

ROUTES AND RESOURCES ON THE INFORMATION HORIZON MAP:
UNDERSTANDING UNDERGRADUATE STUDENTS' INFORMATION SEEKING
PATTERNS AND PREFERRED RESOURCES TO ENHANCE
BIBLIOGRAPHIC INSTRUCTION

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This study explains how the process of bibliographic instruction can be enhanced by a new methodology that introduces information horizon maps (IH Maps) as a means of determining students' information seeking behavior through their self-reported illustrations. The analysis of an illustrative sample of maps from undergraduate biology majors uncovered an overall preference for human information providers, whether professors, family members or peers. Although libraries were mentioned resource targets, there was no illustrated or verbal indication of the librarian as a resource; students anticipated its technical resources over its traditional offerings. The author contends that IH Maps provide a base for understanding the student, their environment, and their information needs. Cognizance of these maps as a prelude to bibliographic instruction has great advantages for both parties, and may possibly have merit in other library settings.

Headings:

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Information Horizons

Information Horizon Maps

Information-Seeking Behavior -- undergraduate students

Undergraduate students -- college and academic libraries

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INTRODUCTION

On a typical college campus, stereotypes dictate two foreign parties that both know a lot: students and librarians. Both parties have vast amounts of information, with intellectual and technical abilities to find even more. However, neither party is cognizant of the other's information world beyond modest familiarity, and on their worst day, they could probably do without the other. Regardless, in the beginning of an undergraduate's education, they both have to meet and, traditionally, one does all the talking.

"This is the way you do it" may not work for today's student. He may want to tell or show us how he does it. She may have her own style or process of which librarians are unaware. Students may have cultural, socio-economic, or environmental issues that dictate patterns of inquiry or present a number of obstacles involved with finding or accessing a particular resource; one could be positioned academically or residentially, in an environment that does not facilitate access to needed resources.

In light of these issues, academic librarians should be concerned about choices the students make to satisfy their research needs. Who or what do they find to mold a finished product? Benoit (1998) pointed out that potential information sources exist everywhere, although the value that people assign to these sources is anchored to their personal, perhaps private, knowledge, immediate needs for knowledge, abilities, and

daily influences around them. Information horizon maps can illustrate the student's view of information resources; they are maps of a student's information world. Understanding why students choose certain paths, and what they find useful along them, could be invaluable for information providers and librarians.

Librarians or academics studying information seeking or teaching bibliographic instruction should initially consider how students actually search for information independent of a library's context. They should discover what types of resources whether human, electronic, or other, provide information to support student's academic or professional endeavors. Acquiring this knowledge may be beneficial for librarians and information providers interested in assessing the effectiveness of bibliographic instruction or other information literacy programs. It could alert librarians to the information horizons of a particular community, public or academic, or at least help librarians understand their users' perceptions of valuable resources.

This paper will chronicle the history of bibliographic instruction, explain the concept of information horizon maps, show how they were used to discover the information seeking behavior of undergraduate biology students, report what was discovered, and describe how the findings can further the process of bibliographic instruction in academic libraries.

BACKGROUND

The History of Bibliographic Instruction

Bibliographic instruction (BI), also called library instruction or library user education, can be traced back a century in Academic Research Libraries. Library instruction was originally designed to introduce the entering freshman to the library building and its resources. Then, bibliographic instruction was library specific and library users were taught to use card catalogs and periodicals housed in a particular library. In 1880, the Harvard librarian, Justin Winsor, had written that the college librarian should become "...a teacher, not with a text book, but with a world of books" (Farber, 1999, 171). In the early 1900's, a Bureau of Education survey found one fifth of 446 colleges and universities provided library instruction, which was considered basic and of no significance to the student's overall educational experience (Farber, 1999).

The concept of teaching library users experienced its biggest revival in the 1960s and 1970s. During this period, various teaching and evaluation methods emerged, along with a proliferation of workbooks, instructional materials, and audiovisual aids. Farber (1999) noted that, until this time, the educational role of the college library remained supportive, but passive. Its functions were limited; materials were made accessible and reference questions were answered. Boyce (1987) notes that librarians were perpetually confronted

with students who had little or no understanding of library research and with declining staff resources to fill information needs on a one-to-one basis.

In the late eighties a paradigm shift among academic librarians changed from one of library literacy to information literacy; hence, librarians' instructional role changed. Farber (1999) perceived the recognition of the educational role of librarians as "...a result of the convergence of two developments: one, the widespread success of bibliographic instruction; and two, the impact of electronic sources of information. The first development got librarians recognized by faculty as colleagues who permitted their students to make more effective use of the library and, thus, to do better work, more satisfying for the teacher; the second, the new world of electronic information, has made faculty and administrators aware that *they*, as well as their students, need assistance in sorting through the myriad of available databases so that faculty members can use them in their teaching and research (Farber, 1999, 175)."

Bibliographic Instruction Planning in College and Research Libraries

The ACRL Model Statement of Objectives for Academic Bibliographic Instruction, developed in 1987, was designed to address the needs of various user groups in a college or university setting. The statement gives general directions for librarians to review when examining current instructional programs or developing new ones. The Model Statement is composed of general and terminal objectives divided into four broad areas of concern: how information is identified and defined by experts, how information sources are

structured, how information sources are intellectually accessed by users, and how information sources are physically organized and accessed (ACRL, 1987).

The Model Statement is commonly used as a checklist for assisting and evaluating programs, and functions as a guide for developing new ones. Recommended steps for developing new programs appear below (the first two are particularly applicable to the author's later suggestions for incorporating information horizon maps into bibliographic instruction).

1. Define the user group and the present level of sophistication;
2. Determine the purpose of instruction;
3. Determine which overall sections of the document are relevant to the proposed program;
4. Select the relevant terminal objectives from each section;
5. If needed, create additional sub points to the terminal objectives selected;
6. Develop enabling objectives.

As electronic resources continue to become a part of the library's make up, however, user education will constantly evolve. Now, library literacy has a new meaning; it necessitates computer proficiency, general knowledge of searching databases, and the ability to determine resource relevance and quality. These skills naturally inadvertently explain the change in jargon used in reference to bibliographic instruction. As of late, BI has been most often referred to as user education or user instruction; the terminology lends itself to the marriage of computer and learning in the context of a library's setting. Therefore, it can be easily understood why library literacy and information literacy are easily interchanged concepts in today's academic library.

The term information literacy was first used by the president of the Information Industry Association (IIA), Paul Zurkowski, who in the mid seventies suggested a national goal of achieving information literacy in the following decade (Maughan, 2001). According to Alan Bundy (2001), information literacy enables learners to engage critically with content, extend their investigations, become more self-directed, and assume greater control over their own learning. Information literacy is a prerequisite for lifelong learning; it is common to all disciplines, learning environments, and levels of education.

Shapiro and Hughes (1996) offer that, in its narrowest sense, information literacy includes the practical skills involved in effective use of information technology and information resources, either print or electronic. Information literacy is a new liberal art which extends beyond technical skills and is conceived as critical reflection on the nature of information itself, its technical infrastructure, and its social, cultural and even philosophical context and impact. They add, further, that information literacy encompasses seven dimensions that include tool literacy, the ability to use print and electronic resources including software; resource literacy, the ability to understand the form, format, location and access methods of information resources; and social-structural literacy, knowledge of how information is socially situated and produced, including understanding the scholarly publishing process. The remaining dimensions include research literacy, the ability to understand and use information technology tools to carry out research including discipline-related software; publishing literacy, the ability to produce a text or multimedia report of the results of research; emerging technology

literacy, the ability to adapt to, understand, evaluate and make use of continually emerging innovations in information technology; and critical literacy, the ability to evaluate critically the intellectual, human and social strengths and weaknesses, potentials and limits, benefits and costs of information technology.

To plan an effective user instruction program that incorporates library instruction and instruction for information literacy, this study suggests that the instructor assess the students' current knowledge and information resources prior to instruction. The potential of information horizon maps as an assessment tool is explored here.

RESEARCH QUESTIONS

A primary research question, followed by four others, guided the course of this work. The first asks: *How can cognizance of undergraduate's information horizon maps be useful in shaping bibliographic instruction programs in academic libraries?* The next two questions are methodological: *Is information horizon map creation labor-intensive; since time is a consideration and student anxiety a concern, how can map creation be simplified,* and *Are information horizon maps reliable?* Finally, the last two questions arise in relation to a case study: *As resources, how influential are family members, professors, and friends; if they are valuable resources, what roles do they play, educational or motivational,* and *Is the library a valued resource; is it used for traditional purposes, or is it simply an umbrella resource- housing another desired source, such as a computer?*

RESEARCH METHODS

Overview

Data from an electronic mentoring program will be used as a case study, to illustrate the evaluation and analysis of information horizon maps. Following this brief overview, this chapter will describe the participants, data collection methods, and data analysis in more detail.

The E-Mentoring project (Wildemuth, Sonnenwald, Bollenbacher, Byrd & Harmon, 2001) was one of the components of CELL, the Collaborative Electronic Learning Laboratory. Through E-Mentoring, a mentoring relationship was established and developed over the course of the semester. The idea was to put science students in direct contact with practicing scientists, who would be able to provide guidance through the duration of the semester for a biology class, and also give advice on career development. Interaction between the two parties (i.e., mentor and student) was a requirement for the course and had an unusual, but predictable element; it would be a relationship virtually maintained through the Internet. It would also require that both mentors and students communicate with someone who was of a different race, socio-economic background, age group, and, possibly, gender. In addition, a web site was designed to facilitate conversation among students, mentors, faculty, and web site facilitators.

For research purposes, participants in the pilot semesters completed surveys and were interviewed before and after the program. Pre-program interviews and surveys explored information needs, previous experience with mentoring programs, and expectations for the E-Mentoring program. Similarly, post-program surveys offered participants the opportunity to evaluate their experience and sought to determine the impact of E-Mentoring (Webster, L., Brassell, E. Sonnenwald, D. H., Wildemuth, B. M., Harmon, G.L., Byrd, G., & Bollenbacher, W. E., 2000). Like the pre-semester interview process, post-semester oral interviews and their corresponding information horizon maps were analyzed to discover students' information seeking behavior in academic and career related contexts. For this paper, the author focuses on findings based on academically related information seeking situations.

The data presented in this paper stems from the student post-program interview where information was elicited about the students' information horizons (Sonnenwald, Wildemuth & Harmon, 2001). Students were asked to sketch out information resources they sought when working on a class-related project or assignment. They were asked to place themselves on the map they were creating and to indicate, through distance, the order in which they consulted the resources. They were encouraged to recite their information seeking paths while drawing the map, indicating the order in which they consulted the resource, while they revealed which resources referred them to other sources for information.

As illustrated in Sonnenwald, Wildemuth, and Harmon (2001), the data analysis involved assigning numbers to the designated resources on each completed information horizon map first, based on the distance resources were drawn from one another and second on the oral interview data when discerning the distance between resources on the map proved difficult. Once resources were assigned preference orders they were organized on a matrix, so one could easily view how the collective group prioritized information sources in a particular information-seeking context.

Participants

The first pilot study of *E-Mentoring: Electronic Mentoring for Tomorrow's Scientists* started in the fall semester of 1999. 11 undergraduate biology students from Rural University* and 9 corporate research scientists from Company One* participated (Sonnenwald, D. H., Wildemuth, B. and Harmon, G., 2001). The second pilot started in the spring semester of 2000, with 7 graduate biology students from Urban University* and 8 mentors from Company Two*.

The participants of the first pilot, from which this paper is focused, were African-American juniors and seniors enrolled in a course called "Frontiers in Biology," an elective advanced course in undergraduate biology. There were 9 females and 2 males between the ages of 19 and 23 years of age (with a mean age of 21 years of age), and overall self-reported grade averages of B/B+ (Sonnenwald, Wildemuth, and Harmon, 2001).

*Organizational and institutional names have been changed.

Data Collection

The pilot study includes pre and post-program questionnaires and pre and post-program interviews with all participants and mentors (See Wildemuth et. al., 2001, for details on the pilot studies; details on the information horizon interview protocol are available in Sonnenwald, Wildemuth and Harmon, 2001). The data was collected by a team of researchers led by Sonnenwald and Wildemuth. The post-program interviews with the participating students form the basis of this case study. These interviews were designed to evaluate the mentor-student relationships, the technology used to facilitate communication, and their overall experience as participants of the program (See Appendix A). A segment of the interview dealt with information horizons and situational information seeking, where information horizon maps (IH maps) were produced, and the students were asked to tell how they normally sought and acquired information in an academic or work related context. Sonnenwald, Wildemuth & Harmon (2001) explain that the follow-up questions (see questions in Appendix A) were asked to encourage or prompt the participant to provide details about the situation, such as the type of information needed, why it was needed, which information resources they accessed, why and in what order; whether they were satisfied with the outcomes; how the information was used; what they would do similarly the next time; and what they would do differently the next time. Questions 3-6 (Appendix A) were asked to broaden the base of experiences on which the student could draw when creating the information horizon map. Question 7 asked the students to create the map, and they were encouraged to explain the drawing as it was created. They were asked to first draw themselves on the center of a piece of paper; then they were asked to draw the resources they normally sought for

information. The completed maps depicted the information seeker with their network of resources within their situational contexts. The maps included in this analysis are included in Appendix B.

An information horizon map is essentially a drawing of one's information horizons-the resources that provide or direct one on their information seeking path. An information horizon (Sonnenwald, 1999) may consist of a variety of information resources such as: social networks, including colleagues, subject matter experts, reference librarians, information brokers, etc.; documents, including broadcast media, web pages, books, etc.; and/or information retrieval tools, including computer based information retrieval systems, bibliographies, etc. Resources within an individual's information horizon are determined socially and individually.

Data Analysis

The maps were analyzed shortly after each pilot. The maps were initially interpreted independent of their interviews; for clarification, however, most maps required their interviews to insure accurate interpretation, especially for the sake of determining preference order among the resources included on the map. Once the preference order for each resource was determined, the numbers were organized into cells in a matrix, based on a format derived from Sonnenwald, Wildemuth and Harmon (2001). The numbers represented each student's preferences or order of access among the information resources.

RESULTS

The matrix illustrated in Table 1 (also shown in Sonnenwald, D. H., Wildemuth, B., and Harmon, G., 2001) presents the post-semester results from the students participating in the initial pilot study. The matrix categorically and numerically aggregates their resource selection and preference order.

Table 1. Rural University's students' preferences for information resources related to academic information needs.

STUDENTS →	DB	KM	AR	DeK	ME	DoK	JI	DaK	JE	YE	Freq ¹	Freq ²
INFORMATION RESOURCES												
People												
Professor(s)	1,4	2	5	2, 3	1,2			2	1	4	8	3
Dept Head								1			1	2
Co-Workers						5					1	1
E-Mentor		1	2				2		3		4	1
Family			3		1	3			4		4	1
Friends						4	3				2	
Other Students		3								3	2	
Locale												
Resource Center						2					1	1
University Library-Home	2				4	1	2,3		5	2	6	1
University Library-Other	3										1	1
University-Other				4							1	1
Electronic												
Internet or Computer		1,4	1	1	3	1	1,3	3	2	1	9	6
Paper												
Popular Magazines			4								1	

¹ The number of students that included this resource on his/her IH map.

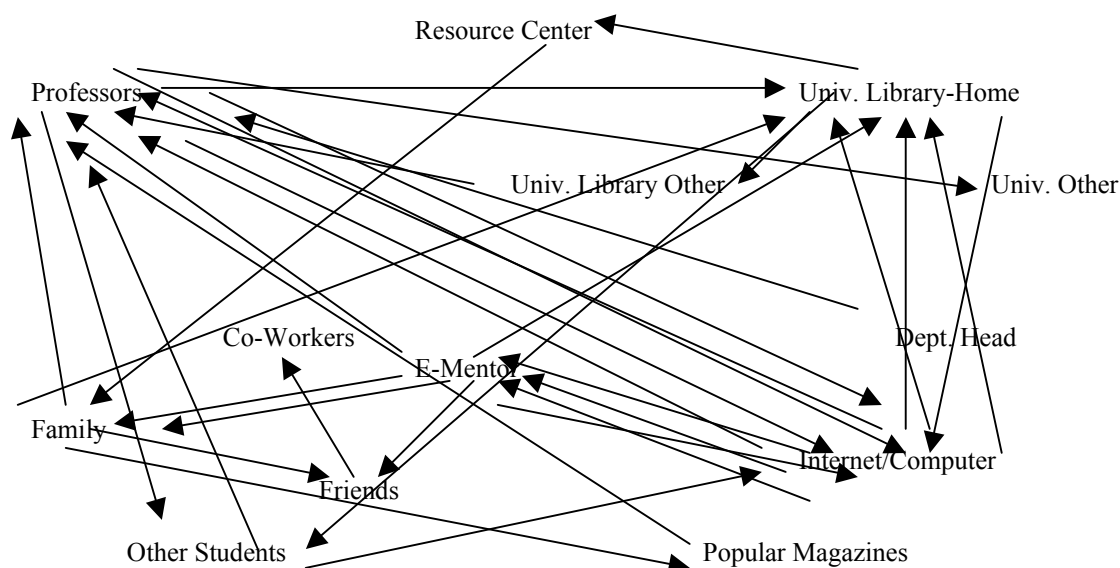
² The number of students selecting this resource as a first choice. Note that several students indicated multiple first-choice resources.

In general, people resources represent a broad category of resources that is very heavily used, and was often a first choice. In addition, the students mentioned a large number of different types of people used as resources. The resources used by at least one third of the students included the Internet or computer (9), their university library (6), their professors (8), their electronic mentor (4) and their family (4).

Some columns present two of the same number, representing different sources, or different numbers, representing the same source, in cases where resources were consulted simultaneously or on a repetitive basis, respectively (see KM).

An alternative representation for a set of IH maps is as a network diagram (Sonnenwald, Wildemuth & Harmon, 2001). The information resources are considered as network nodes, and each student's path among them is drawn as a diverted arc. Such a map from Table 1 is shown in Figure 1.

Figure 1. Network of Information Resources –Rural University, Post-Pilot



DISCUSSION OF CASE STUDY RESULTS

Summary of Findings

The oral interview was an integral part of the interpretation; some maps were truly sketches in comparison to the richness that the accompanying interviews revealed. The combinations of the graphical representations and the oral interviews revealed the value of human resources whether family member, professor or friend.

Although mentioned as a resource, the library was rarely consulted first. It was mostly used as an access point for the computer. Most students tried to find information themselves through use of the computer; when this proved fruitless, they resorted to one or more professors for help. Their behavior created a cycle of repetitiveness for students who initially consulted a professor, were referred to an electronic source, were discouraged by the results, and sought the professor again.

Although the students spoke of using the Internet to find information, they admitted using links mentioned by their professor more than searching independently through use of a search engine. A more detailed discussion of the case study results follows.

Internet/Computer as a Resource

More than half of the students indicated the Internet as a starting point when searching for academically related information. 9 of the 10 participants used it at some point along their information-seeking route. Probable reasons why the Internet is named as a resource of first preference could be due to its popularity, accessibility, efficiency, and in terms of the E-Mentoring project, the only avenue for contacting mentors.

Professors as Resources

Half of the participants (in the post interview) indicated their professors as a resource.

Dawn Kearns*, who starts her research by consulting professors, said:

"I'd go to the head of the department, Dr. Rural, first. It all depends on what I'm looking for. Most likely it'd be laboratory information. And then I'd probably go to Dr. East, to see if he could give me anything to work with or any route to take."

Deon Keys consults professors after searching the Internet. She says:

"...as far as biology questions, I ask, if the Internet doesn't tell me, I ask the professors. And they, you know, they generally know, or if they don't, they'll direct me to someone else."

Denise Bushnell is an example of a student who goes to a professor early in the information seeking process, and then returns at a later point. She says:

"I think I would probably go to my instructor first for either career advice or if I'm doing a research project, to kind of go in the right direction."

She later adds,

"And then I think, after I have all of my information, then I probably would go back to my instructor."

* Pseudonyms replace actual individual participant names.

The University Library as a Resource

Half of the participants said they had used the library in the post pilot, only 1 respondent admitted to using more than one library. One student said:

"I hardly ever go to the library because I can't ever find what I'm looking for. I think the Internet has spoiled people."

She goes on to say:

"I just can never find what I am looking for, I admit. I just hate looking in the library...I'll tell you the Internet has spoiled me. I did not know how to use it when I first got here. I'm used to going to the library. Once I started using it, I did not go to the library any more."

After first consulting an instructor, another Denise Bushnell said:

"Yeah. Next I would probably go to the library, I would say, to do more research...Probably the library here, and then if I don't find anything at the library here, then I'd probably go off campus to another, a new uni-, a university that's near or close by."

Donna Kendrick indicates the library as her first resource below. She sees it as the access point for both the local collection and the Internet resources. She says, when asked what's easy about going to the library:

"Basically, it's like you have your own way, your own will with things. You can, if you've tried to find information on something, you could go to the card catalogue, or you can search, do the Internet now."

Ironically, the librarian was never once mentioned as a sought after point of contact. This is a curious finding since humans were preferred resources, but the librarian was never identified as a member in the body of the student's array of human information providers. What does this mean for the librarian and what does this tell the library

instructor? It might shed light on a relationship that traditionally never developed; librarians during instruction did all of the talking, while the students passively listened.

Family as a Resource

Almost half of the participants considered family members a resource for research related information and one student would consult her mother as a first choice. It is not clear as to whether these members played only supportive or motivational roles or were reliable sources for the desired information.

E-Mentor as a Resource

Less than half indicated their electronic mentor as a resource. Almost all who consulted their mentor did so in the earliest stages of their research processes. Keita Moore said:

“...I went to the, talked to him and I was like, I’m failing or whatever, I don’t know what to do, and he gave me so much, because he’s a...chemist and so he, he just gave me so much, like study things, like just take this. Actual modes into looking at stuff and he’s like, my grade, I mean, boosted it up...”

Expanding more on her relationship with her mentor, Keita continues:

“...I went to him first because I don’t know, I felt more comfortable talking to him than any of my professors or anything.”

Other Students and Friends as Resources

The use of friends and other students as information resources tended to occur if (1) the friend had some pertinent expertise or (2) if the information need was well matched to the relationship. Quotes from Joshua Ingram and Yvonne Early illustrate these situations.

Joshua Ingram said:

"And I would also go to my friends because I have some friends in research that could sort of point me in the right direction, maybe they did something in the lab. Because I remember last year, I had a friend, I was trying to form some plates, didn't really know how to do it. And she was doing it and she basically told me how to do it, gave me pointers and then she wanted to know more about what I was doing, how to use the spectrometer. So I basically, taught her. She taught me what she knew and what I knew."

Yvonne Early says,

"In class, it would be the student, just like, regular old questions about maybe an assignment or something."

DISCUSSION OF METHODOLOGICAL ISSUES

It is worth mentioning, as a prelude to this discussion, the limitations of this study in terms of data collection and possible outcomes. The method detailed above involved the drawing of information horizon maps, augmented with individual interviews. However, time is of the essence for most bibliographic instructors, therefore, the application of these dual methods may not be appropriate for large instruction classes. In addition, the student participants in the case study had in common their ethnic background, socio-cultural norms, economic and environmental situations. Students from different backgrounds may not face the same obstacles, or have the same cultural methods of exchange. Hence, their information seeking experiences, resource selections and preferences may differ.

This section will highlight important methodological issues such as recall dependency, overcoming fabrication, resource layout and design, and noise (i.e. distortion of indicated resources).

Recall Dependency

The ability to create an information horizon map relies heavily on the ability to recall situations within particular searching or researching contexts. Since the creation of the product is dependent on recall, the information provided on the maps may not reveal a complete picture of the user's information seeking behavior or their selected resources. An interviewing style that is open ended and encouraging may provide a remedy for this issue.

For example, the text below shows the interviewer giving directive advice. In this instance the interviewer is giving the student the freedom to express their information seeking behavior, but simplifies the task (for both parties) by suggesting they concentrate on one context first, and then another afterward. In this way, the student is not overwhelmed with complexities of the task, and the researcher acquires complete information.

***Interviewer (Post Interview with Dawn Kearns)** ...If you could, you know, put yourself there and then draw how you typically go about finding information, first for biology or science, and then for career related information.*

In another example, the interviewer allowed the student to explain their behavior while drawing it, aiding the recollection process. In addition, the interviewer assisted her when she was unsure about what to do next.

***Interviewer (Post Interview with Keita Moore)** So, put yourself on it, and what we want you to have on it is anything that you use. And if you could just kind of explain it as you go along.*

Keita Moore: Okay. You mean if like, who I go to first? That's how it was? OK, now...who do I go to first?

Interviewer: Put yourself first.

Overcoming Fabrication

It is imperative that students or library users asked to create information horizon maps understand the purpose of the activity and in particular, why, individually and collectively, their input is valuable. Any perceived judgment or assumed risk of personal evaluation may influence the interviewee to include resources they feel they *should* use, instead of ones they actually *do* use. For example, students might say they use the Internet, when in actuality they may not have any access to a computer at all.

There are a couple of ways to minimize this potential problem. Students may initially hesitate, either because they are trying to recall their actual information seeking strategies or because they may be concerned about perceived credibility of their resources. For this reason, it may be helpful to display charts of "qualified resources" which may include family members, classmates, television, etc. that will allay any fears the students may have about revealing resources that they deem realistic, but that they fear might appear foolish to someone else. Therefore, it may be useful for the interviewer to reveal to the student their own resources they use from day to day in the examples they share to elicit information from the students.

Noise

The oral interviews and their respective information horizon maps are expected to mirror one another; one should tell, and the other should show. Individually and collectively, the two types of data should communicate the same information.

The aforementioned products, the oral interviews and the information horizon maps, could be viewed as communicative tools susceptible to noise. The initial researcher or interviewer who collected the data, had to her advantage the student present, to clarify misunderstandings that pertained to their oral or written admissions. However, the researcher who later interpreted the data did not have the advantage of student presence, which rendered the data less comprehensible. Hence, noise was present in oral interviews and on information horizon maps where elicited information was later determined incomprehensible, illegible, or missing. As a recommendation, the same person who collects the data should conduct the data analysis.

Although as mentioned earlier, clarity of the collective data is important, the comprehensibility of the oral interview will be of primary importance as long as this data is used to clarify or interpret the information horizon map, when the map itself cannot be interpreted independent of the oral interview. For example, Deon Keys' map has a blank resource "box" and Donna Kendrick's map was confusing because she made multiple corrections (see Appendix B).

Resource Layout

Four patterns- linear, scatter, star, and box were discovered in the students' drawings.

The four styles are illustrated in Figures 2-5.

Interviewer's instructions to Denise Bushnell: ...we want everything on here that you would use. And draw it in kind of a map, with things, you know, at different ranges from yourself. So put yourself on it for sure and then what resources you might use.

Figure 2. Example of linear pattern - Denise Bushnell

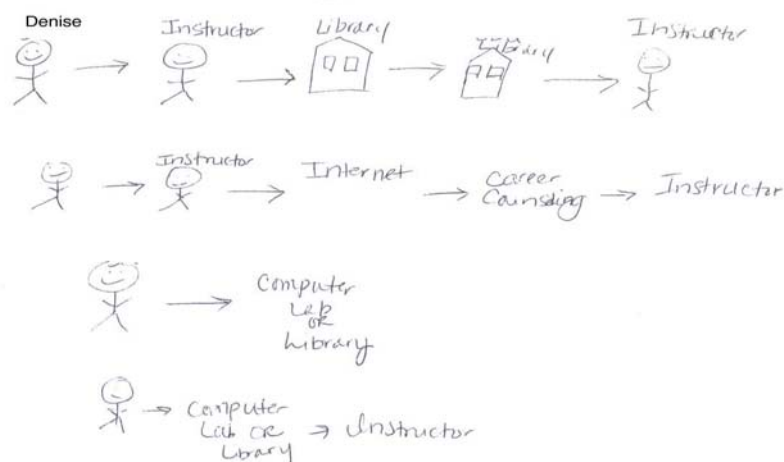


Figure 3. Example of scatter pattern - Yvonne Early

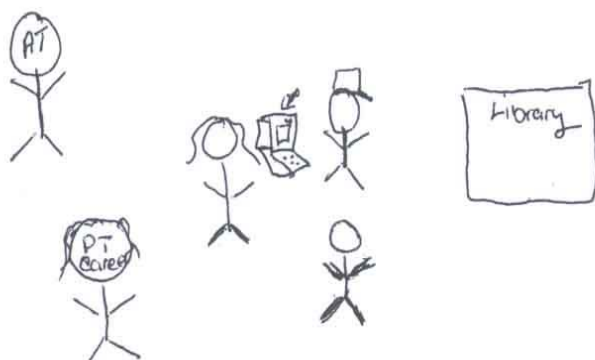


Figure 4. Example of star pattern- Jacki Elkan

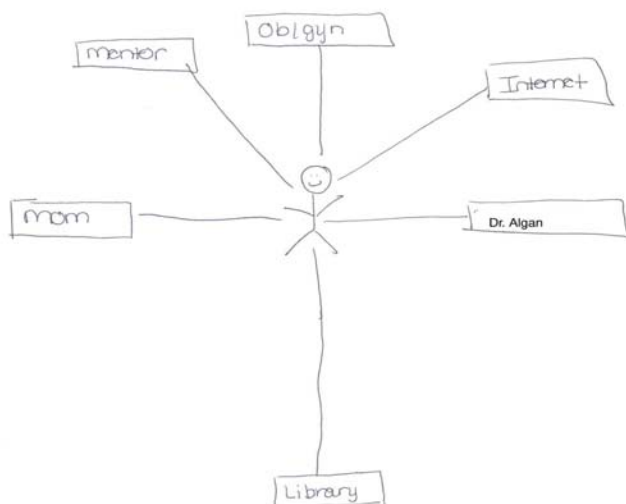
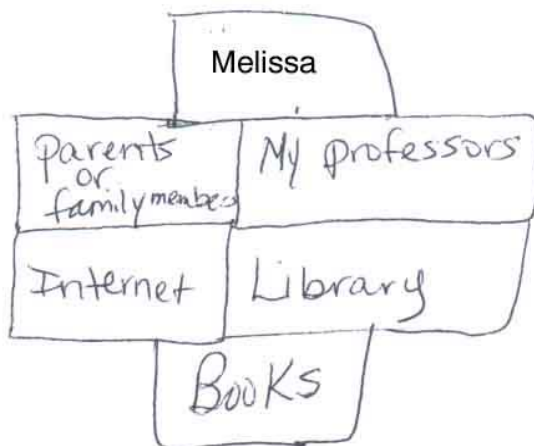


Figure 5. Example of box pattern – Melissa Eckard



Although the positioning of resources was influenced by the interviewer's instructions (in terms of distance from the self), the layout seemed individually and probably subconsciously determined. (It should be noted that students' patterns, or styles of drawing, showed strong intra-student consistency across the pre-semester and post-semester drawings.)

An overwhelming majority of students illustrated themselves and their resources by using geometric shapes and stick figures. All but two, Aimee Richardson and Keita Moore, did not choose this method of design; both used text only in a linear format.

This section highlighted three methodological problems: recall dependency, fabrication, and noise. Recall dependency involves the reliance on memory, and threatens interview accuracy. Fabrication could arise when students feel their own strategies for finding information do not meet some unknown expectation. Noise is a distortion of self-reported information that makes data interpretation difficult. However, these problems can be reduced or eliminated. Recall dependency may be decreased by an interviewer's encouragement or prompting. Fabrication can be avoided by allowing full disclosure to the students of the interviewer's aims, intent, or interest in the information. And, as mentioned earlier, noise can be reduced or avoided if the data collector also functions as the data analyst.

COLLECTING INFORMATION HORIZON MAPS AS PART OF A BIBLIOGRAPHIC INSTRUCTION PROGRAM

This section presents issues to consider during data collection. Resource related issues to be discussed include umbrella resources and their sub-sources, contextual usage of resources, resource roles, and resource weight. Timing, searching zones, and questioning student logic are other issues of discussion.

Collecting the Data

Ask the user group how they normally search for information on a particular topic related to their course. On the map, have them indicate the steps they take to find this information in the library. Depending on how the maps will be used, it might be helpful to ask them to exclude the librarian from their resources in order to understand their independent mental processes in a library setting.

Information horizon maps in the study were drawn in the presence of the interviewer. In some contexts, this situation could produce anxiety in the user comparable to a user too intimidated by the librarian to ask a question, afraid to reveal what he or she does not know. If privacy cannot be offered during the drawing of the maps, a climate that does not resemble a test taking or judgmental environment must be established. Library users should feel free and comfortable to express their natural or learned information-seeking behavior in a library environment.

Students who are instructed to draw an information horizon map may become anxious. The perceived instruction could range from “indicate the resources” to “design the resources.” The participants in this study verbally demonstrated anxiety based on this request. Some admitted or alluded to the fact that they couldn't draw. They drew stick characters (head, arms, legs, and torso) while others simply named the resource inside of a simple geometric shape. Developing symbols representative of a wide array of resources could make it easier for the user to communicate and for the evaluator to interpret. See Appendix C for some examples.

For the sake of clarity, have the participants draw directional arrows from one resource to another indicating starting and ending points or preference order by distance. Unlike concept mapping, information horizon maps do not normally incorporate linking words, but lean on the merits of an oral interview. In concept maps, linking words are a fundamental component; they are the phrases that connect the concepts to form semantic units, and usually include verbs or prepositions (Sherratt, 1990). The linking words “can be,” “contain,” “gets,” “gives,” are an example of words illustrated in the concepts maps studied by Sherratt (1990), that were not used in the case study, but could be useful for interpretational purposes in information horizon maps.

Have the participants indicate with some type of specified symbol, stress points they encounter along their way. These points could be encountered at the reference desk, microfilm reader, or periodical stacks, and may provide teachable material for the library educator; they may demonstrate lack of knowledge in particular areas. In addition,

instruct students to indicate stress free zones (i.e., zones where they previously felt uncomfortable, which they now encounter with greater ease.

If the assessment is administered to a group, remind the students not to confer with one another. Maps should be a representation of the individual's information seeking behavior; every map should present a particular student's information horizon.

Timing

The time considered to draw an IH map was not an expressed concern in the study, but might be an interesting consideration. Could the same map produced in 15 minutes be produced in half the time? Are maps produced in a shorter amount of time more credible than those produced in a lengthier amount of time? Further use of IH maps in different settings and for different purposes may yield additional guidance on timing.

Umbrella Resources and Their Sub Sources

The library and Internet are example of resources that could be considered "umbrella" in nature. Other resources are held within these resources, or can be accessed through them. For an example, the library can serve as an umbrella for a particular periodical, information on microfilm, or a particular reference source, while the Internet can serve as an umbrella for preferred search engines or particular websites. Much is left for the interpreter to imagine or assume if areas within these umbrella terms are not disclosed. An issue of concern is the evaluator's cognizance of the actual resources sought when an umbrella resource is articulated or drawn on an information horizon map.

It is very important to understand what users do or where they go “underneath” these umbrellas. Table 2 presents possible "umbrellas" and resources within their realm. This table also gives an example of how students, during the resource identification process, could indicate where particular resources are found.

Table 2.

Examples of Umbrella Resources

Umbrella Resource	Sub Source
Library Computer Internet	Computer Internet Website

Identifying umbrella resources may also lead to an exploration of where other resources are found, further identified as shown in Table 3. Therefore, one can learn through identification processes, the originally sought resource and the setting where it is most likely found. For the librarian, this is important; if students are not using the library, where are they going, and if they *are* using the library, what resources make it useful? Once the students' "chosen" resources within the context of the academic library are identified, a bibliographic instructor can check these resources against standard reference sources and tools. They may also find answers to the following questions:

What do they already know about accessing resources or using a library? What do they need to know? Are their combinations of sources mutually beneficial for their research? Do their selections represent an efficient selection process?

Table 3.**Resources and Their Context of Use**

Resource	Context
Classmate	Classroom, Library
Journal Article	Library, Home, Internet
Family Member	Home
Encyclopedia	Library
Directory	Library

Distinguish Resource Roles

Participants in the study included resources such as God, mother, or family in a biology research context. Discovering what role these resources play might help the evaluator understand their positioning on the map. Students who first consult their mother or God in a particular academic information-seeking situation may do so because these resources either play supportive or informative roles. However, if the responsibility of conceptualizing role identification will be left to the interviewee, user group appropriateness should be a consideration. One way of understanding resource roles would be to have students indicate what each resource does by the use of action verbs, as shown in Table 4.

Table 4.**Resource Roles**

Resource	Action
God	Motivates
Mom	Encourages
Computer	Informs, Processes
Professor	Informs, Directs, Encourages

Discovering Searching Zones

Although an information horizon may represent the user's body of resources, all resources within the horizon may not always be a part of the user's searching zone. The writer defines a searching zone as a representation of resources searched on a repetitive basis (See DB and KM on Table 1). The zones derived from these search patterns could possibly reveal resources perceived as comfortable. Research to discover how to widen a searching zone may prove beneficial to library professionals.

Questioning the Student's Logic

To the evaluator, some of the presented resources may seem illogical within a given search context. However, "questionable resources" are definitive of the unique quality information horizon maps present. One can only use the resources they are aware of, have access to, or believe provide links to a desired resource. Interactive bibliographic instruction, where students are participating in active learning, may create a line of communication where students can critically think about and explain their logic amongst their peers and the librarian. According to Browne, active learning is more than an

instructor's provoking students to engage with the material. A student experiencing active learning impels himself to consider and evaluate the arguments of both his teacher, peers, and eventually, the arguments of his own construction (Browne, 2000).

Resource Weight

It is important to understand the functionality or weight of particular resources indicated. Of major interest to researchers on this project were not only a user's information horizons, but also the indicated preference orders. Preference order and their perpetual revisiting of particular resources or types of resources, such as people, may be an indicator of the student's perception of a resource's value or weight. Aimee Richardson's and Melissa Eckland's maps (see Appendix B) are heavily weighted with human resources. However, during examination of these maps, the library professional must consider how effective that resource proves to be for the student's research needs.

USING THE ANALYSIS FOR DESIGNING INSTRUCTION

Three Scenarios of Resource Preference

This section will present three possible finding scenarios that may emerge after the IH Maps are analyzed. The three scenarios represent situations in which a large percentage of the instruction group identifies use of a majority of people, electronic or paper resources. Suggestions for how to approach the instruction process based on each of these scenarios are shared.

Scenario I –Preference for People Resources

This scenario refers to one where the user group chooses a majority of human resources to supply their information, such as professors, family, or other students. Based on this scenario, one could make two assumptions-that the group has highly reliable contacts, or that it has limited access to electronic and paper resources. If this preference is discovered, students could be encouraged to share reasons for this preference as a prelude to the instruction session. If a lack of knowledge of other pertinent resources is discovered, the focus of the instruction should be based on other resources the library can offer to assist their research strategies.

Scenario II- Preference for Electronic Resources

The electronic preference scenario refers to users who use mostly technical resources over all others, such as the World Wide Web or electronic databases in lieu of paper or people resources. This finding could indicate either a lack of knowledge in regard to the library collection, difficulty in accessing the library, or a strong attachment to the use of technology.

The instructor will have to use sound judgment based on this finding. The instruction session might start by eliciting from students how they evaluate web content and demonstration of their database searching strategies. In addition, it will help to have them share their reasoning for choosing electronic sources over others. The librarian may discover their lack of knowledge regarding paper sources not available electronically, or problems related to the library and its responsiveness to the students' needs.

Scenario III- Preference for Paper Resources

This scenario may prove to be the most deceptive, and conclusions should not be immediately drawn about the user group or their abilities. One could presume a user group with a high paper resource preference to be unacquainted with the resources available via the web. However, the group could possibly have inadequate access to information technology, or have a strong preference for paper resources over electronically available information. The former situation could apply to economically disadvantaged groups, while the latter may apply to older user groups who trust and are satisfied with paper-based content.

A first step would be to find out why this preference exists. However, care should be used while eliciting the information; shame could be associated with their reasoning in groups such as those in the aforementioned categories. The instructional environment must be considered by the user group to be safe for sharing, which will require instructor perceptiveness and possibly instructor identification with the user group.

The aforementioned scenarios were created to demonstrate possible results based on data analysis. Overall, cognizance of particular resource selections and preferences can stimulate a focus for the instruction process, or identify group curriculum needs.

How Information Horizon Maps Can Enhance the Instruction Process

Information horizon maps add variety, richness, and depth to the instruction process for both the student and bibliographic instructor. In regard to students, they become active learners. They "see themselves" seeking through their own illustrations and re-live their questions or uncertain information seeking situations; this increases their receptivity for learning. In addition, maps set the stage for the session; they are a prelude to a relationship with the librarian, and ultimately reduce library anxiety. They could be used to cultivate an environment of sharing and assistance among the students.

Furthermore, the librarian could reap rewards. IH maps give librarians a starting point. They tell the librarian about the students' information world — what the students know and need to know. They tell how students think about information and its bearers—in particular its bearer's abilities to provide the information in question. Most of all, IH

maps will make each instruction session different; this could mean less boredom or burnout for both parties. Over time, archiving these maps may produce a record of information needs and exchanges.

APPLICATIONS OF MAPS IN OTHER LIBRARY SETTINGS

The emphasis, in this paper, has been on the use of IH maps for planning bibliographic or user instruction in academic libraries. However, IH maps may also prove useful in other settings. Their application in public libraries and school media centers is discussed here.

Community Assessment for Public Libraries

Public librarians are most concerned with understanding and assessing the needs of their community, and information horizon maps may make this possible. They allow librarians to see how citizens of the community find solutions to everyday problems, by understanding what the library users find resourceful, or how the library is meeting their needs. Through this process, they might understand which areas, tools, or collections within the library are most beneficial to the community. On the other hand, librarians can also find out what sources or centers are meeting a community's needs outside of the library. In a public library setting, maps do not necessarily have to be a part of a bibliographic instruction program, but might be better administered during a special program or open house. A new library or a librarian new to the branch or community may find information horizon maps invaluable because they reveal educational, social, and political resources possibly unbeknownst to the library, but vital to the community's citizens.

School Media Centers

The school librarian often lays a foundation by providing the child's first formal introduction to the library. Very often beginning readers are introduced to the library and encouraged to use it, in hopes that their reading skills will be reinforced. However, child readers exist on different levels of comprehension and reading abilities. In addition, some may be more knowledgeable than others of appropriate books, and how to find them. Most likely, by their reading exposure, some will show evidence of parental involvement while others will not. Based on how the data collection is administered, IH maps collected from children can illustrate to the librarian and teacher the child's literary exposure. Questions that elicit who reads to the child, how often they are read to, where they find books, what type of books they enjoy and the like, give educators a large amount of useful information efficiently represented on an IH map.

CONCLUSION

According to Browne (2000), for the lecturer to enhance active learning and critical thinking requires awareness of the fragility of oral communication. A lecturer's presumption that whatever is spoken is internalized in the mind of the learner is grandiose. The assumption seems to be that students are using the energy being conserved physically and expressively to process the ideas or arguments presented by their professor. Herro (2000) proposed that library instructors who implement critical thinking must not only know the information tools, but must also value cognitive developmental theory.

We must then let them be a part of the instruction; bibliographic instruction should possess the interactivity that promotes learning, discovery, and awareness of and for both parties. This study has explored the utility of undergraduate students' information horizon maps as a tool for planning bibliographic instruction that is both interactive and appropriate for the students' learning needs. While this tool needs further development in order to be used routinely, it shows great promise for allowing students a voice in the instruction they receive.

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Appendix A. Information Horizon Map Interview

This appendix includes the basic interview protocol used to collect the information horizon maps. Its use is explained further in Sonnenwald, Wildemuth and Harmon (2001).

1. Could you think about when you recently needed information about biology, or something to do with your major area of study?

- What information or type of information did you need?
- Why? [trying to learn about the context of that information need]
- Who did you go to for help or what resource(s) did you use to find the information you needed?
- What did you do next? [Try to learn about their information seeking process and how they used the information they found (if they successfully resolved their information need.)]
- Were you satisfied with the outcomes? How did you use the information?
- Would you do it this way again (if you needed similar information at a later point in time)? If not, what would you do differently? [trying to learn about if their information seeking process/information horizon changed as a result of this experience.]

2. Could you think about a time when you recently needed information about careers or jobs in biology (or your major area of study)?

Repeat probes from question 1.

3. Could you think about a time when it was particularly difficult to find information you needed?

If the question doesn't work: In general, what type of information is hardest for you to obtain? Why?

Repeat probes from question 1.

4. When it was particularly easy?

If the question doesn't work: In general, what type of information is easiest for to obtain? What makes it easy to get?

Repeat probes from question 1.

5. When looking for information was particularly dissatisfying? I.e., a dissatisfying experience

Repeat probes from question 1.

6. When getting information (finding information you wanted/needed) was very satisfying?

Repeat probes from question 1.

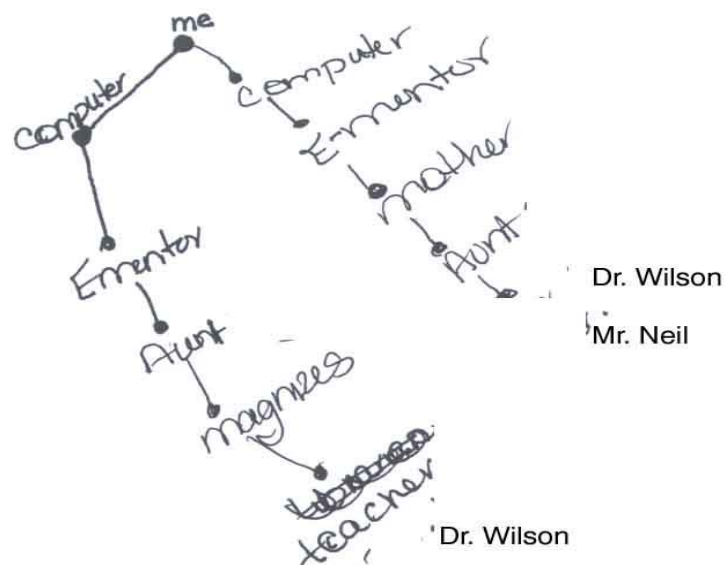
7. [Ask the study participant to draw an information horizon “map” identifying those information resources, including people, they go to for biology and career-related information.] Because I’m a graphically-oriented person, I wonder if you could draw or map out individuals and resources you go to when you need to get information. You mentioned a few individuals and resources earlier. I was wondering if we could develop a picture, or diagram, that identifies most (all?) of the individuals (or types of individuals) and resources (or types of resources) you use and value? [Have study participant put themselves on the sheet of paper and then identify (draw) those resources they must frequently go to and/or most value first. Following are possible prompts to use in this process. Also use information participant told in the previous questions to develop prompts as needed.]

- Who do you prefer to ask when you need information about biology? Would this change depending on the type of information you need? If so, how?
- What resources do you prefer to use when you need information about biology? Would this change depending on the type of information you need? If so, how?
- Repeat for career information.

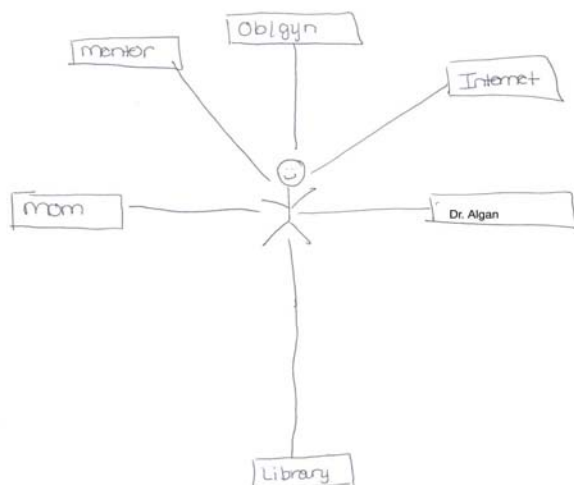
Appendix B. Information Horizon Maps

The maps included here constitute the data set analyzed for the case study described in this paper. They were originally collected from Rural University students by Diane Sonnenwald and Barbara Wildemuth during fall 1999.

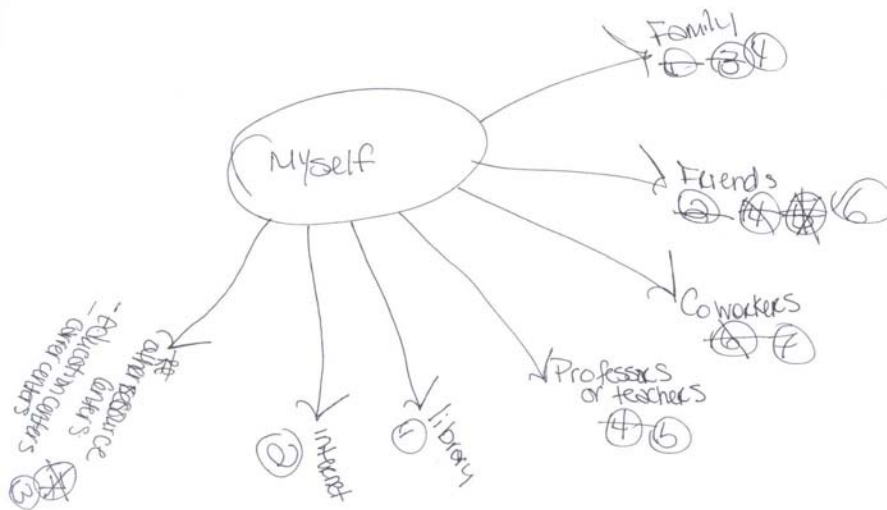
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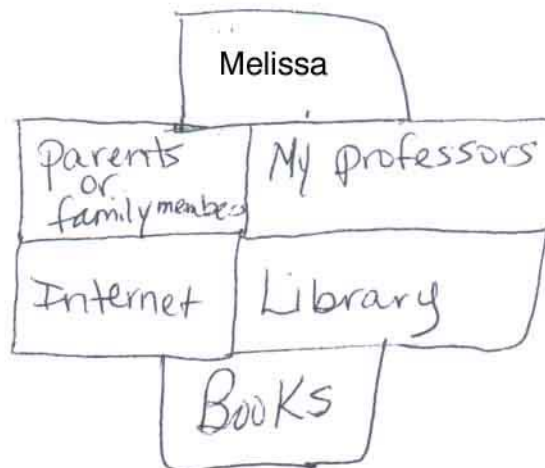
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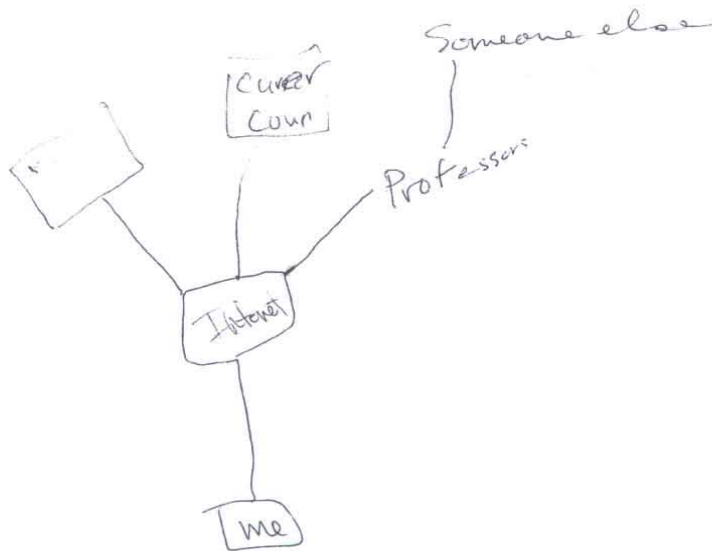
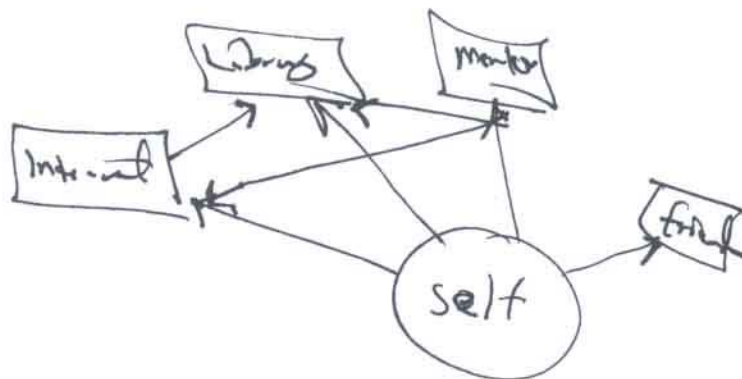


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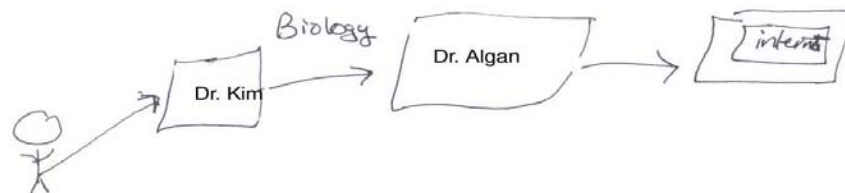
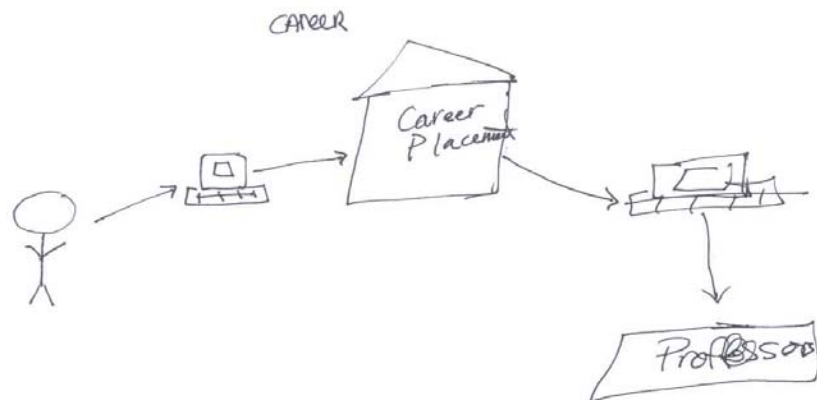


Melissa Eckard

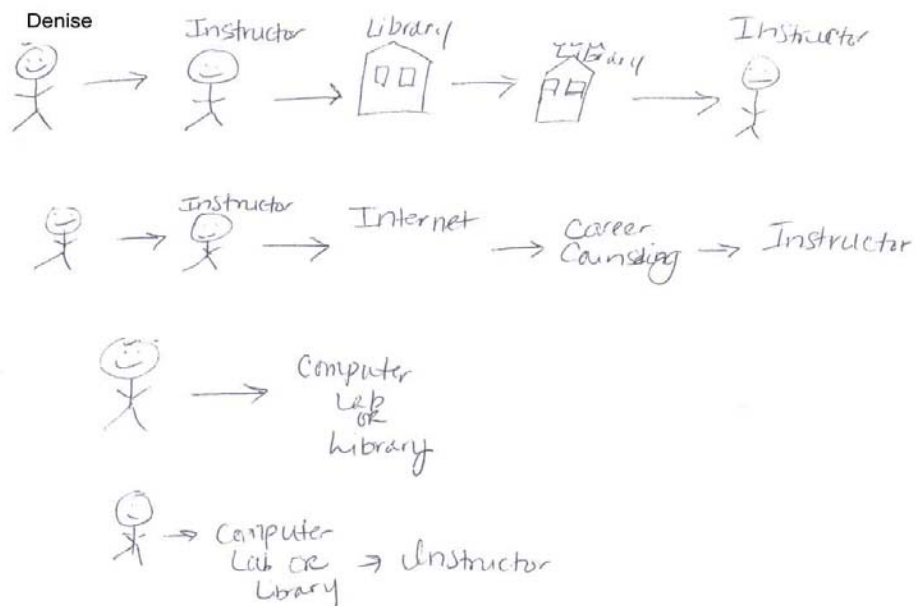


Deon Keyes**Joshua Ingram**

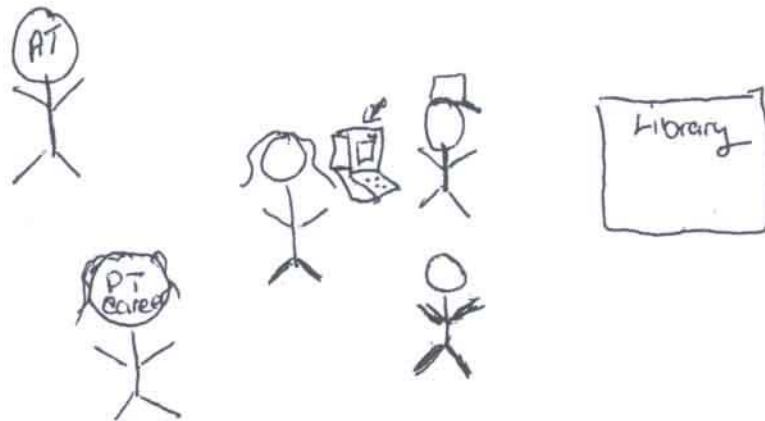
Dawn Kearns



Denise Bushnell

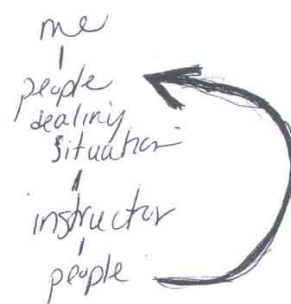


Yvonne Early



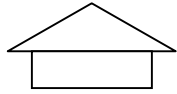
Keita Moore

me
|
mentor
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instructor
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other students
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web



Appendix C. Resource Symbols

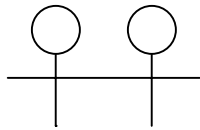
Family



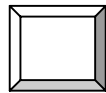
Professors



Classmates



Internet



Library

