that journals were out there; I had just never used them.

Q. Based upon what you all have said in your preference of when you would have liked to be introduced or when you thought it was appropriate, when do you expect your undergrad students to be exposed to the literature here at UT?

A. Junior or senior level. Freshmen don't care. They faint easily.

Late junior and senior years.

As a physicist, I wouldn't expect even a junior or senior to get a lot out of the journal articles since they are usually get specific. 99% of what I read goes over my head. On the other hand, I think just an exposure to learning how things are available is good. It might take special work for the instructor to have the potential of finding the articles they could understand.

Q. We have been focusing on journal articles. What other kinds, in either undergraduates you work with now or going back in your experience, what kinds of materials are they reading besides textbooks? Are there assignments in other types of things like specifications, technical reports, and other kinds of things?

A. Journal articles, patents, textbooks are what I'm using myself.

I'm not sure what you mean by technical. In physics, the graduate and undergraduate level is very technical.

Q. I mean as opposed to newspaper or magazine articles.

A. No. Usually the things an undergraduate would use are the numerous textbooks. There are shelves of them in the library.

Q. Do you ever suggest anything to your students? I know most of you do not teach, but you do have labs. Do any of your lab assignments require any of that information?

A. They can do extra credit projects that hopefully require research. Looking things up, giving references, things like that. That's usually done through the instructor.

One of the astronomy lecturers actually has a "recitation session" where they expect students to do independent research. Or 1-hour seminars. In one course, the lecturing professor meets and lectures the students 3 times a week, but they have a lab session where the students are given a topic and are expected to do some independent research over about a week and write a little paper on what they found. I think in the astronomy lecturing sessions, the department is trying to introduce students to Internet research via their astronomy assignments.

I ran sessions like that for a professor a few years ago and I would give the students a topic to research because astronomy is constantly changing. You can't keep up with the textbooks very well, so we would give the students a current topic in astronomy and they would have about a week to write a paper. The idea was to get them to use the search engines and do Internet research.

Q. That's a 152 lower division, not majors?

A. Correct. Astronomy labs are usually 100 level.

One other appropriate place for an undergraduate to get some exposure would be to require a 1-hour seminar course. They offer those to undergrads as an elective and it will combine graduate and undergraduate. Each student chooses a topic and gives a 20-30 minute presentation. I can see spending the first couple of classes helping them pick out their topic, learning how to do the research, things like that.

I think that's a 400 level course. Grads and undergrads can take it.

At that point, would most of the undergrads be physics majors then, as opposed to the 100 level?

Right.

Q. Are you aware of how students are gaining access to journal articles or yourselves? You talked about search engines. For example, do you want to build on that? Are people going to a particular journal, search engine, library database? Are they browsing the print shelves? How do you get your journals?

A. Most of mine come through SciFinder or Science Direct. Just type in the topic in either of those and they will give you a journal article. Otherwise, look at the references inside that article that you need clarification on.

Q. Do you remember how you first found out about this? Did a faculty member tell you or did you stumble upon it in the library homepage?

A. SciFinder, my research advisor told me about that. Science Direct, I was advised also. They had special seminars showing you how to use it because I think it is a recent addition here at UT. They said to attend the seminar, it would be useful.

Q. The seminars you are talking about, were they part of the class?

A. No. They were by this corporation coming for an hour and giving out handouts on how to use their search engines.

I think when I ran the astronomy lab where the students did their research; most of the students did not use technical articles. They used just ordinary search engines and found sites that were not necessarily technical journal articles. I think that NASA and a lot of universities have technical articles intended for a general audience. I think most of the undergrads I have taught use them.

I was exposed to SciFinder in undergrad and that's what I mainly use now. I think it is the greatest thing having ejournals here. Just call it up and print it out. My undergrad school did not have that. I had to go to the library to get it.

Q. You do have remote?

A. I've never been in the library.

I can't say it's a major topic of discussion among graduate students how they do their research. What I have found, one professor tipped me off to something through the library called Inspect. It's got a million abstracts you can connect to the article. Whether you can print it out depends on the computer you are using.

Q. Most of you mentioned you use online. Do you ever use print?

A. Yes. Often you run into articles that are pre-1955 and since only 1995+ are beyond electronic zero, you have to truck on over or get the library to bring them over.

I've done that.

Q. Do you gentlemen like to look something up the library?

A. Yes. I've done that quite a bit. I have been impressed that they have journals over 100 years old. I've looked at a few of them. I was not so impressed a year ago when I was an undergrad that I couldn't use the university's inter-library exchange. I went downtown where they were very courteous and helpful. They found me obscure items. I haven't tried it as a graduate student.

Yes, graduate students can do that.

I think that's probably abusing their library a bit.

Q. Several of you mentioned the aged materials for print. If the older materials were available in digital form, would you use the digital? Is it just the age thing?

A. It's a lot easier just to clip prints. It gives you a cleaner print than the copy machine.

Go and try to find a copier machine in the library or haul them over to your copy machine.

Q. In the AAS journals, they are putting their whole run, back 100 years. The Astro-Physical Journal, yes. Carbohydrate research goes back to the '60s at least. In American chemical studies, it will be interesting to see if that changes the habits of the grant when the older things are available.

A. Is there a core body of journals that you think your students need to be familiar with? Could you name specific journals that you think everybody who is a major in your field ought to know about?

I think once you get specialized down into a division, not just chemistry, but if you go into analytical chemistry or if you go into inorganic or organic, there is a certain group of 5-6 journals that someone should know about each one. For overall journals just for chemistry, I wouldn't think there is just one.

I think that Nature is a good journal for a broad interest and Science is also a good journal.

Usually in cross-referencing the search engine, you start recognizing the same names over and over. It's not like someone has to tell you to go to that particular journal and start looking through everything. You run across these through your searches.

Q. So you use the journal name as a way to recognize this as quality?

A. I think that's one way to do it. After trying to have something published in that journal, they are not going to let just crap in the journal.

Q. Have you found journals full of junk?

A. Yes. There are a couple that are pretty bad but they have peer reviews and if you give it to some people that like you, your article will be accepted. If the editor selects the reviewer, then that article has a less likely chance of making it through, especially when they are anonymous and the reviewer can just hack it up. Many times you will get better quality journals that way.

Q. That brings up preprints. It seems like the Los Alamos crowd and others have created a preprint network. Do you ever go to the preprint archives, which have things that are not published in a journal? Things that would not have been published in a journal? Do you ever use those kinds of things?

A. By preprints do you mean something that somebody has not published but has made available on the web? I have not had any luck actually being able to find or open any of those files.

I have.

I have used things that are in press but haven't been submitted yet.

F. That would be a preprint. They are a combination of things that people may be going to publish, may not be published, but wanted to make available. They may have been published and they are making a copy available

A. The only thing I would have reservations about is the validity of it. Once it has been through the reviewing process, people that actually know a lot about the field have looked it over and it seems to be pretty sound. If they just throw out something on the web, it could be full of errors and I would not trust it.

When I got to the articles for ideas, I don't think anything I read is gospel just because it's in a journal. I take it all at face value. A lot of stuff I read is stated to be gospel. I just use my own judgment.

Q. Do students know about refereed journals? Do you think it is important for them to know?

A. Which journals? Refereed or peer reviewed?

I would like to learn more about the process. I just found out they actually charge you to get into these things. I thought you were doing them a favor by coming up with a good article. It takes away if you are paying them. It's like anybody could get in if they had the bucks. Maybe they have some kind of credibility rein on things.

I doubt students know about it. I didn't know until I actually tried to submit some stuff. I think it's something you learn as a research professor that deals with it. It's hard knowledge to come about a student.

We were told about the review process in my chemical leadership class. Told how it comes about but I've never tried to have a paper published. I'm not sure how hard it is to get one in.

Q. In that class, they actually talked about it? Was this a graduate level class?

A. Undergrad.

I don't have any experience with dealing with editors or peers. I don't think undergrads necessarily need to understand how the process works. I think that's only when someone is a serious researcher. They have to understand a journal is refereed or peer reviewed, etc. I think for most undergrads, it isn't that important. When a person wants to publish their thesis or important work, I am sure the quality of the journal becomes important. As mentioned, some journals are not as reputable as others.

Q. So the point is that when you are transformed into an author, you are going to be published? You don't think students know the difference between a journal and a magazine or anything published on the web?

A. I don't think they would know the difference in the writing or information they can get out of it. If you show them Analytical Chemistry and Time magazine and you cut out both articles, and Time is about ozone and depletion of that, and the Analytical Chemistry is on lasers and absorption of CO₂ and UV, then they might be able to tell just from the technical writing versus nontechnical writing. From the information content, I don't think they could tell.

I think that is part of being exposed to journal articles. Outside of the average undergrads, they are not really aware of journals. How many there are, what kind of stuff. Eventually, you get an idea that all of the really technical stuff is published in journals.

Q. I think we are trying to find the point in a student's career where it becomes important to know the difference or to work with refereed journals. Is it a point in years? Junior, senior, graduate? Is it a point in major versus nonmajor? What kind of literature is appropriate at what time in the career?

A. I think that as a student evolves, they become more serious about their studies. That's when they might pay more attention to journal articles and may be exposed. That would be upper level undergraduate.

Q. When they know they are in a chemistry class because they are interested in chemistry and not just course work?

A. Right. When you are done with your core classes and are just taking chemistry.

Q. Do you think students understand the content of journal articles?

A. No. I can speak from experience. Just starting this semester year in my class and looking at these articles, it has taken me weeks to understand, to go to where I can take the paper apart and analyze what it is saying. As an undergrad, I read them and got the broad understanding of what it is. I understand how to repeat this experiment, but as far as understanding the details of the paper, I have just started that. I don't think it was important to me as an undergrad, but now it is.

I don't think a junior or senior could understand all of it, they would be few and far between.

Most technical articles are difficult to understand.

I think as far as a course intended for a junior or senior, journal articles that are either very old journal articles ...

I wonder if anyone has ever tried writing a journal that is specifically designed for undergrads, maybe even including articles that would allow an undergrad to publish.

I believe there is a journal on undergraduate thesis.

Q. In all fields or just physics?

A. I'm not sure. Someone told me there was such a thing.

It would be a big project. A young mind sometimes can come up with things that shouldn't necessarily be suppressed just because it is not totally rigorous. The formulation of new ideas begins back in grade school. You question things and can't understand how things work and you can't find the answers. You start inventing your own little solutions and if you are taught repeatedly something is a fact, you never learn to develop these ideas on your own. After all this being taught until graduate school and you get a Ph.D., suddenly we are expected somehow to spontaneously start developing new ideas on our own. I don't think it's going to happen. You just keep with the status quo and figure out some details.

First of all, you have to believe there are new things out there to come up with. I was asking questions adults couldn't answer when I was 4-5 years old. The process never quits. That's why I came back to school and I'm still in school. I am not getting any answers.

Q. If students do use journals, how do you think they are exhibiting the knowledge they are requiring through their readings? Assignments? Presentations?

A. I think students should use journal articles if they intend to do independent research such as a thesis or dissertation. I agree with what has been said before, the nature of our subject does not encourage someone to have independent thoughts. If you are going to specialize in some field, this applies to both undergrad and graduate students; you need to have some idea of what other people have done in the field.

Q. At the next focus group we are going to get more into the details about journals but are wondering if you have noticed undergrad students using information, journals, articles, whatever, differently than you did as an undergrad? Is there a difference?

A. I think the influence of the Internet is the main difference. The Internet was just getting started when I was in college. It is very popular now but it was not the graphical interface you have now with the libraries, search engines, etc.

In my class we were forced to do everything at the library. We could have done it online but were forced to go and look through all the journals and learn how to do it like that instead of using electronics.

Q. And you never did it again?

A. Right.

I'm not that far removed. I know what they're doing. It seems like mainly you find a search engine, punch in your copy and see what you come up with. It is getting easier all the time.

Q. What kind of things do you retrieve? You say you use a search engine like Google?

A. I use those every once in a while. Recently I found Vivissimo with scientific articles.

Q. You get scientific articles and then return them?

A. Yes. Some are high quality. Some times they leave you in the abstract.

F. We have some questionnaires to be filled out ...

[Questionnaires]

[Concluding remarks]

4.4. Focus Group #4: Undergraduate Students

Focus Group #4
Undergraduate Students
Tuesday, April 30, 2002

F Facilitator
P Participant
Q Question
A Answer
*** Unknown; needs clarification

[Introductions]

F. We are transcribing this but no names will be used. Those of you who have worked on a research project know that we have to have each of you sign confidentiality papers.

[Confidential papers signed]

F. Questions will be asked around the room so please give us your feedback.

Q. In your classes, what are your required readings? Here we are not talking about English classes but specifically Chemistry, Physics and Engineering. What are you required to read?

A. Just textbooks in Chemistry class.

Some lab journals, chemistry magazines, fiction, more interpretations.

Readings are mostly from textbooks, normally the only other classes where I am required to read anything additional are one-hour classes that are really specific like working on a task or something, a project.

We will get some specific handouts sometimes for something real specific that there is not a full-length textbook for.

Q. What kind of specific handouts – articles or lab notes?

A. Design-type things, really. Real detailed things that we just want to talk about, like fasteners, different kinds of screws and bolts, things you would use in engineering.

I suppose, at my level, I'm not that far up, we just use text, books and lab handouts that are generated by graduate students or faculty. Otherwise, we just study the notes which are usually thorough. We are not far enough along on the cutting edge where we need to look at Physics Review or anything like that.

Mostly textbooks, although in a couple of my classes in Physics, a lot of the material we are going over in class, they have made a webpage with important stuff, other peoples examples and web experiments. Every once in a while we will get a handout or have to go look something up in the library. Chemistry books are not included in the texts in the school, usually it is a lab or something like that.

I guess in the required reading, it is textbooks. Though, at upper level stuff, sometimes we are required to look up different journal articles but they are usually for general information. You know, if you read this article it might help you understand what we are doing better. The only magazines outside of journals that are required reading was in my E&M class and you were working on a problem and it turned out to be something that was published in a journal in 1996 and you had to read that journal article to understand the problem.

The classes that have used the most journal articles that I have taken are in the Anthropology classes. All of those have required journal articles to be read or either summarized or reported on.

Q. You might be interested to know that when we were talking to your faculty members, not in Anthropology, there was a fairly lively debate about at what point should journal articles be required. There was not a lot of agreement. I think it would fall somewhere inbetween sophomore and junior years. Most of you mentioned materials. Are you expected to find those journal articles or materials on your own?

A. Chemistry, no. In English classes is the only time I have had to – datasystems.

So far we haven't been required to look up any journal articles.

In our Astronomy class, a lot of time we will be presented with a topic then everyone in class will have to go find some aspect of that topic in a journal. The teacher did not give us anything except the topic really – I guess he relied on us to use our own judgment.

Q. Did he give you instruction on how to find the topic?

A. I guess he did us a little guidance. He asked how much we had used computers and so on and most of us said we were used to using searches, etc. But then he gave us some more scientific bases that would narrow it down.

One of my Chemistry classes really required that you find the information someplace else to help understand what was going on. There was lots of information that was not explicitly covered but you were expected to know it, and so there was a couple of times he actually directed us and said, "Go find this particular book in the Library".

Q. Are there any specific websites or databases that your instructors expect you to know?

A. In the last system class, we had to go through and work with SciFinder and Web of Science, both of which are used to locate articles in Physics and Chemistry. One of them costs money, so you have to go to the Library to use it. Most of the other stuff you had to figure out yourself and go find it.

In the Astronomy class, there is one site called Nine Planets, I think from the University of Arizona, and our teacher frequently referred us to reading stuff.

I think that the only time our advisors have required looking for anything outside from the Internet, our teachers provided the website and directed us where to go.

I have not yet figured out which keywords will actually get me useful information.

Q. Are there favorites that you have?

A. As far as generally finding out information on anything, scientific or not, I think it playdoh.Stanford.edu and I think Stanford is compiling this incredible encyclopedia, and it not only has lots of information, but it has good quality academic links to more information about the subject.

That's very interesting. If you do something specific, like scientific word searches, it will actually come up with peoples research results.

Q. Several of you mentioned Google. Do you have favorite search engines?

A. I also use Google because it seems to be less appropriately influenced. I used Ultimate ?? but they have lots of windows and so I use Google all the time because of the difference.

It usually gives, at least somewhere on the first page, what you want, and sometimes it is actually better searching for stuff on someone elses website than they are in searching their own stuff.

I use CubeFinder?? Which lets you look up lots of information on all sorts of things like properties and it has all kinds of links for health info and that is useful to me.

I use Copernicus and it compiles the results from Google and a bunch of the leading research engines. I like it because it saves your results for you, and you don't have to come back and redo the same search if you are coming back the next day.

Q. Is it specific to a topic or is it just everything?

A. Everything. Actually, I was referred to it by a Professor in EEB (Ecology and Evolutional Biology).

One of our Engineering Professors explicitly suggested to me to use Google. I had used Dogpile or something else and he made a note on my paper not to use that.

Another one, Udflow.com?? That was one my Astronomy professor had recommended. I guess when you put in something scientific, we were studying Einstein's papers, and I couldn't find specifically Einstein's real papers. I found a bunch of junk about Einstein's work and it honed it on the scientific papers. But that one's not good for doing just plain searches.

There is a real problem online if you don't use scientific specific search engines. You come up with a lot of quackery, for lack of a better word. There are a million and one people that think they have found the thing to replace general relativity.

You find a lot of bogus theory out there.

Q. Do you know what a peer reviewed journal is?

A. I have found that things like that are more for a Philosophy class than a Science class. I guess in a Science class basically you walk in with that knowledge of what a scientist should be already in place.

We have talked some about peer reviews but it's not always good, like you're not always sure it is accurate. Even if you find it in a hundred different places, if it is not from a journal, you can't be sure it is not a hundred people copying something they have seen somewhere else. Usually, for important stuff, they want you to start not from someone else's website, but from either website, journals or actual text from a website from a large company or something like that. They usually prefer that you get your information from journals.

I think that is partially because there is so much bogus information on the web. I mean, you don't have to go through a publisher to put anything on the web.

Q. How do you make this distinction? At what point do you decide between bogus and real?

A. I guess common sense. If something is from .edu, I assume it has some credibility to it. It's really hard to tell sometimes.

Most of your major periodicals have online components these days. Your main line scientific journals will have them. So you don't have to worry about it. There are a few online journals of dubious quality.

There are a few dubious print ones also.

You look sometimes to see if it is from a department in another university, so look at the .edu's. You can look to see, in Chemistry, there is a lot of government information. You can look for .gov to see if the government agencies have any information on the topic you are looking for.

In finding out whether it is a journal you want, a lot of times, type design will tell you a lot, if it is pink with flowers it is probably not taking itself too seriously. If it is black and white, with a lot of text and not much anything else, it's more likely to be interesting.

Q. When you were talking about going to the main line journal, did you go directly to the journal or go through Google or other search engines?

A. I would say unless you were referencing it, you would probably have to go through a search engine.

Q. The next question has to do with journals. Do you find them difficult to understand?

A. There is a lot of mumbo jumbo.

Q. How do you learn to get through the mumbo jumbo?

A. Personally, I find myself translating almost like a different language. This means "blah blah blah".

If you are searching for a certain topic, you usually have some type of information about that topic to make it easier to interpret the journal.

It also depends on what journal you get. There are some that give our valuable information but making it a little bit easier for everybody to understand. There is Scientific American, which is relatively easy for anyone to at least pick up and get a general knowledge of what is going on. There are more technical ones, like Science. When they publish someones paper, it's a whole lot more technical and not nearly as pretty with photographs, but it is much more informative if that is what you are looking for. Some give you an overview of what is going on and some give you the actual specifics of what they did and how they did it.

Then there are some that do real research. There was a very technical article, very jargon-jargon, about comparing human nasal mucus to that of animals.

With Physics articles like general theory, it is easy to understand if you are just trying to find out what exactly are they talking about. That's not too hard.

Q. Are there parts of the journal article that you would look at first or are more understandable than others?

A. The pictures. Usually with pictures there is some sort of simplified caption so you can check and see ... okay, this is what they have been talking about for the last two paragraphs ... this illustrates it much better.

A graph always helps. They might spend a page or two describing a relationship, but if you just look at the graph it helps.

Unexplained acronyms are a real problem in some journals. I was reading an article about gamma-ray boosters. It was talking about a theory where the interstellar medium falls on to the neutron star, causing it to heat up. Some of these stars are super hot after they have been slowed down. They kept talking about ISM-this and ISM-that, and never explained what the ISM is. I was halfway through the article before I realized that ISM is interstellar medium. That is something that, unless you are intimate with the material already, it can be a bit of a stumbling block.

Q. Is there a difference between the usefulness of the journals and the magazines for the work that you are required to do?

A. Between journals and magazines?

Q. Yes, you haven't mentioned too many names. We have been focused on papers.

A. More important things have been indexed whereas you might be able to find it by general topic in some sort of magazine, but not specifics.

Magazines would be less technical too.

And a little more rounded too. Scientific American has really cool articles and pictures, but they're a couple of years old and they don't teach freshman students.

Depends on what you are using it for. If I were doing research for a class, I probably wouldn't look it up in Scientific American, but I subscribe to it because I like reading it.

The magazines have more quality. In Scientific American you have a big picture and in a journal article you have log graphs.

Q. Pictures versus log graphs. Is there a point in classes where you are taught to interpret the log graphs versus the picture? Is the ability to understand within the journal articles? I am trying to get at what point do you think you got that knowledge?

Until your sophomore year or possibly junior, because until that point a lot of people are taking the class for general distribution or some sort of an elective, so they don't get into exactly what that log graph means because it is not pertinent to the people who are taking

that class. It is not usually until you are taking a class specific to your major that they tell you, "Here is a log graph and here is just what it means", instead of "Here is the big picture."

Q. Engineering might be a little different. You mentioned being given materials, but are you introduced to different types? For example, specifications or standards and have you worked with different types of reading materials?

A. Generally, most engineering in the first two years is pretty much the same. There can be some differences if you want to go ahead and take a few of your classes. The first two years can be a lot of the same.

I really don't think we have done a lot of supplementary looking for things other than what we have done in class. I know I have not done any at all. It has not been a problem. Next year it will be.

Q. If you do happen to use journals, can you demonstrate what you have learned from the journal articles? For example, are there quite a few questions, written assignments, conversations, etc.?

A. The only time I have used journals is in Anthropology and we have had written assignments.

In our Astronomy class, we generally discuss different articles that we have found usually from the web. Then we are required to write a little summary. As far as the hard-core Physics major classes, it is all supplementary. Everything that is required for the classes is textbooks.

We had some image stuff you had to look up. You had to figure out what it was to understand what they were talking about. You demonstrated that you have read it, or that you knew what they were talking about by being able to do the problem. The problem wouldn't make any sense unless you had actually read what they were saying.

Q. If you were required ... let's say in freshman or sophomore year ... you were required to research for a journal article to read to interpret or discuss in class. Do you think it would be useful? Do you think it would be hard to understand? Do you think it would be a waste of time? At what point in majors is it reasonable and useful to introduce external journal articles and when did this become positive rather than a waste of time? Freshman and sophomore years ... do you wish you had more of that? Are you glad you did not have more of that?

A. I think it would be useful to learn looking for journal techniques as early as possible. Just for preparation, but I think that at our level we are just going to have to walk through it. At higher levels we have people that know that this is what they are going to do and so they are motivated to find the articles.

I think it depends also on what kinds of textbooks you have. For some reason, if the professor really likes the textbook and there is a lot of information, the professor may just refer only to the textbook and not worry about it. Or, if the department chose the textbook for them and they don't really like it, at that point it might be useful for them to send you to other information because the book doesn't cover it well. It kind of depends on what the core of the class is ... how good or bad that is. The journals may be useful.

As a second-year student, I think there is only so much you can do with that. I think it would be good to learn how to do that, but in the second year there is only so much extra stuff you can do on Calc II. What are you going to do? Go learn about research applications and stuff, and dynamics and all? I think it would be a good experience to learn how to do, but it just doesn't seem very relevant. A lot of it is just working through problems and going out and understanding how to do it at this point.

I guess what happens is you generally learnt o pick it up as you start actually doing your own independent research. When you get between sophomore, junior and senior years, you start having your own projects. Definitely my senior year here. You do your own research and you will learn, kind of like when you learn to swim, you get thrown into it, and you learn to pick it up or you don't.

Q. Someone mentioned an English class and someone mentioned going to the library. Have you all had, maybe in an English class, how to use the library resources?

A. I have never done that, even in high school. At this point I haven't been really required to do any in Engineering. I am just now taking English as a sophomore and I have no clue. There is nobody really to walk you through. You just have to go in there and figure it out. What keywords, how to combine two words to look through things together. It was really tough for me.

I think that really relates to your teacher. I think some of the teachers try to help you get familiar with the library, knowing that you are going to use it. It just depends on what kind of English teacher you have.

In our English class, they gave us a little library tour to learn how to do research which helped as far as learning where the journals were, and textbooks, but you still have to do it on your own a little bit until it makes sense.

Q. A physical tour or did you do the web tutorial?

A. I did the physical tour but the machines were on the blink.

I did the web tutorial. I have not the slightest remembrance. I guess it was less than a year ago. I don't even remember what was on it.

That is what I was saying. I did that but until I had to look up something on my own, it didn't make sense.

The main library website is much easier to navigate than just when you are searching through the card catalogue.

Q. Did you do the tutorial in your English class?

A. We were required to do it. There was some talk about it in class and that was the end of it.

I went to the library. I didn't have any tutorial or anything. I just went over by myself and started to use the computers and figured it out by myself.

I will say this; it is much easier to search the catalogue now than it used to be. I learned how to search back when it was, "Tell it again" or you had the text only and that was much, much harder because choosing all your options was a matter of remembering, "What does this letter do?" when I hit it. It is easier to search now and easier when you first come to the library to find what you need than it used to be.

It's a whole lot easier for our generation. My sister is four years older than me and when she had to do research for papers and stuff, she had to go to the library. Even though they had computer searches, she had to look up physical journals and textbooks. If I have to do research, my first thing to do is a Google search. You know, how much information can I get at my fingertips in my room. I do not try to avoid the library, but it is a lot easier to search the web and see.

I am writing a paper now and you can find hundreds and hundreds of books that have some relation. They are keyed to the person you are looking for. But to actually search, because they are not on a computer, once you get a search, you can actually refine it down. But you don't know actually what is in there until you pick it up because for the card catalogue it is usually a very short note if there is anything at all. It is easier to search with your computer because there is less manual ... like running around the library trying to find what books you want than leafing through it to see if you got the information you needed.

I will have to disagree with that. I was looking for information for a lab we did last semester, spectroscopic information or something really specific. I found the section where all the books are. There are two shelves of spectroscopic analysis of this compound, of another compound, very specific subjects. If I had gone through my computer ... there were several compounds that were sorted like the one I was looking for. I would have never what I was looking for except by going through and seeing it. Especially since over there all the science books are sort of in the same section. For me, personally, it is a lot easier to just sit there.

When I actually do research in the library, I usually try to find the section that I find useful and then I just go and browse, rather than trying to narrow it down to two words.

Q. Several of you use print books and obviously you use textbooks, but what about other kinds of print ... you talked about Scientific American ... are you using print version or electronic version? Do you use both print and electronic, or what?

A. Print versions, especially in journals and magazines, are usually ... if you want to get all the information, a lot of times when they put it on the web, it is cut somehow, it is not as long. If you ever look at webpages, they are normally not that long. There might be two or three, and that's it. The article will take up pages and pages in the journal, so if you want the full article, it requires that you go find the actual page. It is sometimes easier to leaf through the print journals. You don't normally use the microfilm or anything like that in the scientific stuff. That is newspapers and everything.

Especially forms and .pdf format. I don't know about you all, but I don't like to leaf through anything long and .pdf is kind of a pain.

My kid's have printed stuff out just by looking it up and then printing off the .pdf files for me is less work than going through the numbers in periodicals. I think that is just personal preference.

Q. When you are given articles or extra materials for classes, are you giving them in ... or does the teacher give you an URL, something to put together, or what kind of format do you use?

A. Hard copies that have been passed out.

One of my professors will put links from his website and just says, "Find the website" ... that's about it.

In chemistry classes, we have hard copies but there are about 300 people so the teacher will say, "Here are some journals, go find an article", and then for the other one there is library reserve.

Q. In any of your classes, are the professors using the Blackboard software?

A. For my math class. Most of the others have not used it. Most of our stuff is on the web and he knows all about it. It was easier for him. He just put all the stuff on his website. There is a lot of stuff on Blackboard that he didn't need to use and he didn't see the point, I guess, in setting it up when he just needed the simple points. When they do use it, it is usually all of the teachers.

Q. I started out by saying that you were not just random students, but do you think that you use information the way ... do you read and understand the same way as your fellow students? Do you see people going to the library more or using search engines, or what?

A. I think I am typical of the students who came in my year or the year before, but I can see differences between how I get stuff and people who are just a year older than me. I don't know if anything special happened then, but most of the people who are over me like grad students or seniors, they spend more time physically in the library. That's not everyone, but it seems like the people who are above me, but they tend not to search the web or search.

A lot of people in our class are addicted to "If I can't find in 30 seconds, it's not worth finding." Some of the search engines need to be simplified.

Q. We are about to stop. Do you have any questions or anything else you would like to say about use of information? Our next focus group will look more specifically at electronics, environment, what kinds of things you like and don't like. We have already talked a little about that here. Things that you find particularly appealing as far as search engines or class material. Some mentioned SciFinder and what are the things about it that appeal to students? Why do you use those?

A. As far as simpler goes, both the library card catalogue and web, they have very specific categories, that if you don't type in the right keyword, you are going to get some freaky random stuff. What I personally look for in a web search engine is, if I type in a pretty weird, out-of-the-way search, does it get me somewhere near what I am looking for.

I have noticed though, if you look for it, you can use the Almad?? periodical search and the problem is like the more specific the search, not the search but the search engine is, for instance, we have learned about SciFinder and the Web of Science, and they are very, very useful for finding articles you want, but the more specific they get, the more archaic they get. There are all sorts of random ways like someone who is doing it said, "Hey, this would be a good idea", so there are all sorts of things you have to learn. General search engines like Google and stuff generally all work the same way. You type in the same general format. Whereas, once you start looking for some articles on specialisms, it gets much harder to remember what's going to give you the best results. You could end up with random results or good results with the same search in two different places.

It's a very interesting format on a political discussion. I think it would be good for an online journal. Whenever they would submit "Argyl"?? or something they would actually have a list of keywords to fit in that would specifically tell the search engine what would take precedence over the title or whatever. Say you had an article about a certain topic such as the 2000 elections, the keyword you have would be "Election 2000". Even if that was not the specific title, you would be able to hit that and have that whatever articles were submitted have a list of specific keywords that you know students and colleagues are looking for to help bring that up.

One really useful thing about Copernicus is that it highlights the keywords you put into the search in articles it pulls up.

Google will do that. In the little bars that it puts underneath, you can click on a link. Google also has an interesting feature where if a website is no longer available, they usually have a copy of it that it saves whenever it went to that website. Actually, you can click on that and that usually has the words highlighted so you can see whether or not they were true. Sometimes if you have different parts of the words and different sections but they are not actually associated with each other.

Does it actually highlight the words in the website?

It will go bold, I think, in the same version.

You can go to the same version in Google, that is an interesting feature. Plus it means if it is something that was up temporarily and is no longer available, you can still read it.

I also like under the Vivissimo search, it has whatever you typed in. Say I am looking for Einstein's Theory of General Relativity, it divides it up into sub-categories that are things that people usually look for, like scientific or philosophy. That kind of helps you narrow down your search without having to use your brains too much.

Another useful thing. I know Google does it and a couple of others. It actually lists, "Are you sure you didn't mean to type this", in case you put in a word that is typed wrong and a lot of times it will give you things that are related. Because you typed in one thing and it knows that this word is mentioned a lot in other articles, like other options, and you can search on that. It's kind of a way to expand out.

Q. Does anyone use the directory? Yahoo or Google? You have been talking about search and search engines, but does anybody ever go to the directory?

A. I used to use Yahoo, but the problem is you never know. It's kind of like looking for keywords. You never know what category something will be under. If you want to find about x, it will give you 6-7 categories. It's really hard to figure out what someone was going to put that under. It's usually something similar but it's really hard to guess.

Usually with the catalogue, you search and find out what the category is, then go back up to the catalogue and have a wider range.

[Concluding remarks]

[Questionnaires]

4.5. Focus Group #5: Graduate Teaching Assistants and Undergraduates

Focus Group #5

Graduate Teaching Assistants and Undergraduates

May 21, 2002

F Facilitator
P Participant
Q Question
A Answer
*** Unknown; needs clarification

[Introductions]

{Consent Forms}

F. I am here to ask questions and listen and have a conversation about particularly the kinds of online searches that you do, your use of electronic journals and that kind of thing. At the last meeting, I guess several of you mentioned your favorite weapons were Google and Vivissimo. Out of curiosity, how did you find out about the search engines? Which search engines do you use, if any?

A. I usually go to Yahoo or Google unless it is something special.

Q. Do you use any of the abstract A&I*** services like SciFinder or Web of Science? Do you use any of those? How did you find out about the search engine you use? Do the instructors tell you to use a certain search engine or did you just decide to use it?

A. They mentioned a couple of them. You learn which ones are the best.

Q. Is that pretty much how all of you do?

A. I think I turned in a report one time, like a technical report, and I told him where I got my data. He made a note to use Google for this and "X" for that.

Q. That's interesting. Do you know what the basis for his suggesting that all?

A. No.

Q. Let's pursue this a little further. He mentioned Google and what were other search engines he mentioned?

A. SciFinder is one. I had never heard of the other one.

Q. Was there a particular reason? Could you tell if there was a reason?

A. We were researching specifics for some kind of mass flow meter and he suggested getting the data from Google.

Q. Did you get any training at all to use these as part of your course or anything? Did they tell you how to search and what to look for? What kinds of questions you should ask or whether you should use logic or those kinds of things at all?

A. A group came in from SciFinder and gave an open seminar. It was about 1-1 ½ hrs. They gave a demonstration of what it is capable of, future prospects, what they are trying to do as a company, what will be available in the future.

Q. Did you find that useful?

A. Yes. It was useful since it was the first time I had heard of it. I had used it before but once I found out what it was capable of, it became a lot more useful.

Q. Was that just for Graduate students?

A. It was open to anyone.

Q. How many attended?

A. About 25-30.

Q. On the searches you performed, I know a couple of you are GTAs, for your own research or sometimes do you use it for the faculty?

A. A lot of it will be for your own research. A research professor may ask you to look up something for him, track down this article, this book, but over 95% of it is for your own use.

Q. Is that true for everyone?

A. Yes.

Q. When you are doing this, are you running down a particular article or are you doing kind of an open search on a subject?

A. An open search usually.

Q. Looking for something on a subject?

A. The subject and author. I might look for works by this one particular group from so-and-so university, and whatever comes out of that ...

Q. Again, other than the kind of training you are talking about, the rest of you haven't had any particular training. Just one last question – what about the quality of searches? Do you have any notion at all about how good the search engines are? The kind of results you are

going to get? Do you have any sense about that when you are using Google and Yahoo and some of these search engines?

A. The ones that are specialized for science and research purposes like SciFinder, say you are searching for something like quantum*** mechanics, you don't want a lot of garbage. It's very difficult to find useful scientific information unless you narrow it down very well.

Q. Do the rest of you find a similar kind of thing?

A. I agree. SciFinder usually hits very well.

Q. In talking about the kind of searches you do, the kind of systems like SciFinder, Google and Yahoo, what is it that you particularly like about them?

A. They don't turn up as much irrelevant, far-out searches. They seem to be a little more specific.

Q. Which ones are you referring to?

A. SciFinder has limited experience. It does not turn up as much gray area that you are not looking for. I get that a lot in Yahoo.

Q. So, what you do like about them is that they narrow the number of responses you get. What you don't like about them is? Are there any other features of the search systems in terms of, the kind of terms you could use, whether to use Boolean logic and that kind of thing? Are you familiar with that term?

A. Yes. With SciFinder, you can approach it from a Chemical perspective. You can just send in the structure or a CAS number and it will retrieve the relevant article on that subject. Also you can go after authors. There are different ways to come up with a result. In Google and other ones on the Internet, you are limited to what you can put into words.

The specialized ones are more like a library search. It just kind of turns the whole area into a Library. You can search the author by keywords and what not. It is a lot easier to use that way.

Q. Have you ever tried to identify a relevant document on the topic that you are looking for and see whether or not that relevant document can be retrieved or not in the search engines you use?

A. I would say at least 80-90% of the time you get it unless it's a fairly new one and they haven't updated the database. Then you won't find it. But, for most cases, and in some of these, when they update the database, have them send you a flag that they will notify you that so-and-so published this article for this keyword. They will send you a note.

Q. That's great. Have any of the others of you had that kind of a feature you have observed? Focus now on the web search engines, Google, Yahoo, etc. Are there any things you would

suggest might be done with them that could improve those systems? I know you have mentioned they tend to get too many documents. Are there any suggestions you have that might be able to overcome that problem?

A. Maybe have scientific "Page Go"; pages that are scientifically oriented. Ones that will have user's papers on them, journals – maybe have a marker on the page that a search engine could pick up easily. If you're on an automatic search, drop to "Scientific Literature". That would really narrow it down.

Q. That's something that could be done. Let's hear from everybody on how they could improve. If you were designing Yahoo or Google, what other things would you add? Here's your chance to improve.

A. There is a search engine called dogpile.com. It actually draws from multiple search engines. That is a pretty innovative feature. This search engine queries, I think, 10-11 other search engines so it's very likely you will find information.

Q. How often do you use the web search engines over a research semester?

A. 10-20 times. Google, etc. SciFinder usually 5 times a week.

Almost every day.

Q. That's very interesting. From where do you use it?

A. Home or school.

Q. Do you use the Library at all?

A. Yes. The campus labs get used a lot.

Usually at least every other day in some capacity.

About every day in research.

2-3 times a week.

Q. How much of this is for classroom purposes? About what proportion?

A. I don't use Google and things like that for classroom.

20-30% of the time maybe.

50-50%.

I would estimate 50%.

Q. How about the database systems? A&I, abstract indexing database systems like SciFinder and Web of Science. How often do you use them?

A. 4-5 times a week.

I haven't gotten far enough in my career where I use them much. This year should be more serious and I can gain experience there.

Q. When did you start using them?

A. Graduate student. As an Undergrad, I never touched it.

The most I have ever done with databases has been outside of scientific and geared more towards literature. I have done most of that in the Library through ProQuest and things like that. I haven't used it a lot for scientific stuff. I have used it a little bit for looking up spec sheets and that's about it.

I'm just getting started on my research so I use SciFinder a lot, but when I was an Undergrad I did research too, so I did both of them. In the first part of the semester, I used SciFinder getting literature and then tapered off as I started actually doing experiments.

Q. What kind of research are you doing? Laboratory mostly?

A. Yes, Chemistry.

I mostly use the Library search engines with SciFinder. I am just more familiar with the Library search engines.

Q. How often do you use them?

A. For serious work, usually once a month or so.

Q. Now show me that through one of these systems that you identified an article that you wanted to get access to. How do you locate where that article is typically. Obviously, it tells you what journal it is, but how do you locate which one? How do you get access to it?

A. I guess it is the Library homepage and look up the ejournal.

If it is '95 or later, and it's a journal that I know is online, I will click on the webpage and go from there. Otherwise, the Library or Library researchers bring them to the building.

Q. You have an express service here, don't you? Do you get anything on Inter-Library Loan at all? Other than your express delivery service?

A. Sometimes there is a journal that I need that UT doesn't have.

Q. Do they give you pretty fast delivery?

A. Yes, usually a couple of days.

Q. With an article, is it almost always photocopied?

A. I think we can request 2-3 different forms. You usually don't get originals.

Q. Do you visit the periodicals room very often and follow-up that way?

A. Just for general keeping up *in* the field, what's current, not looking for specific articles. I look in about 3-4 different journals, pick them up and thumb through. See what was published.

I usually do use the periodical room rather than trying to find it electronically. I'm old-fashioned, but I've utilized the periodical room much more than the Internet.

Q. How far back do the journals go in the periodicals? The current periodicals? Two years?

A. I think '95 or '96.

Q. Do they bind them and put them in the stacks?

A. Yes. I find things in stacks.

Q. Do you have a Chemistry Department collection? If so, is it complete?

A. There are a couple of complete journals in there. If the journal you are looking for happens to be in another set, slide in there and get it.

Q. Is it primarily the current materials or do they take the bound volumes back too?

A. They don't have bound volumes. They have them all the way back to whoever donated them.

Q. In other words, you build it up through personal selections.

P. I want to ask a follow-up question. You said you were "old-fashioned", but there is clearly something you prefer about the print. Can you think about why you like it better?

A. I think it is more convenient for me. I know everyone thinks that using electronics is more convenient, but for me, no. I know how the Library of Congress system works ...

Q. So, it's faster for you?

A. Yes it is. I have looked up articles in the periodical room in relatively short time whereas for me it is more difficult to try and find things on the Internet. I guess this is contrary to the idea of what the Internet is. It's not contrary to researchers really. I know it is contrary to the

idea of sitting at your desk doing a lot of research, but I was raised on the LC system as an Undergrad so I am more familiar with that. It's just easier for me to look up articles in the Library than go to search engines. The main reason is all the meaningless, like some people already mentioned, it is more difficult for me to find Internet based research material because of all the miscellaneous or extraneous material that surfaces with search engines.

Q. There are several different purposes for what you are looking for in these articles, one is when you are trying to keep current and you are browsing. Is that the type of situation that you are talking about in using the periodical room? Or do you do it for almost all of it?

A. I used the periodical room for the majority of the periodical research I have done in the last 4 years. It's more convenient.

Q. You obviously did Undergrad work at another university. Where was it?

A. I went to USF in Sarasota. It's affiliated with USF in Florida.

Q. Does anyone else go through periodicals just to keep up with the literature?

A. Sometimes. We have subscriptions that come to the lab so we go through them.

Q. They're not routed but in a departmental collection?

A. My Advisor gets the subscription to Analytical Chemistry. He brings it to the lab for the rest of us to look at.

Q. There is a situation where you are actually conducting a search to look for things that you did not know about before. Do you get those materials from the Library?

A. What I have done is use the Library search engines and find the call number of some article or book, etc. Then I find it in the Library. I have been doing that ever since I was an Undergrad. This new information on SciFinder will be useful for me. This seems to be an advanced way to do a search.

There is the advantage though that the hard periodicals don't have flash advertising popping up every 5 seconds.

I'm not sure I understand. When are you using the electronic?

If you have a dial connection, if you're not in a good network, if you're in the Schoolnet***, searching online can be a pain. Especially if you're not using a specialized search engine because you get so much junk. Again, it takes you about a minute to do a page of searching. If it's not in that first 20, you have to wait another minute for the next one to come up.

Q. What do you do if they are older articles back beyond '95?

A. UT has a form you fill out online. You type in what the name of it is, what volume, if it's before 2:00, they bring it over that day, if it's later in the day, and you get it the next day. It it's really pressing and you need it, you can walk over there.

Q. When you are looking at the full-text information online, how often do you read those articles online as opposed to printing out?

A. It usually takes too long to print. Sometimes you will scan it to see if you really want to take the time to print and read.

Q. What proportion of reading do you think you spend on this?

A. It depends on length.

If it's a useful article, I'll print it out and get a hard copy and file it so every group has a copy of the article. Then I will save a copy on CD and reference that. I always have that hard copy in the file cabinet.

Q. Once you have identified an article or series of articles that you want through searching or browsing, or somebody tells you about it, what electronic journal systems do you use?

P. You mean specific titles?

F. There are aggregators for example, for consortiums that have groups of journals, not necessarily one publisher, but maybe a number of publishers. We are just getting some idea as to whether you typically rely more on a particular publisher or some of these systems.

A. Most of mine is Elsevier but I will look at Analytical ACS Journal***.

The main journal for Physics is Physics Review.

Nothing specific. I do broad searches. There are probably a dozen or more Astronomical journals covering the same type of topic so you can use any one of these.

I have used IEEE journals frequently on applications and physical science.

Elsevier and ACS.

Q. Is there anything about the Elsevier, ACS systems or other systems you think could be more useful to you?

A. It could go back further than 1995. Put everything available online. That would be nice.

Has there been any attempt to get journals to digitize their older issues? Maybe starting with the most recent that are not digitized and go backwards. Maybe a financial help, small tax write-off would be good to get them motivated to do this.

One journal goes back to the 50's and 60's.

I think ACS is doing that. The AAS, American Astronomical Society, have taken all their journals back to the originals, to 1849.

Astronomical, Astrophysical, Astrophysical Journal are back to about '95. That seems to be the trend.

Q. In addition to getting the back files on electronic, is there any other feature of those systems you feel would be helpful or useful?

A. I think if they are within their own database, like the reference articles, if you had a particular reference and you could link directly to that.

Are you talking about citations?

Yes. You would see one citation with reference to the paper and then easily go to that page.

Q. So, you are shepherding through the citations. Any other thing? Does that seem to be useful? Do you know of any other databases that has that?

A. SciFinder. You can't get the journal article, but you can see all the references to it and articles that have referenced it. You can go back and forth.

Are you talking about future references to the article? That's always been something I wanted but had no idea how to do it.

Web of Science too. SciFinder is used more. You download it. It's a program.

Q. The American Astronomical Society journals do that. Are there any things you think would be useful in terms of display? How about the actual visual format of the articles? Does that make a difference to you as to whether it looks like the article in the print version?

A. Some of them. Usually the pdf files will give you the best print. The others won't usually display the figures and graphs.

Q. Is that a barrier? A problem?

A. Yes. If your computer has Adobe pdf, it is not usually a problem. Most of them seem to have that capability.

It depends on what you are looking at – online or planning to bring it up. Adobe is great for printing things but if you get online with a 20-page paper, it can be tedious to get through. Adobe doesn't have the greatest scrolling capabilities.

Q. How about linkages to actual databases? In the kind of work you are doing, is that useful?

A. It could be. That's something I'll get into later with the Marcos satellites. I haven't really used it yet.

Q. Are linkages to images important?

P. What do you mean "images"?

F. In space, if you are doing astronomical kinds of things, different kinds of space images that are coming out now, in terms of galaxies, etc. ...

A. You mean photographs? That is for pdf or *** to reproduce. I haven't tried to do that.

Q. How about in Physics?

A. I don't think there is a lot of choice is how you lay out articles so much. Traditionally, the abstract is at the top and then columns.

Q. Should they be arranged differently?

A. I can't think of an improvement in the official format.

I suppose the format that is used has been used for decades. I suppose everyone is comfortable with it and it has evolved to this point where everybody is happy. Why fix it if it's not broken?

P. When I think of it, centuries and centuries. You think of it in decades.

A. One thing that could possibly be an improvement for us is if you could view only the abstracts of articles. If you were searching for information on a topic, maybe you could view just the abstracts when you were initially searching.

Q. Are the abstracts informative enough to really tell what is in the article?

A. If I remember, in Chemistry, chemical abstracts were just big books of abstracts. You go in and read them like that.

Q. Would it be helpful also to have the citations as well as the abstracts to get some clues as to what kinds of things are in the articles?

A. Perhaps a sub link. There are lots of references in some.

SciFinder already does that.

You mean just tell you where they are, summarize and all that. The frustrating part is the abstracts are written in text, and scripts and superscripts are hard to read.

Another thing I thought about is when I've tried in the past to use conference proceedings to find current information on a topic; it's hard to find them online. If they were more easily accessed, I think that would be a great feature.

Q. When you have research results, it goes through a lot of different ways in which the information is provided. Conference proceedings are a kind of early one. Tactical reports are often kind of earlier than that in certain fields. How important do you think a peer review is as far as the article is concerned?

A. Fairly important. If you do any search on the Internet at all, you come across a lot of nice guys who can't be convinced they are wrong. They are right for 30 years about some crazy theory in left field that doesn't have a chance of being correct. Yahoo is bad to come up with things like that. It looks legitimate, nice page layouts and stuff but when you are halfway through an article and think, Wait a minute.

Q. Do you think it would be useful to have an indicator on the article that it has been reviewed? The journal title is kind of an indicator but do you think there ought to be something more than that or even who did the review, for example?

A. I think once you get into a field enough and are actually acquainted with the journals, it's just something you come across and say, This is peer reviewed. You start to recognize it. It must be useful for a beginner. I think it's something you know through experience.

Q. In other words, the journal itself is an important indicator as to what the quality is going to be?

A. If they're publishing on their own on the Internet, it's a tip-off.

Q. Many authors say, I'm going to have my own website and all my articles are on the website. If you want to get it, you can get it. Do you think that's a good approach?

A. I don't want to discourage that. If you have a crazy there, there is the freedom of speech thing.

It's a good source of information to sort of see what other people think about this. Then you can go to the peer-reviewed journal and see if others agree with that.

Q. Do you think there should be more ... in some fields there is one line of thinking and they will always have an adversarial approach to discussing that kind of research? Is that a useful way to publish? For example, I am a statistician and there are traditional statistics. If you go to a statistical meeting, it can be an argument. You don't see that in the literature. You don't see the arguments and counter-arguments that you get in different fields. I assume that is true with many fields. I was wondering if it would be useful to have different viewpoints on a particular field.

You will see some articles that will anticipate their criticism and tell you upfront.

I think if you look hard enough that just through the peer review process, if you have a good editor at all, he will send it to some people who are more interested therein and some people who are against it. If it is a hot debate, they will publish it anyway and get more responses like "Letters to the Editor". If it is in an anonymously reviewed journal, it should make it.

Q. What about the editing aspect. How important do you think that is? Somebody who actually attempts to get the author to write more clearly and concisely? Do you think that is as important as well?

A. Certainly. Badly written articles are. It wouldn't hurt if they sent it back a few times. One thing I thought I would like to see ... Scientific American is a basic layman's journal but you have an article and a month or two later they will have Letters to the Editor. If you've lost your journal, you can't find the specific articles, you have problems.

Q. I wanted to ask about preprints and whether or not you use preprint databases or know about them?

A. I happened to find a preprinted article. I don't know how it got there. I couldn't find it again.

On Science Direct they have articles in press. A lot of the ACS journals, you can look at those. Those are articles in galley proofs or articles that don't have a page number yet. I go across those to increase the breadth of knowledge. I find a useful article now and then but it's just by chance.

Q. How about in Physics? Are you familiar with the preprint services?

A. No.

No.

In regard to articles being edited, I think the poorly written articles, as mentioned before, are a serious problem. I have encountered times when the Professors, experts in the field, do not understand what an article is talking about because it's vague or poorly written. I think it's very important for an article to be edited before communicated. Last semester I was working on a final project and the Professor gave us an article that no one in the group, including the Professor, could understand.

Q. Did he give it to you for that reason?

A. I don't know. I really do think the quality of writing is very important in scientific literature.

I was reading an article about gamma ray boosters in Astrophysical Journal for a project this summer. I noticed they get carried away if they know their subject and expect you to know it. Being a less experienced Undergrad, it is hard for me to understand, like the acronyms. We love them. It drives people in other countries crazy. He was talking about ISM this and that,

about how neutron surges were ISM, but never explained what that was. I was halfway through the article when I realized ISM was interstellar medium.

Q. Do you think it would be useful to have an acronym glossary on the web?

A. It's hard the first time you use it.

[Concluding remarks]

[Questionnaires]

[Late participant]

Q. There are two kinds of search mechanisms one might use. One of the web search engines like Yahoo and Google, etc. we were asking the extent to which you use these? What you think, how those services could be improved, what you like about them and what you don't?

A. The main one I've used lately is Vivissimo. It doesn't give you a bunch of junk and gives you lots of references.

Q. How did you find out about the system?

A. One of my Professors told me about it.

Q. How about the online databases that are put together by abstracting indexing services like American Institute of Physics. Do you use them?

A. Like Inspect***? I use that one. It puts a list of abstracts together. I start with the Index and click on the topics I am looking for. It will ring up all the abstracts.

Q. Can you think of anything to improve that?

A. It would be nice if you could bring up directly a copy of the article itself. When you click "Holdings", it tells you if UT has it but sometimes it doesn't say and it isn't always accurate. It will say the library has things it does not have.

Q. Prints, electronic or both?

A. I haven't tried it enough to figure out what it is trying to say.

Q. Other than that kind of improvement, are there any other kinds of things you think might improve the searching capabilities?

A. Nit-picky things like they list the author by last name and one or two initials. Sometimes there is some ambiguity about whether they are the same author. Maybe a first name would help.

Q. Do you use a citation search system like Web of Science?

A. No.

Q. Let's follow-up with Vivissimo. You get relevant information, but is there something in the search engine and display that you particularly like or is it that you get good stuff?

A. You don't get a lot of junk. It seems upfront with the most relevant articles. You can compare that with other search engines on the same words. It seems to have things the other ones missed.

Q. After you mentioned Vivissimo, we all went out and tested it. I thought what was most unique was the way it displays things in terms of folders. Have you used that?

A. No. They have a little thing on the left but I haven't used it. I tried it but it didn't make sense.

P. We will go do more work and research on it.

Q. Do you ever use a current periodical room at the Library?

A. We get the actual Physical Journal on the 6th Fl. of the Physics building. I look those over. I do that to others. Just scan the titles to see if something looks of interest. Usually there are 2-3 articles and it comes out 3-4 times a month.

Q. Do you use Astrophysics Data Services (ADS)?

A. No. I'm kind of new at all this so I haven't really tried to download all of that or anything but I anticipate learning how to do that.

Q. When you find an article on Inspect, when you find a citation to an article, how do you get the whole article?

A. What I have been doing is to print the abstracts and try to find them either through the Library or just punch in the name and try to find the particular journals webpage. We hardly subscribe to anything.

Q. When you go to the Library, do you go to the periodicals room or the Library online catalogue? How is it you find articles?

A. You punch in the catalogue list and it will tell you whether they have it or not. Then you look for the electronic journals, do your special order and stuff.

[End]

4.6. Focus Group #6: Faculty (Second Session)

Focus Group #6
Faculty: Session 2
May 21, 2002

F Facilitator
P Participant
Q Question
A Answer
*** Unknown; needs clarification

[Introductions]

[Consent Forms]

F. At the last meeting, several of you who did web searching on search engines like Goodwill***, Vivissimo, Yahoo, etc., I wanted to know which you used, what you find favorable about them, what you think some problems may be.

A. I tend to use Google for things I am interested in. I am finding more and more of these web search engines are becoming painful. It used to be 25-50 search results and now they don't do that. They cull them together and put on their own headings. Pop-up ads come up now. It's becoming more painful to use.

Q. Do you know of any alternatives?

A. I use Lycos. They are all getting to be the same. You get 2-3 things here and they point somewhere else. Then you get 2-3 choices in a line, then a few more other things. It's not straightforward anymore like they used to be.

Q. Do you assign your students to use these web search engines?

A. No.

I do. The general research engines we have mentioned here such as Lycos, Google, etc., some are very good for general topics, particularly when I am interested in something outside my field. They aren't as useful as they could be for details within the field. My field is Chemistry and I find I do much better by going to specific sites that either I or our Library people have provided for us. When I am looking for topics, I always try the general search engines. In the course that we team-teach with the Library, we have them use several general search engines and say, Go and see what sort of a gateway these general engines give you to Chemistry topics.

Q. Do you find the same thing in Physics?

A. In general, depending on what is the general feeling toward what kind of layman's interests are, they go to Google and other things. If they want to do the real scientific thing, then Science*** and other things will give you more focus. They are more reliable. The citation is more complete and more thorough and professional for scientific. Google and others are more like reading newspapers in some ways.

I feel pretty much like the others, but there is one exception. I don't know if you encountered this too but sometimes there is some real specific, obscure fact that you can't find easily in the literature or reference books. Sometimes I can find them on Google. Sometimes there will be commercial sites that have data that you can't easily find anywhere else short of a lot of hours in the Library, which makes it prohibitive. There are many times I find specific scientific facts, you have to look at it and judge the source after that and guess if you believe it or not. There are some weird little things that that's the only way I can find them, on Google.

Q. Are there any aspects to the general web search engines that you find difficult? That you don't particularly like?

A. Yes. The pop-ups. It's aggravating.

There are many times I get references to places that are out of date, no longer there and you waste time chasing these dead ends.

It would be useful to date these things when they are posted. You don't know if it was 1982 or 1994. Most dates are not obvious.

Sometimes you go to faculty websites at XYZ University and it says, Bora Bora. It would be nice to know when the website was last accessed, updated or put in the database.

Q. Some information about the frequency of usage. Things of that sort. Are there any other kinds of suggestions you have about the general web search engines you think would really improve them?

A. I think it's important to make sure students understand no search engine is complete. If you are looking for a generalized topic, don't stop with just one. My rule is to always ask them to use at least 3 when we are looking for any topic.

Sometimes, searching depends on the keywords. If you miss a keyword, it is gone. It's a matter of luck. Look at a few and see what's in there. Maybe you can pick up some keywords other people use and try to use. It might be more useful if they could provide things like whether the search is missing, whether those are similar words.

Q. Do they have a thesaurus in these?

A. I don't think Google does.

They could steal from SciFinder. I really like the way it surfs. I don't know if that is feasible with the size of the database. It would be great if Google could do it. At least what's reasonable with their database. It makes issues of different spellings simple stuff.

I think it's important to remember that SciFinder has the American Chemical Society and all its financial resources behind it. Google has to be somewhat self-sustaining.

Maybe that's why they should steal.

I think if they could do some automatic stemming. I remember when we first got the current contents database and were looking at searches and retrievals, students would put in *polymer* but they would miss everything like *polys*, *polymeric*. Do an automatic stemming so if you say, I didn't retrieve enough, you have an option to do the stemming on some of the words and see if you can increase your search response.

The Thesaurus would have that too.

Yes, definitely, but if they didn't have that, the stemming could be done.

Getting students to have a look at the way a search engine operates, how it uses parentheses, quotation marks, how entries are made, is as difficult as getting them to read the introductions to their textbooks. You are likely to miss a great deal if you don't understand how to enter a variety of things. How you put in the Boolean operators, how you *and* and *are*, how you assure that an exact phrase is worked out and many other options of that sort.

Q. Do you have a sense that they understand what the strengths and weaknesses are of these systems along those lines?

No.

One of the disadvantages of search engines is that it is easy to get something. The kinds of strategies one had to use before computerized data in searching things out, the logical and mental strategies – you don't have to use them anymore. It's kind of like before the pocket calculator problem solving strategies. When you were a student, there were certain things you had to do because the arithmetic was hard. To survive you had to do things like reduce things to their simplest form and do conventional analysis. You had to do powers of ten because the actual calculation was either a laborious pencil and paper thing or a slide rule calculation. It was preset. The same is true of Library searches. You had to know what you were doing to get anything so you got better. Now you can type *something* in and get *something*. Perhaps what you want or perhaps something of questionable validity. But it's there and if you're not critical, then you get garbage.

Q. Do you think that hurts the creativity that is associated with doing search engines? There has to be some element of creativity that your searching helps on.

A. Everybody's criticality. Creativity and criticality. It's relatively easy to do and because it's easy to do, it is the first and last choice of students.

Q. I want to talk a little about SciFinder and the Web of Science and some of the more traditional online databases. One is, do you think they will be replaced? Do you think web search engines are likely to replace them or do they hold a niche?

A. SciFinder. I don't think it will be replaced. I think it is proprietary to begin with. And, in being proprietary it has all or most of the advantages of the fact that Chemical Abstracts is probably the most complete, the most thorough going, and probably carries the highest amount of integrity of any field of endeavor. We Chemists are fortunate in a great number of ways as compared to other fields of endeavor. SciFinder, of course, is the electronic version of the indexing capability of Chemical Abstracts***. It covers many fields that are not just Chemistry. It's off to Physiological Chemistry and Geological Applications. It is so broad and encompasses so many journals that I don't see any place on the planet with the economic resources to even challenge it.

The American Chemical Society is, I guess, the world's largest professional society and it puts in an enormous amount of its resources into keeping up.

Which every one of us realizes when we pay our dues, right?

Libraries know about those resources too. We get into a little bit of that. It holds its information very close to its heart.

I think in the future they will probably not combine with web systems but, in all respects, I think students will be searching only full text databases. I think there will be less use of things like SciFinder by students. I think they will be using only full text databases and eventually there may be some economic pressure to move that way and have more databases that are solely full text indexes.

The face is the students tend to use only, in my experience, articles they can get electronically and full text. They don't go hunting down print journals in the Libraries anymore. They avoid it. My guess is they will turn more to full text type sources.

Q. Do you have confidence that, for example, since the early 1900s when Chemical Abstracts has been functioning, the number of journals it covers is legion? Do you have any confidence that all of that corpus of material is going to be put as full text?

A. No. I don't think so but I do think only very specialized researchers will be using it. I think the Undergrads are already using, if they can, full text databases and I think they will make full text databases much larger in the future. I think publishers will merge. Eventually, it will be mainly Professors and Librarians.

Q. On the cutting edge of research?

A. That's the question. What happens when you get out into the national labs and industry where these people are going to go to work? My guess is that the quality of the search is going to be much more important than the speed and the time restraints. The question then becomes one of, are they willing to be prepared to get into that environment? That's what the educational process is all about.

It mostly focuses on the student or faculty. Which of the primary groups do you have in mind to talk about?

Q. It is directed toward improvement in facilitating new search tools, particularly for the educational process. That is, a student's learning process. Part of that is to prepare them for job occupancy.

P. May I interrupt for a minute? The representative from OSTI just came in. They create tools and are interested in the career of a scientist and how they use these tools.

Q. The question then becomes that students should at least be familiar, when they go into the workplace, with some of the more sophisticated and admittedly more difficult, kind of search tools they have.

A. One of the dangers of student habits and the ease of things like full text database searching is that it only accesses those things that are available in full text. There is information which is not available in full text computer databases and never will be. The American Chemical Society is never going to go back and take the journals from 1912 and put them into a full text database. It is going to be economically prohibitive and some stuff is not that important. If you want to look up the chemistry of thallium aluminate***, you might have to go back there because nobody has done that since.

Could that compete with the Scandipedia*** file already?

I'm not familiar with whether or not they put 1912 back on or not.

For ACS? They've got everything. They're working on everything.

There is an ad that Jack *** says Free from 1878-1879. If you go to their masthead right now. I haven't looked at it.

They say that, but whether they have caught up with these journal titles, they are getting there.

Because you can. You're talking about SciFinder and your search for electronic text. You can bypass SciFinder and go to the ACS publications site and search all the ACS journals right there. I know they have full text.

I think the issue of old stuff is going to be ... some go back pretty far. It seems they are scanning whole pages. The question is if they get to where they can through .pdf pages like that and pull out the text. I guess it is like reading it off a scanner. If they can do that, there

should be no barrier. Five years from now the computers may be able to do that without blinking.

I think that relatively speaking for the student, is how often they have to go to the full text, or how often do they have to that they don't. Obviously, if we have a particular kind of project and ask them to do it, they say, We want to study this, it won't work unless they get the full text. It won't be a simple paper for them to read. I don't think it is necessary for it to be available all the time and for all students. It has to be faculty who pushes them to do certain things. Otherwise, they won't do it. We always can find some paper similar. In general, I don't see the necessity of having full text available all the time.

I see the tendency. When I started using literature in say a Graduate class, I started having a bias on what I selected already about what I just printed electronically. I do it myself without thinking about it. I just click and get it. I have to remember to copy it later in the day.

I would suspect the bottom line, in my judgment, is, and in the Chemical literature I jointly teach, we feel a student must know how to get the full text regardless of where it is. A student must know how to get into the stacks. The student must know the old Library procedures. Maybe someplace in the future, things are going to be more broadly available as full text on the net. They aren't now and I don't foresee them being for x years. You fill in the blank. Students need to know this. When you go into more detail, you are going to have the likelihood of going to more and more obscure journals, which is probably not going to pay to put full text on the net. The American Chemical Society, of course, is an economic thing and they are putting all their journals on there. They aren't going to put or do it right off the cuff, the obscure journals that Elsevier terminated 15 years ago, that may only have had a life of 5-6 years. Those old journals and the information I want, or what I want the students to look at, may be there. So they need to know how to go back in the stacks. It may be lonely, but in this joint endeavor we work in, I make sure they understand the old ways before we turn them loose on the net. I make sure they can get back in the stacks and find them.

Q. Let me mention a comment a student made earlier, "I rely on the express delivery from the Library".

A. Apparently he uses it a lot!

They judge by how much time they have to walk over and not missing their exercise.

Students are very efficient especially in Engineering because they have that kind of mindset. They will avoid, even if they are in the Library, going upstairs to another floor to get it.

Journals that we don't have, they are lucky. They have to use the Library. Otherwise, they pay.

Q. There is a question of what is going to happen. I do think you will find that once they get into the workplace, they are not going to have all the amenities you have in the University. Some do.

A. It depends. If you go to work for Dupont, they are.

If they go to the lab, they may have to pay out of their funds for the document, or pay for their chemical abstract searching, which they do at Oak Ridge.

The National Lab I used, Fermi Lab, has access there. They have a Library open to anybody onsite at no charge, no matter what experiment you are working on.

The economics is an interesting question because one of the things about print journals or books is that once they came into the Library, they were part of the Commonwealth. As things become more digital, more and more costs are associated with them and they become more proprietary. That's a broader philosophical and policy question about what information, who owns information, or who should own information. Which is not part of this thing. To me this is scary that information becomes increasingly proprietary. The idea that the Library is a Commonwealth of information for people when they walk in the doors is decreasing. Somebody is going to make money – Bill Gates or somebody.

There's another facet too in terms of the Library participation. One indicator we have observed is that a lot of times the Library's purchase of these electronic journals is through a consortium or something like that but the faculty and students don't know that. They think it's free on the web.

F. One of the things we were touching on but really didn't get into is that there are basically two kinds of searches. One is browsing to keep up with literature and the other is the indepth search. It sounds to me, from what you are saying, that browsing is more what web search engines deal with and the indepth stuff is what the traditional online database is more concerned with.

Q. In doing that lighter kind of search, there is kind of an issue as to when you have identified one or more articles you want to get and the question is how to get it, how you locate it, where you are going to get access to it, whether it is in a Library or whether you use an electronic medium. Is the process of locating where it is, how you are going to get it, going and obtaining a copy of that ... I was wondering what kind of procedures you use in that kind of research, in that kind of situation, whether there are things that could be done to improve that?

A. I think that when a student discovers a journal article in SciFinder they want, the first thing to do is go to the UT catalogue and see if we have it. If we don't, consult the Inter-Library Loan people, which can be done on the net. An application for it can be made. I do not see right offhand any complication beyond that because Inter-Library Loans, the people have the expertise to ferret it out, once again I must apologize for being provincial, but the American Chemical Society publishes a list of where they get the journals. Your last resort is to get it from them.

I bookmark the list of electronic holdings in our Library and look at it and print it if I want. Anything I can't get that way tends to go in a stack of printed abstracts. Later I will go

through the ones I have checked and get them through Inter-Library Loan or delivered by Library Express. Not that I would walk over.

Q. Physics literature, is that a different kind?

A. I get it off the American Physics Society or Los Alamos or Spiros***. I have been going through an experiment that is in Europe and accessed the website. They have all the PostScript files and .pdf files so I print out what I need.

Q. Is there any way you can think of that this process of linking from what they find in the databases and knowing whether it is available through the Library or not?

A. We have acquired some SFX*** software with the open URL standard. We have to get it up and running and then notify our database of vendors. Unfortunately, SciFinder is not one yet. I think the web based part may be, but.

Q. Web of Science?

A. No. SciFinder has a different kind of linking that we could do but what this will do is identify automatically ... let's say you do a Web of Science search and there is an SFX logo by a citation you are interested in, you can clip on that. A window pops up and says, Oops, you have to go to journal blah-blah. You will go right to the article level. Say it is not available electronically, but here is the link to Inter-Library Loan, and hope at some point it will automatically copy all that stuff over with the citations and all. That's what we are going to work on this summer.

It's interesting looking at the publishers of SFX. None of them are science; none of them cover Elsevier; well, they do but it doesn't work as seamlessly. We have to do something extra to make it work.

Yes – Yes – Right.

We have mentioned something that is frustrating. Look at something and it's not there. You have to open two windows and click, click, click, all the time, all these mistakes. Then it looks like we are there using information in the catalogue. It is natural to bind them together.

What is so interesting when we have students come up to us with references, How do I find these? and they have printed things off a database search. We say, Whoa, you have to use the UT online catalogue. They stand clueless.

They are going to fail that course, right?

We have to put little signs, Click this logo.

I think I was clueless when I was a student doing it the old way too. I don't know if I was clueless about the paper version rather than the electronic version. I learned mostly by doing.

They can't interpret the records they are looking at. They can't figure out what is a Title, a Journal Title, abbreviations.

Q. A concern might be how easy do we want to make it for the student?

A. I think you can make it so easy for the student that they learn nothing. Both their criticality and facility for examining the literature suffers because they become more and more limited to button pushing and have less and less pressure to be creative in their search effort.

I have serious problems with that statement. I think the major point we have to worry about at this University is making sure they get educated in the material they came here to learn. Not necessarily how to go from one place to another on the campus. The major point is that they be able to get to the article as quickly as possible with the least work possible. They can spend their time studying the journal article or textbook that may be online, or sections from somebody else's syllabus or course content, than have them spend 3 hours trying to surf the web. I think we need to keep their mind on the endpoint of the game.

I think this creativity and being able to use the Library is primarily of use to the Librarians. I don't think it encourages the transfers to criticality or scientific thinking. I think it is a verbal linguistic skill rather than a logical, mathematical skill. That's just my theory. I don't think it's going to improve their creativity or criticality to have things easily available. I think they need to be focused on critical thinking skills and evaluating what they are reading.

I disagree. I think it's all part of the educational structure. It's all part of the ability to reason logically, make critical selection, and applies equally to research as it does to browsing around the Library. It is an intellectual skill.

But you can ask them to develop that skill more on reading the content of the article rather than trying to find it in the first place.

It's possible. That's what counts.

When we ask a student to search something, they put in one word and out comes a hundred words. It tends to be discouraging. The page has so much information they don't know what to do. They don't know how to use it or they use it in different ways. Perhaps it would be easier to pop-up something to help them. Tell them what to search but tell them in what method they can use it. Push it toward their eyes so they can see it. Occasionally, I use Help and see what it is. Most of them don't know to look at Help so a pop-up would help them develop critical thinking.

Surfing the web and making them go through all that stuff is not necessarily critical thinking.

It's information gathering.

Sometimes information overload. I think one has to be careful if we are talking about Freshmen and Sophmores or Juniors or Seniors, and Graduate students.

By the time a Senior is starting to use the web, we do get some students from "isolated" places, they should have some critical skills. If not, they are going to be lost anyway.

If this is information overload, how do we overcome that? Otherwise the more you search, the more you get. Perhaps it could show a little bit of a diagram. Sometimes you have to go to History to find out. I think it is part of critical thinking to know how to restrict your information to a certain extent.

You have to know how to filter.

Q. I talked some about this whole issue of indepth searching. In terms of the browsing kind of searching, do you think that the term "Periodical Room" will continue to be important within the Library environment or do you think they will ultimately go, within the next few years, to strictly browsing on the net?

A. This is another version of the full text business. I think as long as the full text is not out there and available on the net, Yes, the Periodical Room is going to be important, even though the students are going to develop a reluctance to go there.

I think that's going to go before the other things because the ones you browse are not the obscure ones that are hard to find. It's the mainstream journals. That's the stuff that is probably already available electronically. I've got 3-4 bookmarks and my students do the same things. Either by email alerts or whatever.

I have a very eclectic set of interests to say the least. There are strange things on the net.

We have 3 different places to go to get Shakespeare Quarterly Online depending on the dates.

These are old projects, but everyone is catching up.

What I find interesting is when I tell a colleague, Look, ACS is putting everything up, and they say, I can't do anything for the minor ***. She is in Biomedical. Biomedical is not grouped into these large publishing conglomerates to where getting electronic access to them is a pain. You have to go to each individual title and publisher.

They are the ones where things lapse. They have switched their access from ITM*** authentication to ITM password. This happened in Gastroenterology over the weekend. Somebody got upset. I got an email Sunday night from a student worker and we got it fixed the next day. Having to deal with the individual publishers on these takes a lot of time.

There are a number of different Societies as well as commercial publishers that do Biomedical stuff.

Q. Let's carry on to other topics. Before I do that, I would like to ask you as researchers a question just to confirm something. When we were doing studies in the 70s, we observed that

scientists tended to, on average, read at least one article from about 13 titles. That seems to have gone up almost double since then. Is that something you have observed?

A. I do it differently and this is a built-in habit. I look at the successive issues of Chemical Abstracts that come out and use the categories I am interested in. I look at Inorganic Chemistry, Radio Chemistry and Bacterial Science. I may come up with one issue in 5 journals because I will read and scan the abstracts. If anything rings a bell, I will go to the journals for more detail. The exact journals to which I go cover a broad span. I have a few journals come to my desk, but that's only three.

Some of the Physics journals are so big.

Some of that is the proliferation of increasingly specialized titles. That's certainly true in Chemistry and Biomedical. ACS and others have started increasing numbers of journals. There are more opportunities. The Physical Review was one thing, and now it's a through E plus Physical Review letters. What used to be 1 is now 5. For someone who is interested in condensed matter, as I am, you can look at several different parts of Physical Review. It depends a little on the nature of your field.

Did you mean read regularly or pick up an article say 6 months or a year? I don't read that many journals regularly but as far as getting articles, it is well over 20 or 30 in any given year.

I don't read any journals. I look at the contents of the journal and pieces of it that I find are pertinent to my work. I don't pick up and read each issue of Inorganic Chemistry and read every article in it.

We can just look and see what is of interest to us. Once we have our professional journal which we read regularly, we don't read that many but the thing is it refers to other things. You climb into the tree.

When I go to each issue of Chemical Abstracts that carry the headings I am interested in. I don't care when it comes from. This gives me coverage of foreign journals. It gives me coverage of obscure journals and regular journals so I can't give you a pattern because that pattern varies.

Q. If I could talk now about electronic journals and the kinds of journal systems you use to get access to the full text of these journals. Are you going strictly to the publishers to do that?

I go right to the American Business Societies through the link from UT and look through Fiscal Review, etc. Just start looking through Nuclear Physics, etc. and go directly to the article.

Q. Do you skip the abstract and go directly to the article?

A. Yes. I go from the title of the article.

I don't. The abstract almost always functions as my intermediary. It is also important to me to go to the Web of Science and see the sources on which the author of a given article has drawn and see if I am familiar with that chain of development in that particular topic and see if I could say, Oh, he left out Popack's*** work. It gets suspect to me. I make suggestions. I make some judgments on the basis of that and the Web of Science is very helpful to me. I can also look and see what the scientific community thought of this paper and see how many times it has been cited.

I'm not addicted to that one as well as SciFinder. I use them for different things and about as often.

Q. Is there some way to link the two? SciFinder and Web of Science?

A. Doing the parallel searching of the abstracts. Subjournals do that. I would love it if they bought one another and merged.

One that pops into my head is Annual Reviews. You pull up an article and off to the side you can link to Web of Science and pull up related articles. I have seen that link in some journals.

Web of Science does not give us hard copies in the sense of linking. We have to bookmark it and then I know what journals and what articles I want to see.

Your idea of linking SciFinder and Web of Science means you have let somebody else do part of your selection. When I have to do them independent, things occur to me. Where, if they were linked and tied to the logic of the linker, a lot of stuff I do in the literature is serendipitous. I look at one article in the list of abstracts and at the adjacent and say, There's a wonderful research idea there.

I mean I almost never do a keyword or topic search in Web of Science because I don't like that. I like SciFinder for that reason. I spend a lot of time on Web of Science doing just what you are doing – seeing who is citing whom, working on a paper or proposal, making sure you haven't missed anything because SciFinder is not as good as that as going through it all.

SciFinder is not only not as good as that, it does do it all.

It's not as good at finding every thing in every corner.

Its syntax-thing is not as precise as search by citation.

Q. In terms of linkages of citations, how useful do you find the Forward and Backward site of linking – articles that link this particular article as well as articles that the article cites?

A. I love that part. That's where I do what you talked about which is get off on strange tangents and find new things I wasn't looking for.

It's a way of browsing, is it?

Not intentionally, but it happens.

The Forward/Backward technique gives you some confidence that you are not reinventing the wheel. You get to review the history of the project, of the electronic excitation of solid titanium dioxide; you see who did it first. You have the facility of following it through. Unfortunately, we don't, in the literature anymore, chronicle our failures. The older literature did. It was wonderful because it kept you from redoing a lot of things. This saves you redoing a lot of the successful things.

Q. Do you do the related records search?

A. Sometimes.

It's interesting where it ranks them by the numbers of common references. It's another way of finding work in the same area.

Once again, you are dependent on somebody else's logic to help you.

It's a mindless sorting of rank.

Mindless with regard to your frame of reference.

It's a webpage version of what you were talking about. It's able to do the same kind of things like wandering through the stacks and picking up titles except it's more focused because they are not so far afield from what you are looking for.

One advantage is that years ago you used to tell people that when they left the stacks, you could tell whether they were searching because their heads were this way from reading the titles. You don't have to do that anymore.

Q. One of the issues and concerns I want to look into is the access to Eprints and PrePrints. And, obviously the Los Alamos National Lab system, which, as in Cornell, now was a biggie.

A. It's gotten to the point now, we were in the process of collaboration and I am associated with the publishing of papers. Not only do we need the references, but they have started to put in Heb Phys***, you know, the whole works, as much as PRL*** and Nuclear Physics Journal, that goes there also.

Q. Is this true in Chemistry as well?

A. In PrePrints. Not as much in Physics.

Our major access to materials before they reached the publication stage is in meetings. Conferences and meetings, much more than PrePrints.

Everybody uses the Physics text and most of the journals are two column summations. The PrePrint article is just the one piece of paper and the figures are usually larger in the PrePrint. There are some theorists that started using PrePrints, they just publish it in PrePrint and it never gets published.

I think perhaps the factor that's important to us and maybe to you, is the time factor. You get to the information more quickly as it is reported out in the meeting and you read the abstract of the talk which again is going to be in abstracts and I suppose PrePrint serves Physics in this same way.

Also for our conferences, unfortunately not all of our conferences are on websites, but they tend to be somewhat old. You can't get to them for a year or two. Not only do they have the agenda, but they have started putting up the transparencies themselves. Somebody does a presentation – those transparencies are there on the website and you can access it.

Talking about PrePrints, one of the things I heard someone talk about is one of the reasons PrePrints are so popular in Physics, is that much of the research is done by large-scale projects. The reviewing takes place internally on a lot of this so you have confidence that has built up in terms of the peer review and this kind of thing even though it has not gone through a formal outside external peer review.

All our papers within our collaboration that we are now in the process of analyzing and publishing is that somebody has done an analysis, committees are formed within the collaboration, usually about 4-5 other people along with a Chairman. We have been going through and have been in the process of writing a paper. We have just sent the Chairman of that committee a note saying, Here is all the web material. Here is the paper. Here is the backup material. Do you have any comments? Then it will go out to the collaboration for a full technical review, then a full stylistic review, a review of Is and Ts. Then it will be sent to the PrePrint archive and then to the journal.

Of course it is important to remember that Physics is one of the few fields where the listing of authors is usually greater than the paper itself.

Does that occur in Chemistry?

No. May occur in medicine, I'm not sure.

The PrePrints are circulated. People used to circulate PrePrints and there may be ways you can find them, but articles tend to be published by individuals or small research groups. I've always been a little skeptical of PrePrints because they are not peer reviewed and sometimes it is possibly not quality work. The other thing is the rapid communication in letters. Journals have always been the place if you want things in a hurry.

Another factor is Chemistry journals may be a little less forgiving in publishing something that has already appeared than the Physics journals. They maybe more liberal in their policies. There are some journals that won't accept for publication things that have appeared in PrePrint. I don't know how much of that is a factor.

When you send in your paper to Physical Review, it's still all peer reviewed.

I think I would feel I was back to the issue of filtering. Talking about filtering, I think I would be very frustrated if we had a lot of PrePrint and I had to do the filtering myself. I feel like if it is peer reviewed, its been done for me. We don't have giant committees. Our projects aren't structured that way. We have committees that go through it. I can throw out all kinds of junk to get published for a committee of a student and me.

Q. There has been a slight trend, not a major trend at all, for authors to put up their own websites without going through any journals. They say, I'm well enough now or think I am, where people come to me rather than my being active in getting the materials out. Do you think this is a viable kind of system? For what reasons?

A. No. It's not peer reviewed. All of our internal working pages are password protected so if I want to get to somebody or go to another collaboration's website under "Experiments Website" and go to the internal pages, I can't. One of our collaborations online sort of changed the password every 6 months.

Bernard Shaw's introduction to Saint Joan addresses this issue. "In every intellectual field, the heretics must be suppressed. It is absolutely necessary for human thinking that heresy be made to make its way upstream against opposition." The peer review does this. The person offering the heresy may turn out to be right. Usually they don't, but they may turn out to be right. This is a useful insight and this is why I object to the individualism of an investigator. Good or bad, setting up his or her own site. Setting up shop independently of the scientific community because what makes Science is not individuals doing great things. What makes Science is the check of the community and its interaction and filtration operations so anybody who sets up his own site and says, I'm putting my stuff here if you want to get it, go on.

I think that's a good note to end on actually, this unit of Science.

[Concluding remarks]

[Questionnaires]

4.7. Focus Group #7: Scientists from a national laboratory

ORNL Focus Group #7
October 23, 2001

F Facilitator
Q Question
A Answer
*** Unknown; needs clarification

F. This project is part of a two-year project sponsored by the National Science Foundation. It is part of their National Science Digital Library and that library is actually going to have its premiere the end of this year in early December. It is a wide variety of collections that have been funded by NSF for the past couple of years. The purpose of this particular project is not to create a collection, but to help design better electronic journal systems, so we have been in Phase I the first year, which is just coming to an end.

One thing we have been doing is holding focus groups of faculty and students because this particular project is aimed at designing better journal systems that will help undergraduate science students, particularly physics, chemistry and engineering, and any field of science. It will help make them better users of journals, scholarly journals and digital resources and help design systems that will be good for them.

One of the things I asked you to reflect on in the email I sent was just how did you, if you think back as a college student, did you use journals and how did you use journals? You are really more of a check for the real world of sciences. In other words, one thing is designing the system that helped students and faculty use them, but the other point is how do we get them into habits that will serve them well in their workplace.

How do the folks that are doing the science, how do they interact with information systems? How do you interact with both print and digital information in particular journals and other kinds of information sources as well? What sorts of things do you like about existing electronic journal systems? What kind of things do you dislike?

We are going to lead a fairly informal discussion on a variety of those kinds of topics. I am going to back out here in just a minute and turn the discussion over to our main facilitator. He has run focus groups and been a consultant for many years.

[Introductions, sign forms]

One thing I failed to mention is that we worked with OSTI on this. OSTI is electronic systems and their programming staff is going to help us with Phase II which is to develop, from your input, we are actually going to be testing some specific features in usability tests,

and OSTI has helped with the whole project and particularly with that, in making their systems available and trying things out.

Q. I would like to ask you all now what your experiences are in using journals and whether you continue to rely on your personal subscriptions or going to other sources for the journals that are available to you now rather than relying almost exclusively on personal subscriptions, like you did back in the 60's and 70's?

A. I think that economics make that unfeasible except for the American Institute of Physics Journal, things like that that you get at home. Journals are just too expensive to buy.

Q. One of the things that we observed in the 70's is that the clients averaged about 6 or 7 personal subscriptions to journals and it is down to around 2 now. Is that pretty much what you all have observed?

A. I still get a personal subscription to a journal because I still like to sit down at night and thumb through the Table of Contents, find something cool, and read it at leisure later. I just can't stand to watch screens scroll. I still like to thumb at my own convenience rather than be chained to a computer. I used to have 2 journals, but financially I can't afford it anymore.

Q. The journal that you have is part of a membership to a society?

A. Right, the American Chemical Society. I am an organic chemist so I get the Journal of Organic Chemistry.

Q. Is this the kind of experience the rest of you have had as well?

A. I can't afford it any more, so I rely on the library. As far as I am aware, nobody in our building subscribes.

Q. Are you finding that the migration to electronic journals is a barrier, or are you still relying on the print versions as well?

A. Personally, I use mostly the electronic journals. If your article appeared in the journals, which have an electronic form, it would be highly cited, let's put it that way.

A. Say you look at a journal and it has a lot of references. An organization like APS is funded to archive going back to Issue 1, Page 1. They are hyperlinked to the actual article, so in Physical Review, if I read an article and click on it, I will go to that article, I can print it out and so forth. But, other journals, particularly European journals, only go back 8 years. When you need a hard copy to make a copy, you go to the library.

Q. Has AP gone back all the way electronically? Are they emphasizing the electronic versions or do they have both electronic and print versions they are making available?

A. It is available but it is a growing thing. As they get the articles in, they put it in, and you can watch it and then about the 25th of the month, they will send an email saying it is finished.

Q. If print went totally out of style, would that be a problem for any of you?

A. I like print. I'm sure it's a cultural thing. I still say I like the idea of thumbing through. I'm interested probably in too many things and it's very difficult to do an electronic search in a browsing mode and see things that I want.

Q. Is that a common thing?

A. It really helps if you have a whole rack with magazines, and you just look at them and you can look at them with cross-cutting fields, and it makes it easier to pick something up over here, and say you need something from over there, it is easier to find.

A. This concept is an interesting one. There are actually some new virtual journals which some of the journals have which actually collect articles from a whole range of different journals and link them all electronically so that it's the same kind of thing as "browsing" a whole range of journals in one place. It's also sort of a generational thing. I went back to visit a university a few weeks ago and saw a lot of the graduate students. There were no journals in their offices or anything that they literally felt comfortable sitting at the computer living in this world where they look for things. I personally prefer the paper myself.

Q. Do you find that there is a difference in the effort or the time that is necessary because some of the studies we have done have indicated it takes more time to browse through the electronic versions than it does a paper version. I am talking here about strictly browsing.

A. As a Chemist, sometimes you are making molecules, doing synthetic reactions, and the titles sometimes do not reflect what the articles really are. So you sit there and skim through them. One article, a few months ago, after skimming through it, I found a solution to a problem that we had been working on and would never have thought of this solution.

Q. You mentioned that one of the trends is that you are not subscribing personally to many of these journals, but some of you like to browse the print versions. You must be getting these through the library, is that the current periodicals section? Is that what you are doing for the most part?

A. It is most important to have the research journals in print and if I want a copy of something in a previous year, I would like to have it is my computer to print. Just to look at them.

Q. If you have a current periodical section in the library that is recent, then the journals will suffice?

A. I think you have to go all the way back. Things go in cycles. With the space reactors, they are looking at stuff 10-20 years old. They are looking now at MHTGR reactions, gas cold reactors, etc.

Q. Some of the fields of science are retrospectively getting that information in electronic format but are you saying that in terms of that kind of browsing that you are doing for the older materials that you still would like to have that in bound volumes as opposed to electronic access, if you had electronic access available?

A. In some cases, neither is available.

A. I am not opposed to hard copy of a journal, but one problem is that if you made one copy of an article and then you can put it somewhere and being able to reclaim it 4-5 months later is very poor. Whereas with the electronic journals, you can retrieve the articles if they are in the system. Second thing is that when you refer to a bound article, if you go to the library and there is a bound book about that, if you have an electronic book, a flat book, you can print it out.

Q. Do you find that there is any difficulty as far as the aesthetics of the way in which the articles look electronically? Is that an important aspect of the electronic journals? Some publishers seem to be trying to make those journals electronically just like they do in print. Others don't bother. How important do you think that is?

A. I like having pictures. If you have pictures on the front page of the electronic copy and when you look at those pictures, you know immediately what the articles will be about.

A. There is an enormous saving of space. What was bad about that in the older days was the quality. Then they went and bought some new machines that significantly improved the quality of what you got. It was better than Xerox machines.

A. I don't want to see the electronic get so artsy that I can't print it. Sometimes you get all these different colors and all. I want to be able to get scientific information, but also be able to download and print a black and white article.

A. The electronic journal today seems to be the .pdf format, which seems to be designed for printing the page and have it look like a printed journal. If they are going to go ahead and make the commitment to go electronic so that people like me who are cheap and don't have a huge computer monitor have trouble printing and reading the .pdf files. I have to go to 150 to see it and then I can't get the whole thing on the page.

A. The good thing about electronic format is today people like to use PowerPoint for a presentation. Less and less are using the overhead so what my experience is, I always load electronic journals and sometimes you want to use a picture or article from another journal. If you do that electronically, it is much clearer than scanning or hard copy, and it's easier once you get used to it. I like that very much.

Q. There are a couple of trends that we have observed that are sort of contradictory in a way and I would like to get your sense of what has been happening over the year. One of them is that it appears that the length of the journals, that is, the number of articles in a journal, has been increasing over a period of time. Of course, physics has bombed that out of sight. The other is, it appears that the access to online searching in electronic journals has meant that scientists are now actually getting access to a larger number of journals. In the 70's, a scientist would read maybe 10-13 journals, but now it seems to be well over 20. Does that seem a trend that you have observed as well?

A. Yes. A point was made earlier that use of virtual journals that combine articles from a number of other journals is, in my opinion, very useful. I have found articles that I would never know to have looked for because of that.

Q. Right. Now when you say "virtual journals", do you refer to things like ScienceDirect?

A. The one in particular that I am familiar with is the Virtual Journal of Nanotechnology that combines probably 15 or more journals together.

A. There is an editor from the community who chooses articles from a number of journals and then makes concise linking of all of them. For example, the American Physical Society has several on nanotechnology and things of this nature. You find things you wouldn't have time to look for that way.

Q. When you say "linkages", are you talking about citation linkages?

A. They are hyperlinked to the articles so long as they are within journal families that have the right to cross. That is the problem that we have with some journals that are not society-published.

A. There is the impression that you have journals, and then the electronic journals, and these things are becoming very accessible. But, I want to say that the libraries are dropping not only the hard copies, but also electronic versions just as fast. That is to say, some companies such as Elsevier and others ... they package many journals into a single package and the journal that began it is in hard copy, but the electronic version is not available at ORNL because there is a cost involved and they are dropping electronic versions just as fast.

Q. Are they maintaining the print versions, or are you dropping both?

A. In some cases, with the packages you will get a discount if you have electronic only, and we are going in that direction when we can. Some don't do that and in some cases there is an added fee to have the electronic and the print version. We may get the print and not have the extra money to get the electronic. Publishers are still changing their model as to how to price these things.

A. I thought when I walked into the library that the print versions of journals are decreasing over the years. Every once in a while the library says, "We can't afford all these journals so let us know which ones you use". Other times, we find they have dropped a journal we use

all the time, and we call up and ask them to rescue it. They say, "Can your division kick in some money for this?"

A. Every year I get an email saying they only have so much money for subscriptions, and which ones do we use?

Q. What if the whole journal system went back to the page charges more actively, which would reduce the price of the journals. Would that be a solution that authors would be willing to accept? I don't know if you do authorship, you have had some editing activities and this kind of thing. What would your opinion be on that type of thing?

A. It seems to be a real headache with the American Nuclear Society. They have page charges and are even inclined to go after people to pay their bill. We have problems like, "My project is finished and I published the paper and my grant has ended. I don't have any money." If all of the journals had page charges, it would probably work. There are so few now that people resist paying the page charges.

A. When the genie is out of the bottle, it is hard to put it back in. If you go back, you change some element of the sociology of how science is done and how people publish.

Q. There is one other topic I would like to cover quickly and that is that some of our studies have demonstrated that culturally in universities that scientists tend to follow a particular line of research over a long period of time. They are experts in it and they tend to follow that line of research. But outside of universities, in industry in particular, there is a tendency of changes in direction that are necessary. One was mentioned, of having to go back and look at reactors in space and this kind of thing. Is that generally true here, as well? That sometimes you have to learn about a new specialty and therefore you have to become familiar with new lines of research and that kind of thing? There is an implication of this in terms of the use of the journal literature in the monographs as well. Does that affect the way in which you use a journal literature and what journals should go to?

A. That is what journals should go to, definitely. When I started out I was working as an organic chemist and almost all my projects have moved into polymer chemistry now. Why? There is opportunity there.

A. Journals themselves evolve as well. When I started in atomic physics, atomic collision physics sounded quite big and Physical Review Society is dominated by things that did not exist long ago, so the journals themselves sort of evolved in reflection of the submissions obviously. Journals change over time as well. You can use the same journals even if you switch fields.

Q. It seems to me that when you are in a situation like this, when you have to do some juggling of to the side to learn some new specialties and this kind of thing that it emphasizes the role of the university, which is to learn how to learn. What I would like to do is ask you a little bit about when you were getting your educational processes as to how you were exposed to journals and whether they were part of your course work and that kind of thing. I think that has changed a little over time too.

A. I think that your interaction with journals usually began when you started work on your thesis, because that is when you find out about them. Also, in most universities, the best place to study is always the library. It is quiet, open, well lit, and so this was the old-fashioned way.

Q. Did any of you get a large exposure to the journal literature when you were an undergraduate in any of the fields?

A. We did a little at our school because there actually was a one-credit class that you could take that was a kind of introduction to library science where they made us look up things in journals and made us learn how to use the literature. Then, in your senior year, you typically had to give a seminar on a research topic so they said, "OK, you know how to use the library, give us a seminar on a topic that you know nothing about". This was James Madison University in Virginia.

Q. How about other fields? We are talking mostly about chemistry now. Do you feel even though this is talk about your later stage of your education, that this was a good exposure to get you to learn how to learn and be able to be effective in your research?

A. I had a professor who used a 50's article in his 6010 or 6020 class in physics, and he used it to stump everybody. Back then and to some degree now, it seemed like the method to write was to make it so concise and so difficult that nobody could understand it. You would have these equations saying, "It follows from here that ... such and such." Typically, when you took exams, those of you like special problems, how do you get from here to there? I think journals have improved a little bit. They made it very daunting to read some of the physics articles in the 50's and earlier because they assumed you were like Einstein to read them.

Q. You feel that is changing some? The journals that you read now in your research work, do you feel they would be easier to deal with as undergraduates?

A. I was going to say that the paradigm is different. When I was an undergraduate, I did not have much exposure. In graduate school, when we were talking about a focus subject rather than learning a broad, remedial base of things, I would have a journal day, meaning in the morning I would go to the library and find the chemical or physical abstracts and spend time with a piece of paper writing down the numbers. I am going to submit those numbers to someone standing behind a desk. About an hour later when they bring out some books, I am going to say, "This is not anything I wanted." Now, in the 70's, for a nickel a page, I am going to Xerox these pages. This takes about 4-5 hours. Nowadays, when I visit a university, the undergraduates are able to use Google to find scientific research articles and print them out in 30 seconds. The process is similar intellectually, but it is so much easier that it's very revolutionary. You can have an electronic book that you are teaching astronomy to undergraduates and they can have hyperlinks to actual articles.

Q. Speaking of Google, most of you were more accustomed to the traditional abstracting and indexing databases. Now that we have gone to web search engines, do you feel that is a good thing or a bad thing? Or are both good?

A. I will still go to something like searching Chem Abstracts when I want scientific information because you are only as good as the coverage of that search engine and how good it does. If you miss that key article you could waste a year in the lab on something that has already been done.

Q. What are the other experiences with the traditional A&I databases as opposed to the Googles, Yahoos, etc. and the new search engines?

A. Google tends to give me far too many things that are worthless. Maybe I have not learned to use it well. I do not want Peer Reviews Archival Information.

A. Is it hyperlinked directly to the article? I think Inspec, for example, everything you would want would be there.

A. It is nice but not necessary. Having to sit there and hit another link and then spend a second or two in finding it is insignificant compared to pulling out these things, etc.

A. Science does not search engines similar to what Google offers. For example, to search for some things that appeared in Nuclear Instruments and Methods, there is no search engine.

Q. Is that the general consensus on your attitude about this subject?

A. No, not at all. In computer science, we learn about nuclear jets or what other people are doing basically by talking to others – conferences, workshops, and grapevine. When you want to find specific information, my colleagues and I go to Google first and most of the time I am lucky and get what I want right away. Then having the name of a project or research index. If it is not there, only the citation may be there. Then I go to the library and get the electronic copies.

Q. All of you, I am sure, have the opportunity to observe new entrants to the research here. That is, people who are just coming out of the university as graduates, the masters and Ph.D. levels. Do you sense that they do things differently than you did in terms of this kind of thing then?

A. Nowadays they take to this like fish to water.

A. If it did not happen between 10 years ago and now, to them it never existed. Lots of great organic chemistry was done in the 50's and 60's, but they will never go look. They have never done it before. They have always sat at the computer. They wouldn't look up something in Chem Ed abstracts if you paid them. They've never done it before and nobody ever told them how. They just know they can sit down and type a few keywords and it is instantaneously done for them. If you have to go down the hall, that is work!

A. I think it is a lot in the discipline because in the disciplines I have been in, anything older than 5, maybe even 3 years old, there is no need to look at it. There are a couple of key things like the first article on artificial intelligence.

Q. Do you feel that those articles are not in electronics today?

A. We are doing chemistry now that was done in 1956 because that is the best way of doing it. Just now Chem Abstracts is online and gone back to 1800, but until this year, this was not the case.

A. If you are searching Elsevier Journals, now you only get back to 1993 or something like that.

A. That is because they are not subsidized. The AIP got subsidized and that is why they went back to Vol. 1, Page 1. These are commercial and they are planned to make money.

Q. Are all of you familiar with preprint services like the DOE PrePrint and the Los Alamos Labs systems? Do you use those systems?

A. We use them all the time.

Q. The reason is that it is at the forefront of the research?

A. Yes. Basically we want to get the advantages. It is the preprint and then we can learn some new ideas.

Q. Are you concerned at all by the fact that the preprints aren't reviewed yet? I know some people say when they come out of the labs that so many people have reviewed them within the labs, it really doesn't matter.

A. Well, we know what is right and what is wrong. We have the basic technology. We know it has been reviewed. It is serious work. We watch it all the time, particularly in our areas.

A. I am part of the fuel division of the American Chemical Society and we do all preprints. I happen to be the Chair of the division right now and we are going electronic because it costs us a fortune to publish. The one thing we find is that we were talking about rid of them altogether, but everyone loves them, especially people in the industry. They can publish great data easily, because it's only a preprint. It's not refereed and they don't have to go through all the internal hoops and patent clearances and all that because it is an unrefereed publication. We find that industry loves to do that and we would have no knowledge of this work otherwise.

Q. That's an interesting point.

A. People in academics hate it, because if the unrefereed publication gives them no credit and precludes them from publishing in journals.

Q. What proportion of the articles that come through your preprint service is from industry as opposed to other sources?

A. It depends on funding because we are the fuel division and when coal was king in the 80's, 50-60% was industry. Now it's probably more than 20-30%, but it's just a reflection of funding. We are also going in new directions like fuel cells and all that, and all these small companies are now starting to publish information.

Q. It's kind of interesting because one of the things, as far as the whole scientific communication process is concerned, is something like 76% of science articles are authored by university scientists, but something like 70% of the readers are industry. Just because of the size. Most scientists are in industry or outside of universities and it does seem that there is an opportunity here to begin to get better communication from those readers.

A. We had like 100 standing orders with libraries and most of those are with companies for our preprints.

Q. Do you use preprints, and, if so, how much are you using like Los Alamos? How do you compare it to the journals?

A. I don't think the final answer has been written on preprints. I have been very skeptical, especially from the Ivory Tower. In the last few months, you have heard from AT&T about producing the same graph over and over again in a series of publications, Victor Denoff *** and LVL fabricating data for super heavy elements and those are refereed. I don't mean to make any conclusion, only to state that I think that the final word on preprints has not been made.

A. My experience here has been that the internal review is poor, much more so than someone who is sitting right next to you who gets a journal article. He is going to review it more carefully than internal reviews. When I send things out that is where it gets most of the cut and slice.

A. I think you can determine by whom it comes from whether or not it's good. When I put out a preprint, my name is on it and it's my scientific reputation and career, so I am going to put out a good product, which I think is honest and truthful. But, after a while you learn that some people's data, even in published reviewed journals, you say, "No, I don't think so".

[GAP]

A. From a chemistry standpoint, whether you have a chlorine, bromine and iodine, they are all the same. I can chemically transform them into whatever I want. In the old days, that is 3-4 searches that I would have to do. Now I just draw a structure and say, "Give me something that contains this or looks something like this", and they will present me with a thousand structures. But, I can scroll through a thousand structures in 15 minutes and pick what I want. That's really nice. You pay more for this, for 3-4 searches, but that's a weeks worth of library work I can do in 15 minutes.

Q. How about some of the other disciplines in physics or in materials or some of the other areas? Do you have similar kinds of features in your systems that you find particularly interesting? What are your favorite systems?

A. I like citations. What I found objectionable there was that it's enormously expensive. A single citation was \$1.50 to print out. If I want to see if somebody did some work in some area, but I know that if they had done it, they would have cited this particular paper, so through that paper I was able to find it.

Q. How about different alert services? Are you familiar with those that alert you about new articles that have come out that might be useful in your specialties or disciplines? Do you use any of those, like Table of Contents, for example?

A. I use Current Contents and I have weekly searches emailed to me that have abstracts in 2-3 different areas. I find it is really useful to keep up with because most of my projects are in different areas altogether. There is no overlap.

Q. Would anyone like to comment on any of these issues and what you think the future might be?

A. I have one comment. In the future, you have journals and then you have electronic journals, now there are some journals where the electronic version is simply .pdf of what appeared in the journal, but that's not the way most journals are going. Physical Review, for example. I can write an article for Physical Review and if I have very extensive tables, they will encourage me to put the tables in the electronic version but not the hard copy, so they aren't by any means complete. In our journal, sometimes we get articles that are 400 pages long. We may turn around and say to the author that we will only give you 30 pages, so you put 30 pages in our journal, but 370 is supplementary material in the electronic version. For the journal not to take note of this but just say, "We don't have the money so we are not buying the electronic version, is really short-changing."

A. The American Chemical Society has done that for a while, where you got supplemental material that tells you where you can order it from the masthead.

A. Now it is different. They are putting it in the electronic version. I am saying that libraries have to do both hard copy and electronic. It's taking on a new meaning and new expanded capacity.

Q. Any other comments you would like to make? Do you think scholarly journals are going to be the thing of the future? There are people who say they are going to go out. In out literature, they say by 2005 they won't be around. Does this meet with your expectations? The idea is that it will be in author websites and archives.

A. I don't think that will work because of lack of peer review.

A. No way it will work – the key is peer review.

A. It also blows the whole rating up.

Q. You mentioned peer review but what other things are there that you think are particularly important, or that you liked, in journals? What kind of things do you think should be kept?

A. One thing is review journals. They are very useful. I think I found much relative information over the past year reading those articles.

A. I think even more importantly – review journals importance is growing more, as we are all jumping fields. How do you get into a new field? You find one or two good review articles and then all the links and references from there, and all of a sudden you can talk knowledgeably about something. That's because there have been surveys on how its interest and usage has skyrocketed and it has been credited to the review articles they have in the first few pages.

A. I would also like to say one more thing about the multi-discipline work. That is the electronic books and pamphlets, for example, in different fields are useful and also the glossaries and dictionaries for different fields are good to refer to if they are in the library in electronic form, that's very good.

[Concluding remarks]

5. Questionnaires

5.1. Sample Questionnaire: Scholarly Article Use

SECTION 1—SCHOLARLY ARTICLE USE

1) In the past month (30 days), approximately how many of each of the following types of publications have you read in connection with teaching, research or other work? Reading is defined as going beyond the table of contents, title, and abstract to the body of the piece.

Scholarly or professional journal articles	<input type="text"/>
Trade journals, non-technical magazines, bulletins, newsletters, etc	<input type="text"/>
Scholarly text or professional books	<input type="text"/>
External reports and other formal documents. Other professional materials (e.g., government documents, patents, standards, regulations, conference proceedings, etc.).....	<input type="text"/>
Substantive electronic documents not included above (e.g., listserv, bulletin board, author Web sites, etc.)	<input type="text"/>
Other (Please specify)	<input type="text"/>

2) What is the title of the journal from which you most recently read an article or what was the topic of the article?

Approximate title of journal: _____

OR

General topic of article: _____

3) What is the source of the article you last read?

- Journal, print
- Journal, electronic
- Author's Web site
- Paper Preprint

- Digital e-print archive
- Other (please specify):

4) From this same source (e.g., journal, author's Web site, preprint archive), how many articles did you read in the last year (12 months)?

5) What year was this most recent article published/posted (e.g., 2000, 2001, 2002, etc.)?

6) Had you previously read this article, i.e. is this a re-reading?

- Yes
- No

7) Prior to your first reading of this article, did you know about the information reported or discussed in this article?

- Yes
- No

8) How thoroughly did you read this article?

- With great care
- With attention to the main points, or to find specific information I already knew was in the article/ preprint
- Just to get the idea

9) Please indicate your best estimate of the time in minutes that you spent reading this article the most recent time: minutes

10) In what form was the article when last read?

- Printed journal or book
- Photocopy
- Facsimile copy
- Online computer screen
- Previously downloaded, on computer screen

- Downloaded and printed, paper copy
- Other (please specify):

11) For what purposes have you used, or do you plan to use, the information obtained from the article you last read?

A. Principal Purpose (Choose only one):

- Primary research
- Background research
- Teaching
- Administration
- Writing proposals, reports, article, etc.
- Consulting, advising others
- Internal or external presentations
- Current awareness/keeping up
- Other (please specify):

B. Secondary Purpose(s)--If you read the article for more than one reason, what were your secondary purposes for reading it?
(Choose all that apply):

- Primary research
- Background research
- Teaching
- Administration
- Writing proposals, reports, article, etc.
- Consulting, advising others
- Internal or external presentations
- Current awareness/keeping up
- Other (please specify):

12) In what ways did the reading of the article affect the principal purpose?
(Choose all that apply):

- It improved the result
- It narrowed/ broadened/ changed the focus
- It inspired new thinking/ideas
- It resulted in collaboration/joint research
- It resulted in faster completion
- It resolved technical problems
- It saved time or other resources
- No effect on principal purpose, but was valuable to me
- Other (please specify):
- It wasn't helpful; it wasted my time

13) How important is the information contained in this article to achieving your principal purpose?

- Not at all important
- Somewhat important
- Absolutely essential

SECTION 2—PUBLISHING AND EPRINTS

14) In the past two years, how many articles in refereed journals have you published?

15) In the past two years, how many non-refereed articles have you published in print form, perhaps with electronic versions (e.g. unrefereed conference proceedings, popular or trade magazines, etc.)?

16) Have you ever submitted an article to a preprint service (for example, Cornell/Los Alamos National Laboratory's ArXiv)?

- Yes
- No

17) If yes, how many articles have you submitted?

18) Are you aware of the Department of Energy, Office of Scientific and Technical Information's PubSCIENCE (<http://www.osti.gov/pubscience>)?

- Yes
- No

19) If yes, approximately how many times have you used PubSCIENCE in the last 12 months? times

20) Approximately how many articles did you read as a result of this use?

articles

21) Are you aware of the Department of Energy, Office of Scientific and Technical Information's PrePRINT Network (<http://www.osti.gov/preprint>)?

- Yes
- No

22) If yes, approximately how many times have you used PrePRINT Network in the last 12 months? times

23) Approximately how many articles did you read as a result of this use?

articles

24) Are you aware of the Department of Energy, Office of Scientific and Technical Information's Energy Citations Database (<http://www.osti.gov/energycitations>)?

- Yes
- No

25) If yes, approximately how many times have you used Energy Citations Database in the last 12 months? times

26) Approximately how many articles did you read as a result of this use?

articles

27) How many personal subscriptions to professional journals do you receive, including those obtained as a member of a professional society?

Personal subscriptions are those, which are personally addressed to you at your home, office, or lab.

Subscriptions paid myself

Subscriptions purchased by grant or other source for my personal use

Subscriptions purchased by grant or other source for shared use of my group or department

SECTION 3--DEMOGRAPHICS

Since we are not linking your answers to your identity, please answer these next few questions about yourself.

28) What percentage of your work time do you spend doing the following?
(The total should equal 100%)

%--Teaching

%--Research

%--Service work e.g. assisting visitors, committee service, etc.

%--Preparing proposals, e.g. research and observing time

%--Other (please specify):

29) What is your primary field of study?

(please specify):

30) Please indicate highest degree earned:

BA or BS

MS or MA

PhD or equivalent

31) In what year did you receive your last degree?

32) Sex:

Male

Female

5.2. Questionnaire: Electronic Journal Awareness

SECTION 1--USE OF EPRINT, SEARCH AND AWARENESS SERVICES

Question #1

Of which eprint services are you aware?

arXiv.org (Cornell's eprint archive; formerly hosted by Los Alamos National Laboratory)

Department of Energy's PrePRINT Network}

Other (please specify): _____

Question #2

Over the past year, on average, how many eprints per month do you read from this service?

A. arXiv.org (Cornell's eprint archive; formerly hosted by Los Alamos National Laboratory):

Never used

1-2 eprints per month

3-6 eprints per month (about one a week)

7-10 eprints per month (about two a week)

11-20 eprints per month

One eprint per day or more

B. DOE PrePrint:

Never used

1-2 eprints per month

3-6 eprints per month (about one a week)

7-10 eprints per month (about two a week)

11-20 eprints per month

One eprint per day or more

C. Other:

Never used

1-2 eprints per month

3-6 eprints per month (about one a week)

7-10 eprints per month (about two a week)

11-20 eprints per month

One eprint per day or more

Question #3

Approximately what percent of these eprints did you read by printing out the eprints on paper? _____

Question #4

Have you ever submitted an article to any eprint service?

Yes _____ Which one? _____

No _____

If yes, how many articles have you submitted in the past 24 months? _____

Question #5

When do you generally submit your articles to the eprint service?

_____ Before I submit it to a journal

_____ When submitted to journal

_____ When accepted by a journal

_____ I don't, or don't plan to, publish in a journal any more

Question #6

Which early awareness service(s) are you aware of and use?

_____ PrePrint Alerts (<http://preprints.osti.gov/alertmain.shtml>)

_____ emailed journal table of contents (available for most core journals now)

_____ Other (please specify): _____

SECTION 2--YOUR USE OF SERVICES

This section consists of questions about how you use information services.

Question #7

In your field, how important is rapid awareness of new papers?

_____ 1 not at all important

_____ 2

_____ 3 somewhat important

_____ 4

_____ 5 absolutely important

_____ 6 don't know/ never used

Question #8

What source do you personally use to keep up with recent developments?

_____ Eprint service, e.g. DOE PrePRINT Network

_____ Electronic journal

_____ Paper preprints

_____ Paper journals

_____ Other (please specify): _____

Question #9

Where do you generally go for information older than 2 years?

- Eprint service, e.g. DOE PrePRINT Network
 - Electronic journals
 - Paper preprints
 - Paper Journals
 - Other (please specify):
-

Question #10

In the past two years, how many non-refereed articles have you published in print form, perhaps with electronic versions (e.g. unrefereed conference proceedings, popular or trade magazines, etc.)? Do not include eprints which appear only in electronic form. (e.g. articles submitted to DOE PrePRINT Network). _____

SECTION 3--YOUR OPINIONS

We would like your opinion on the value of the journals and other electronic information services. In answering these questions, please consider how you will be using these services in the future.

Question #11

How valuable is the DOE PrePRINT Network eprint service to you for keeping up with recent work in your field?

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

Question #12

How valuable is the DOE PrePRINT Network eprint service to you for finding information more than two years old?

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

Question #13

How valuable are current awareness services to you?

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

Question #14

How valuable are refereed journals?

A. For current awareness:

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

B. For definitive results:

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

Question #15

In electronic journals how important are the following features to you?

A. Links to references:

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

B. Links to future citations:

- 1 not at all useful
- 2
- 3 somewhat useful
- 4
- 5 absolutely essential
- 6 I do not use this service

C. Machine readable data files:

- 1 not at all useful
- 2
- 3 somewhat useful

- _____ 4
- _____ 5 absolutely essential
- _____ 6 I do not use this service

D. Inclusion of color graphics and photographs:

- _____ 1 not at all useful
- _____ 2
- _____ 3 somewhat useful
- _____ 4
- _____ 5 absolutely essential
- _____ 6 I do not use this service

E. Inclusion of movies and/or sound files:

- _____ 1 not at all useful
- _____ 2
- _____ 3 somewhat useful
- _____ 4
- _____ 5 absolutely essential
- _____ 6 I do not use this service

Question #16

What additional features would make electronic journals more useful to you?
